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Conclusion should elucidate how the results communicate to the theory presented as the basis of the study and provide a concise explanation of the allegation of the findings.

ACKNOWLEDGEMENT

Provide the list of individuals who contributed in the work and grant details where applicable

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PAKISTAN BIOMEDICAL JOURNAL

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Volume 5, Issue 5 (May 2022)

Cholera Epidemic of 2022

Anna Maria Lavezzi[1]

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Cholera in an intestinal infection caused by Vibrio cholerae. Its symptoms include profuse secretory diarrhea. Cholera can be endemic, epidemic or pandemic. This disease still remains a challenge to the modern world. Although it can be asymptomatic or mild but in severe complications it can cause death within hours due to dehydration. About one in 20 infected people have severe water diarrhea along with vomiting, leading to dehydration. Even the asymptomatic people can spread the infection. Other symptoms include rapid heart rate, loss of skin elasticity, dry mucous membranes, low blood pressure, thirst and muscle cramps.

Precautionary measures include increased water intake and use of boiled water for drinking, washing face, teeth, washing vegetable and fruits, washing utensils. Avoid raw or unpeeled fruits and vegetables, unpasteurized milk, uncooked meat. It is highly treatable disease but hydration is must and maintained. Antibiotics are not used for emergency treatment but it can only reduce the span of disease by half and thus help in further spread of disease [1].

Director General of 'Global Task Force; on cholera control side event in observance of WHA, held of 25th May, 2022 stated that, 'Although cholera was eliminated from the globe north more than 150 years ago, it continues to plague the global south. Cholera is a disease of inequity. Almost exclusively, it affects the communities without adequate water, sanitation and hygiene and those who have been displaced. Despite pandemic, humanitarian crises and natural disasters, the Democratic Republic of Congo, Malawi, Tanzania, Uganda, Yemen, Zambia all conducted preventive campaigns with oral cholera vaccine. Cases and deaths have declined in the recent years but preliminary data for 2021 shows a massive increase in the number of cholera-related death, with an average case fatality rate of 3%. The trend in 2022 remains very concerning, with at least 14 countries experiencing new cholera outbreaks. This is why the work of Global Task Force on Cholera Control is so important' [2].

REFERENCES

[1] https://www.webmd.com/a-to-z-guides/cholera-faq

[2] https://www.who.int/director-general/speeches/detail/director-general-s-opening-remarks-at-the-2022-global-task-force-on-cholera-control-side-event-in-observance-of-wha—-25-may-2022

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Ashwagandha And Its Pharmacological Activity Against Immunity

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As pandemic hit the globe, stress in people increased drastically. Some people were losing their jobs while others were restricted to their homes due to precautionary measures against COVID-19 infection. Some were stressed about their living while others concerned about their families being affected. Many lost their dear ones. But one thing we learnt in this phase was fighting immunity and how immunity plays a vital role in prevention of disease.

Ashwagandha (roots of Withania somnifera, fam. Solanaceae) is named generally as "Indian Winter cherry" or "Indian Ginseng" has been in use for medicinal purposes since more than 3000 years [1]. This herb is one of the main spices of Ayurveda (the customary arrangement of medication in India) consumed since centuries as a Rasayana (rejuvenator) for its larger spectrum of medical advantages. By increasing cell-mediated immunity, Ashwagandha boosts the body's resistance against disease. It also has powerful antioxidant properties, which help to protect cells from free radical damage.

The bitter leaves are used to treat fevers and uncomfortable swellings. Aphrodisiac, astringent, depurative, diuretic and aphrodisiac are all properties of the flowers. It can also help eliminate white spots from the cornea when combined with rock salt and an astringent. Hysteria, anxiety, memory loss, syncope, and other conditions are treated with Ashwagandharishta, which is made from it. It is also consumed for nervous exhaustion, insomnia, neurodegenerative diseases, memory loss [2]. It is also used as anti-inflammation, anti-cancerous, general weakness, impotency and respiratory disorders [3]. A randomized controlled trial has suggested its role in the treatment of anxiety and depression in schizophrenia [4]. Its role in health and healing has also been observed [5]. As studies show its role on immunity so we should consume it in our daily lives for variety of benefits.

REFERENCES

[1] Mandlik Ingawale DS, Namdeo AG. Pharmacological evaluation of Ashwagandha highlighting its healthcare claims, safety, and toxicity aspects. J Diet Suppl. 2021;18(2):183-226. doi: 10.1080/19390211.2020.1741484.

[2] Kuboyama T, Tohda C, Komatsu K. Effects of Ashwagandha (roots of Withania somnifera) on neurodegenerative diseases. Biol Pharm Bull. 2014;37(6):892-7. doi: 10.1248/bpb.b14-00022.

[3] Vashi R, Patel BM, Goyal RK. Keeping abreast about ashwagandha in breast cancer. J Ethnopharmacol. 2021 Apr 6;269:113759. doi: 10.1016/j.jep.2020.113759.

[4] Gannon JM, Brar J, Rai A, Chengappa KNR. Effects of a standardized extract of Withania somnifera (Ashwagandha) on depression and anxiety symptoms in persons with schizophrenia participating in a randomized, placebo-controlled clinical trial. Ann Clin Psychiatry. 2019 May;31(2):123-129.

[5] Joshi VK, Joshi A. Rational use of Ashwagandha in Ayurveda (Traditional Indian Medicine) for health and healing. J Ethnopharmacol. 2021 Aug 10;276:114101. doi: 10.1016/j.jep.2021.114101.

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Diabetes Mellitus: Life Style, Obesity and Insulin Resistance

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In millennia, 40 million people were died with non-communicable diseases and diabetes is one of them. In diabetes, insulin secretions are not produced properly or resist to body and if it is not treated, it might cause death of all the organs. Researchers now seek the other therapies apart from medicinal, to manage diabetes with minimal side-effects and more efficacy. They are experimenting on herbs and therapeutic food that play role in disease or delay the progression of disease. Drugs in these days are very costly and may also have side effects. Different herbs may have a beneficial role in diabetes due to the active components involved in insulin resistance such as 'myoinsoitol'.

Researchers are more interested in lifestyle in recent decades because it is importance for health [1]. People that follow an unhealthy lifestyle are in million. The dominant form of lifestyle that affects the unhealthy lifestyle is alcohol, drug abuse, malnutrition, stress, and unhealthy diet [2]. Unhealthy lifestyle may cause death, illness, disabilities, metabolic disease, cardiovascular diseases (CVD), skeletal diseases, diabetes, and hypertension [3]. The oldest disease known by man is probably diabetes which dates back to 3000 years ago, first reported in Egyptian [4,5]. Type 1 and type 2 diabetes differentiation was made in 1936 [6]. In 1988 type 2 was defined as metabolic syndrome [7]. Defects in insulin secretion or action cause hyperglycemia and this group may cause metabolic disease and form diabetes mellitus. Failure of organs and body dysfunction may be caused by prolonged chronic hyperglycemia. Diabetes may be developed by several pathogenic processes [8]. Insulin resistance may be due to insulin deficiency or abnormalities and the destruction of the cells of the pancreas by an autoimmune disorder. Deficient action of insulin on target tissues may affect the fat carbohydrate and protein metabolism [9].

Deficiency of insulin may cause hyperglycemia by affecting the complex hormonal pathways by unknown mechanisms [10]. Beta cells in the islets of Langerhans of the pancreas produces a hormone 'insulin' which regulates carbohydrate, fats and protein metabolism. Insulin is secreted from beta cells by glucagon but commonly by glucose. Hyperglycemia is caused when the balance of insulin and glucagon is disturbed [11]. In 5-10% subjects diagnosed with type 1 diabetes [12]. The β cells in the pancreas are destructed [13,14].

In most patients, β-cell destruction varies as it may be increasing in some patients while slow in others. In children and adolescent's ketoacidosis is the first stage of this disease. In other patients fasting hyperglycemia converts into a severe stage and in the presence of stress, the ketoacidosis is occurred [15,16]. Most of the patients depend on insulin for survival to prevent ketoacidosis because in these patients β-cell function is sufficient for the prevention of ketoacidosis [17].

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In type 1 diabetes the pathogenesis is still unclear, there is no data on why the auto antibodies against work on islets cells hallmark [18,19]. Type 1 diabetes is most common in children or adolescents. Several environmental factors also cause diabetes apart from genetic predisposition [20,21], including Ljungan virus, viral infection, herpes virus, enterovirus, congenital rubella [22,23]. The autoimmune disease also occurs by different pollutants, low level of vitamin D, childhood infection, prenatal exposure to viruses [24]. These things may be controversial because in recent studies viral infection may cause the type 1 diabetes [25].

In type 2 diabetes, hyperglycemia causes the insulin deficiency and is also known as non-insulin diabetes mellitus. It may be due to genetic, behavioral or environmental risk factors [26-28]. In poor developing countries like Africa, type 2 diabetes increased the morbidity and mortality due to the commonness and late diagnosis of this type of disease [29]. Type 2 diabetes is also associated with genetics and lifestyle. Type 2 diabetes mostly occur genetically as compared to type 1 diabetes [30]. Approximately, there are 90% chances of diabetes occurrence, if in monozygotic twins, one is affected with diabetes. In type 2 diabetes, Maturity Onset Diabetes of the Young (MODY) is also identified in type 2 diabetes, it is not like autoantibodies in type 1 diabetes and it occurs in 25 years of age [31,32]. The genetics of this disease are still unclear as some patients have mutations but never develop the disease, and others will develop clinical symptoms of MODY but have no identifiable mutation [33].

Diabetes may be devasting in the next years due to the obesity because obesity is more prevalent globally and due to this insulin resistance may occur. A lot of medicines are prescribed for the hyperglycemia but it also has so many side effects. There are a lot of nutraceuticals that are helpful in diabetes management and most of the herbs have potential to lower the hyperglycemia and treat diabetes insulin resistance.

REFERENCES

[1] Ziglio E, Currie C, Rasmussen VB. The WHO cross-national study of health behavior in school aged children from 35 countries: findings from 2001–2002. J School Health,2004, 74(6): 204– 206. doi: 10.1111/j.1746-1561.2004.tb07933.x.
[2] WHO Services for prevention and management of genetic disorders and birth defect in developing countries (Farhud DD. As committee member)(WHO/HGN/WAOPB-D/99.1).2001 doi: 10.1159/000016212
[3] Karimi M, Heidarnia A, Ghofranipur F. Effective factors on using medication in aging by using healthy believe. J Arak Med Uni.2010,14(5); 70 78.doi: 10.2147/PPA.S151263.
[4] Ahmed AM. History of diabetes mellitus. Saudi Med J 2002,23(4): 373-378.doi:https://pubmed.ncbi.nlm.nih.gov/11953758/
[5] Lakhtakia R. The history of diabetes mellitus. Sultan Qaboos Univ Med J. 2013,13(3):368-370. doi:10.12816/0003257
[6] Patlak M. New weapons to combat an ancient disease: treating diabetes. FASEB J 2002,16(14):1853. doi/10.1096/fasebj.16.14.1853e.
[7] Maitra A, Abbas AK. Endocrine system. In: Kumar V, Fausto N, AbbasAK (eds). Robbins and Cotran Pathologic basis of disease (7th ed). Philadelphia, Saunders;2005,1156-1226.doi: 10.4236/health.2015.713194.
[8] Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus—present and future perspectives. Nat Rev Endocrinol. 2011,8(4):228-36. doi: 10.1038/nrendo.2011.183.
[9] Das SK, Elbein SC. The Genetic Basis of Type 2 Diabetes. Cellscience. 2006,2(4):100-131. doi: 10.1901/jaba.2006.2-100.
[10] Azevedo M, Alla S. Diabetes in sub-saharan Africa: kenya, mali,mozambique, Nigeria, South Africa and zambia. Int J Diabetes Dev Ctries 2008,28(4):101-108. doi: 10.4103/0973-3930.45268
[11] Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the expert committee on the diagnosis and classification of diabetes mellitus. Diabetes Care. 2003,26 Suppl 1: S5-20. doi: 10.2337/diacare.26.2007.s5.
[12] Genuth S, Alberti KG, Bennett P, Buse J, Defronzo R, et al. Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Follow-up report on the diagnosis of diabetes mellitus. Diabetes Care. 2003,26(11):3160-7. doi: 10.2337/diacare.26.11.3160.
[13] Carpenter MW, Coustan DR. Criteria for screening tests for gestational diabetes. American journal of obstetrics and gynecology. 1982,144(7):768-73. doi: 10.1016/0002-9378(82)90349-0
[14] Kaul K, Tarr JM, Ahmad SI, Kohner EM, Chibber R. Introduction to diabetes mellitus. Diabetes. 2013,1-1. doi: https://doi.org/10.1101/2021.10.11.21264833
[15] Klein BE, Klein R, Moss SE, Cruickshanks KJ. Parental history of diabetes in a population-based study. Diabetes Care.

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1996,19(8):827-30. doi:I: 10.2337/diacare.19.8.827
[16] Maahs DM, West NA, Lawrence JM, Mayer-Davis EJ Endocrinol Metab Clin North Am. 2010, 39(3):481-97. doi: 10.1016/j.ecl.2010.05.011
[17] Daneman D. Type 1 diabetes. Lancet. 2006,367:847–858. doi: 10.1016/S0140-6736(06)68341-4
[18] Devendra D, Liu E, Eisenbarth GS. Type 1 diabetes: recent developments. BMJ. 2004,328:750–754. doil: 10.1136/bmj.328.7442.750
[19] Dabelea D, Mayer-Davis EJ, Saydah S, Imperatore G, Linder B, et al. Prevalence of type 1 and type 2 diabetes among children and adolescents from 2001 to 2009. JAMA. 2014,311:1778–1786. doi: 10.1001/jama.2014.3201
[20] Mellitus D. Diagnosis and classification of diabetes mellitus. Diabetes care. 2005, 28(S37):S5-10.doi: 10.2337/diacare.28.suppl_1.s37
[21] Pradhan AD, Rifai N, Buring JE, Ridker PM: Hemoglobin A1c predicts diabetes but not cardiovascular disease in nondiabetic women. Am J Med 2007,120: 720–727 doi: 10.1016/j.amjmed.2007.03.022
[22] Canivell S, Gomis R. Diagnosis and classification of autoimmune diabetes mellitus. Autoimmun Rev. 2014,13:403–407.doi: 10.1016/j.autrev.2014.01.020
[23] Vermeulen I, Weets I, Asanghanwa M, Ruige J, Van Gaal L, et al. Contribution of antibodies against IA-2β and zinc transporter 8 to classification of diabetes diagnosed under 40 years of age. Diabetes Care. 2011,34:1760–1765. doi: 10.2337/dc10-2268.
[24] Couper J, Donaghue KC. Phases of diabetes in children and adolescents. Pediatr Diabetes. 2009,10 Suppl 12:13–16. doi: 10.1111/j.1399-5448.2009.00574.x.
[25] Ginsberg-Fellner F, Witt ME, Fedun B, Taub F, Dobersen MJ, et al. Diabetes mellitus and autoimmunity in patients with the congenital rubella syndrome. Rev Infect Dis. 1985,7 Suppl 1: S170–S176. doi: 10.1093/clinids/7.supplement_1.s170
[26] Stene LC, Oikarinen S, Hyöty H, Barriga KJ, Norris JM, et al. Enterovirus infection and progression from islet autoimmunity to type 1 diabetes: The Diabetes and Autoimmunity Study in the Young (DAISY) Diabetes. 2010,59:3174–3180. doi: 10.2337/db10-0866
[27] Yeung WC, Rawlinson WD, Craig ME. Enterovirus infection and type 1 diabetes mellitus: systematic review and meta-analysis of observational molecular studies. BMJ. 2011, 342: d35. doi: https://doi.org/10.1136/bmj.d35.
[28] Hyppönen E, Läärä E, Reunanen A, Järvelin MR, Virtanen SM. Intake of vitamin D and risk of type 1 diabetes: a birth-cohort study. Lancet. 2001, 358:1500–1503. doi: 10.1016/S0140-6736(01)06580-1
[29] Knip M, Virtanen SM, Seppä K, Ilonen J, Savilahti E, et al. Dietary intervention in infancy and later signs of beta-cell autoimmunity. N Engl J Med. 2010,363:1900–1908. doi: 10.1056/NEJMoa1004809.
[30] Forlenza GP, Rewers M. The epidemic of type 1 diabetes: what is it telling us? Curr Opin Endocrinol Diabetes Obes. 2011,18:248–251. DOI: 10.1097/MED.0b013e32834872ce
[31] Ferreira RC, Guo H, Coulson RM, Smyth DJ, Pekalski ML, et al. A type I interferon transcriptional signature precedes autoimmunity in children genetically at risk for type 1 diabetes. Diabetes. 2014,63:2538–2550. doi: 10.2337/db13-1777
[32] Richardson SJ, Horwitz MS. Is type 1 diabetes "going viral"? Diabetes. 2014,63:2203–2205. doi: 10.2337/db13-1777
[33] American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care. 2014,37 Suppl 1: S81–S90POSITION STATEMENT| DECEMBER 16 2013. doi: https://doi.org/10.2337/dc14-S081

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Review Article

Bioactive Profile and Health Claims of *Ginkgo biloba*

Muhammad Aqib Saeed[1], Huma Bader Ul Ain[1], Hafiza Nazia Koser[1], Bahisht Rizwan[1], Tabussam Tufail[1]*, Muhammad Abdullah[2], Farrukh Jawad Alvi[1], Asifa Saleem[1], Sahar Imran[1], and Fatima Zahra[1], Habib-Ur-Rehman[1]

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ABSTRACT

Ginkgo biloba also known as 'maidenhair tree' is a therapeutic herbal medicine consumed by people around the globe and is commonly used to treat neurological and cardiovascular disorders as well as neurological illnesses such as Alzheimer's disease, dementia, and cognitive impairment. As it is rich in vitamins and has a number of bioactive compounds which are helpful in treating many health-related issues. This review aims to cover the beneficial side of *Ginkgo biloba* like its pharmacological effects, antidiabetic effects, anti-inflammatory effects, and its role in treating diseases.

INTRODUCTION

Herbal medicines have been utilized for over a thousand years and are one of the most promising sources of new pharmaceuticals. Ginkgo biloba is a living fossil and medicinal herbal medicine that has astounded scientists across the world with its vast array of bioactive chemicals. The name Ginkgo biloba comes from the Japanese word Yin-Kwo, which means silver fruit. The leaves of the Ginkgo biloba plant have a bilobed form, and the shape and veins of the leaves resemble those of the maidenhair fern, hence it's also known as maidenhair tree. The species is often used to treat central nervous system disorders like Alzheimer's disease, dementia, and cognitive impairment [1]. Ginkgo biloba is a living fossil and one of the oldest plants on the planet. The ginkgo tree thrived throughout the Mesozoic era 150 million years ago, and the Ginkgo biloba plant attained its greatest growth during the Jurassic and Cretaceous periods of history [2]. In Asia, Europe, North America, and Argentina, ginkgo trees are now widely planted. Ginkgo leaf extract has been widely utilised in herbal medicine products, food and dietary supplements, botanical and complementary therapies, and has a long history of use in Chinese medicine [3]. The Ginkgo biloba

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plant contains a variety of bioactive chemicals, including terpenoids (ginkgolides and bilobalides), flavonoids (quercetin, kaempferol, isorhamnetin), bioflavonoids (ginkgetin, isoginkgetin, sciadopitysin), and organic acids (ginkgolic acid). Vitamin C, riboflavin, carbs, and other nutrients are found in Ginkgo biloba seeds. Ginkgo nuts are a kind of nut that offers a variety of health advantages, including anti-cancer characteristics and impacts on neurological dysfunction [4]. Ginkgo biloba seeds are a classic delicacy that may be used in a variety of sweets, glazed fruits, and drinks. Using various cooking processes, ginkgo biloba seeds may be converted into hundreds of dishes and sweets. The most popular ginkgo recipes in China include ginkgo stewed chicken, ginkgo steamed egg, and boiled or roasted ginkgo. Because ginkgolic acids might trigger allergic responses, Ginkgo biloba seed nuts should not be consumed on a regular basis. To lessen the toxicity of Ginkgo biloba seed nut, many processing procedures are applied. Boiling, baking, and microwave processing can significantly minimize ginkgo seed nut toxicity [5]. Ginkgo biloba EGb761 extract is commonly used to treat neurological and cardiovascular problems [6]. Ginkgo biloba is the most commonly traded medicinal plant; it was originally grown mostly in China, Japan, and Korea, but it is now widely grown in Europe, America, and temperate New Zealand, Argentina, and India. The last wild Ginkgo biloba tree was discovered in Zhejiang, China, and according to the International Union for Conservation of Nature and Natural Resources, there are just a few wild types of Ginkgo biloba trees extant, making it a rare medicinal plant [7].

Morphology of *Ginkgo biloba* Plant:

The *Ginkgo biloba* plant is sporophytic, means this type of plants don't have chlorophyll and obtains food from dead and decay matter such as fungi. The configuration of *Ginkgo biloba* tree is in ex-current manner and can reach the heights of approximately 30 meters. The branches of Ginkgo biloba trees are unique in that they have both short and dwarf branches that develop at different rates. A dwarf sprout can be several years old and be 2-3 cm in length. Ginkgo biloba leaves are yellow, light, and dark green in hue. The Ginkgo biloba tree has long and short branches with different characteristics; the leaves grow alternately on the long branches and are fan-shaped, lathery, and smooth in appearance in the spring. The *Ginkgo biloba* tree is 30 to 40m long and it is columnar in shape, and the female *Ginkgo biloba* tree produces small oval shape fleshy fruit and its size resembles with small Chinese date, and when this small fruit matures its turns into pale color, and its outer covering is known as sarcotesta [8]. The mature Ginkgo biloba seeds are relatively large in size and immersed in the tissue of the female gametophyte, which is surrounded by a thick seed coat made up of three layers: the first layer is soft and fleshy and is also known as the outer layer, the middle layer is hard and stony, and the inner layer is thin and membranous. outer soft and fleshy layer is known as the ginkgo nut [9]. In comparison to Ginkgo biloba leaves, the ginkgo nut has been widely used for a longer time; It has been used as a food and medicinal all across the world since 1350, when it was first described in herbals [10]. Ginkgo nuts are used as a meal and offer a variety of health advantages, including anticancer characteristics and impacts on neurological dysfunction. Ginkgo biloba seeds are a classic delicacy that may be used in a variety of sweets, glazed fruits, and drinks. Using various cooking processes, ginkgo biloba seeds may be converted into hundreds of dishes and sweets.

Nutritional Profile of Ginkgo Biloba Seeds:

Ginkgo biloba contains many bioactive compounds and constituents but according to different analysis these contents differs slightly.

Ginkgo biloba seeds include nutrients and bioactive substances.	Ginkgo biloba seeds contain what percentage of nutrients and bioactive compounds
Carbohydrates,	Dry weight 35 to 72.6%
Protein,	9 to 13%
Fat	2.4%

Table 1: shows proximate analysis of ginkgo biloba seeds [11, 12]

The most prevalent carbohydrate in Ginkgo biloba seeds is starch. Carbohydrate content in Ginkgo biloba seeds ranges from 35 to 72.6 percent. Ginkgo biloba starch is a resistant starch that takes a long time to breakdown. The proportions of amylose and pectin in different Ginkgo biloba cultivars vary. Standard commercial maize starch is more resistant to pancreatic amylase hydrolysis and acid hydrolysis than starch isolated from ripe Ginkgo biloba seeds [13]. The size of starch granules extracted from ginkgo seed nuts vary depending on harvesting conditions and time. The protein composition of Ginkgo biloba seeds ranges from 9 to 13 percent dry mass, with albumin protein, globulin protein, and salt-soluble protein accounting for the bulk of the protein content, with prolamin, alkali soluble protein, and complex protein accounting for the remainder. Many researches have been undertaken in attempt to modify these proteins' favorable health effects [14] Ginkgo biloba seeds also contain a 13-kDa antifungal protein [15] that inhibits the growth of various fungi, including Candida albicans, Trichoderma reesei, and Fusarium oxysporum, but not Escherichia coli [16]. Antifungal protein from Ginkgo biloba seeds is a high-quality protein with good antioxidant characteristics [17]. Ginkgo biloba seed proteins globulin and albumin have anti-oxidant properties [18]. The antioxidant potential of these proteins is

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influenced by the amino acid residue species, such as sulfhydryl content or antioxidase enzyme activity. G4b protein, a new protein isolated from Ginkgo biloba seeds, has high antioxidant properties and contains sulphur and aromatic amino acids, both of which have antioxidant action [19]. When an amino acid polypeptide chain is enzymatically digested, the protein takes on a variety of biological functions [20]. The enzymes alkali protease and pepsin are used to hydrolyze these antioxidant peptides from Ginkgo biloba seed. These antioxidant peptides have strong free radical scavenging properties and also reduce linoleic acid autooxidation. The bioactivity of ginkgo seed protein has been demonstrated to be good, suggesting that it might be employed as a food additive. Ginkgo biloba seeds also contain Polysaccharides, but according to various reports, these Polysaccharides are uncommon. Ginkgo biloba seeds contain roughly 0.9 percent polysaccharides, which have a molecular weight of about 186kDa and are fully made up of single sugar class D mannose [21]. In 2006, Fan et al. [22] used ultrasonic processing to improve the technology of extracting Polysaccharides from Ginkgo biloba seeds. The Polysaccharides ratio increased 2.0 percent, and the purity rose to 88.7%, using this method. Ginkgo seed polysaccharides have the capacity to induce apoptosis in SMMC-7721 cells. The microvilli of this cell become thinner and the number of microvilli rises after treatment with Ginkgo seed polysaccharide s, and apoptotic bodies form on these spherical cells.

Ginkgo seed oil	Unsaturated fatty acids
Linoleic acid	40.4 to 42.9%
Oleicacid	35 to 36.9%
Palmitic acid	5.7 to 6.7%
Palmitoleic acid	3.2 to 3.9%
Linolenic acid	1.7 to 5.5%
Stearic acid	0.9 to 1.3%

Table 2: Ginkgo seed oil also has a lot of unsaturated fatty acids in it.[23].

Flavonoids present in *Ginkgo biloba* seeds:

Flavonoids are bioactive chemicals found in ginkgo that have anti-inflammatory, anti-tumor, anti-fungal, and neuroprotective effects. When compared to Ginkgo biloba seeds, Gingko biloba leaf extract generally has a flavonoid content of more than 24 percent [24]. Over 70 flavonoids have been discovered to date [26]. Flavonoids have low bioavailability because of low absorption and quick elimination from the body, Flavonoids in glycosidic form is inadequately absorbed in the intestine only in the form of aglycone they are directly absorbed in the intestine [27]. Flavonoids are absorbed and then transported to the liver where they are to conjugated derivatives [28]. Although several investigations have been done on flavonol glycosides from Ginkgo a few studies have proved it may be extracted from the seeds using ultrasonic and flash extractors. [29, 30]. 0.07 percent to 0.2 percent. Biflavones have a variety of medicinal characteristics, including neuroprotective, anticancer, and anti-inflammatory activities [31-34], The neuroprotective effects of biflavonoids on cell death in brain cells caused by oxidative stress and amyloid peptide were examined. Ginkgetin, amentoflavone, and isoginkgetin, all contained in Ginkgo biloba seeds, were found to have a substantial neuroprotective impact against cytotoxic shocks in a study of nine bioflavonoids.

***Ginkgo biloba* phytoconstituents and their potential characteristics**: *Gingko biloba* seed nut contains several bioactive compounds and phytochemicals that exerts beneficial effect on health. These includes terpenoids (ginkgolide and bilobalide), alkyl salicylicacid derivatives (alkyl phenols or alkyl phenolic acids), flavonoids (apigenin, quercetin and kaempferol), ginkgotoxins, plant hormones such as cytokine like components, asparagine and gibberellin [35]. The principal ingredients are ginkgolide A, B, and C, as well as bilobalides. Ginkgolide may be categorised into five forms (Ginkgolide A, B, C, J, and M), all of which have the same molecular geometrical structure but differ in the location of the hydroxyl group [36]. Ginkgolide A, B, and C, as well as bilobalide, have been shown to increase circulatory perfusion, inhibit platelet activating factor, offer neuroprotection, and stimulate cognition. Flavone glycosides may have antioxidant capabilities as well as anti-platelet aggregation properties [37]. The EGb761 is a standardised Ginkgo biloba leaf extract that includes 24 percent flavanol glycosides, 6 percent terpenoids, 5 to 10% organic acids, and other beneficial components for general health. In addition, the Ginkgo leaf contains 6% lactones and 24% flavonoids. Ginkgo biloba's main bioactive ingredients include allylphenols, bioflavonoids, and ginkgolic acids. Ginkgo also includes Ginkgotoxin, which is structurally similar to vitamin B6 [38] Ginkgo toxins are also known as vitamin B6 analogues [39], with 4-pyridoxic acid, pyridoxamine, pyridoxal, pyridoxin (vitamin B6), methyl pyridoxine 5phosphate, and methyl pyridoxine 5 glycosides among the analogues. When the levels of various Ginkgo biloba seeds were measured, it was shown that methyl pyridoxine 5 glycosides are the major component in Ginkgo biloba seeds, accounting for nearly 94 percent of the total vitamin B6 analogues. Ginkgo biloba contains 170 to 404 parts per million of methyl pyridoxine [40]. All of the phyto-constituents found in Ginkgo biloba seed have numerous beneficial properties. They are powerful antioxidants with

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the ability to scavenge free radicals, protecting body organs from oxidative damage and cancer. They are also antifungal, antimicrobial, and anti-inflammatory, protecting organs from harmful microorganisms [41].

Pharmacological Significance of *Gingko biloba:*

Ginkgo biloba has shown to increase the blood circulation specifically in the cerebral area of the brain, it also maintains vascular permeability, improves venous tone, provides relaxation to vascular smooth muscles and prevents them from constriction and thus improve vascular muscle function and blood flow, reduce blood clotting and also maintains blood pressure and decreases the secretion of stress hormones such as cortisol and corticotrophin [42,43]. All of these clinical effects of *Ginkgo biloba* are due to presence several bioactive compounds in it.

Antidiabetic effect of *Ginkgo biloba:* In diabetic mice there is accumulation of free radicals in the body because of increased oxidative stress which can cause oxidative stress and tissue damage *Ginkgo biloba* supplement is both anti-inflammatory and antioxidant abilities [44]. And the diabetic mice fed *Ginkgo biloba* supplement in addition to diet the level of inflammatory factors such as TNFα, interleukin-6, P65 decreases significantly in them this illustrate that the *Ginkgo biloba* supplements have radical scavenging and inflammation reducing properties [45]. The inflammatory factor secretion is important in insulin resistance because of the over secretion of these inflammatory factor TNFα, interleukin-6, P65 this inhibits the insulin receptor tyrosine kinase activity and causes insulin resistance, interleukin-6 is associated with glucose intolerance and type 2 diabetes mellitus [46].

CONCLUSION

Plant-based foods and supplements, botanicals and alternative medicine, cosmetics, and other goods are becoming increasingly popular throughout the world. Ginkgo biloba, sometimes referred to as a living fossil, is used in the three "cals," or cosmetics, nutraceuticals, and medicines (CNP). This tree is described as a "wonder tree with varied purposes" based on its stated uses and medicinal potential. The existence of ginkgolides and other bioactive substances in the tree, particularly its leaves, has demonstrated its efficiency in neuroprotection, cardio protection, and cancer protection; however, long-term usage and negative effects have yet to be studied. As a result, studying the long-term usage of these bioactive, particularly ginkgolides, will be beneficial in determining their mechanisms of protection and, if any, adverse effects. Because the number of Alzheimer's patients is rising, as is the number of patients with other brain disorders, using G. biloba to combat these health issues will be quite beneficial. However, its wild distribution is minimal, and only professionally cultivated trees are accessible. In such cases, it is critical to reintroduce the species to its original environment in order to assure its conservation while still allowing for its beneficial use.

REFERENCES

[1] Chan PC, Q Xia, and Fu P Peter, Ginkgo bilobaleave extract: biological, medicinal, and toxicological effects. J. Environ. Sci. Health C. 2007,25(3): 211-244. doi.org/10.1080/10590500701569414

[2] Kushwaha SK, Sharma CS, Singh HP, Ankalgi A, Ranawat MS, et al. Ginkgo biloba a source of bioactive natural products: a review. Indo Am. J. Pharmaceut. Res. 2014,4(12):5622-9.

[3] Singh B, et al. Biology and chemistry of Ginkgo biloba.Fitoterapia. 2008,79(6): 401-418. doi.org/10.1016/j.fitote.2008.05.007

[4] Youdim K A, and JA Joseph, A possible emerging role of phytochemicals in improving age-related neurological dysfunctions: a multiplicity of effects. Free Radical Biology and Medicine. 2001,30(6): 583-94. doi.org/10.1016/S0891-5849(00)00510-4

[5] Yu YY, Toxic and active compositions and the intervention effect on Alzheimer's disease of ginkgoseeds. Master's thesis, Jiangsu University 2017.

[6] Vellas B, et al. Long-term use of standardized Ginkgo biloba extract for the prevention of Alzheimer's disease (GuidAge): a randomized placebo-controlled trial. Lancet Neurol. 2012,11(10): 851-9.doi:10.1016/S1474-4422(12)70206-5

[7] Jaracz S, et al.Ginkgolides and glycine receptors: a structure-activity relationship study. Chemistry-A European Journal. 2004,10(6): 1507-18. doi.org/10.1002/chem.200305473

[8] Gunkle JE, KV Thimann, and RH Wetmore. Studies of development in long shoots and short shoots of Ginkgo biloba L., part IV. Growth habit, shoot expression and the mechanism of its control. Am J Bot. 1949,36: 309-16.

[9] Prajapati ND, Purohit SS, Sharma AK, Kumar T. A handbook of medicinal plants: A complete source book. InA handbook of medicinal plants: a complete source book 2003,554-554.

[10] Anonymous. Combining nutrients for health benefits. Food Technol. 2001,55: 42-47

[11] 11. Li Y, Hu C. Ginkgo biloba L. 银杏(Yinxing, Baiguo, Ginkgo). InDietary Chinese Herbs 2015,391-402.Springer, Vienna. doi.org/10.1007/978-3-211-

DOI:https://doi.org/10.54393/pbmj.v5i5.460

99448-1_45
[12] Miao M, et al. Structure and functional properties of starches from Chinese ginkgo (Ginkgo biloba L.) nuts. Food research international. 2012,49(1):303-10. doi.org/10.1016/j.foodres.2012.07.038
[13] Spence KE, and J Jane, Chemical and physical properties of ginkgo (Ginkgo biloba) starch. Carbohyd. Polym. 1999,40(4): 261-269. doi.org/10.1016/S0144-8617(99)00059-4
[14] Deng Q, et al. Functional properties of protein isolates, globulin and albumin extracted from Ginkgobiloba seeds. Food Chem. 2011,124: 1458-1465. doi.org/10.1016/j.foodchem.2010.07.108
[15] Wang H and T B Ng, Ginkbilobin, a novel antifungal protein from Ginkgo biloba seeds with sequence similarity to embryo-abundant protein. Biochem. Bioph. Res. Co. 2000, 279:407-411. doi.org/10.1006/bbrc.2000.3929
[16] Sawano Y, et al. Purification, characterization, and molecular gene cloning of an antifungal protein from Ginkgo biloba seeds. Biol. Chem. 2007,388: 273-280. doi.org/10.1515/BC.2007.030
[17] Zhou H, Chen X, Wang C, Ye J, Chen H. Purification and characterization of a novel~ 18 kDa antioxidant protein from Ginkgo biloba seeds. Molecules. 2012, (12):14778-94.
[18] Huang W, et al. Study on separation and purification of protein from ginkgo seed and its antioxidant activity. Scientia Agricultura Sinica. 2004. 37(10):1537-43.
[19] Huang W, et al. Purification and characterization of an antioxidant protein from Ginkgo biloba seeds. Food Res. Int. 2010,43: 86-94 C. doi.org/10.1016/j.foodres.2009.08.015
[20] Wu C, et al. Purification and identification of novel antioxidant peptides from enzymatic hydrolysate of Ginkgo biloba seed proteins. Food Sci. Tech. Res. 2013,19(6):1029-35. doi.org/10.3136/fstr.19.1029
[21] Chen Q, GW Yang, and LG An, Apoptosis of hepatomacells SMMC-7721 induced by Ginkgobiloba seed polysaccharide. World J.Gastroenterol. 2002,8:832-836. doi.org/10.3748%2Fwjg.v8.i5.832
[22] Fan LH, Wang KZ, Cheng B. Effects of Ginkgo biloba extract on lipid peroxidation and apoptosis after spinal cord ischemia/reperfusion in rabbits. Chinese Journal of Traumatology. 2006,9(02):77-81.
[23] Mahadevan S, and Y Park. Multifaceted therapeutic benefits of Ginkgo biloba L.: chemistry, efficacy, safety, and uses. Journal of food science. 2008,73(1): R14-R19. doi.org/10.1111/j.1750-3841.2007. 00597.x
[24] Ma YC, et al. An effective identification and quantification method for Ginkgobiloba flavonol glycosides with targeted evaluation of adulterated products. Phytomedicine. 2016,23: 377-387. doi.org/10.1016/j.phymed.2016.02.003
[25] Jose Abad M, L Miguel Bedoya, and P Bermejo. An update on drug interactions with the herbal medicine Ginkgo biloba. Current drug metabolism. 2010,11(2): 171-81. doi.org/10.2174/138920010791110818
[26] Lin LZ, et al. Chromatographic profiles and identification of new phenolic components of Ginkgo biloba leaves and selected products. Journal of agricultural and food chemistry. 2008,56(15): 6671-9. doi.org/10.1021/jf800488x
[27] Goh LML and PJ Barlow. Flavonoid recovery and stability from Ginkgo biloba subjected to a simulated digestion process. Food Chem. 2004,86:195–202. https://www.infona.pl/resource/bwmeta1.element.elsevier-907aeff3-3332-33fc-a11b-84018c50a323
[28] Mahady GB. Ginkgobiloba for the prevention and treatment of cardiovascular disease: a review of the literature. J. Cardiovasc Nurs 2002,16: 21–32. doi.org/10.1097/00005082-200207000-00004
[29] Zhang QM and MG Gong. Extraction optimization and antioxidant activity of total flavonoids from ginkgonut. Food Sci. Technol. 2014,39:231-234. (InChinese)doi.org/10.3390%2Fmolecules23051167
[30] Meilin W, Chunshan Z, Longsheng C, Shi Z, Fangfang G. Study on the Extraction of total flavonoids from ginkgo leaves by enzyme hydrolysis. Natural Product Research and Development. 2004,16(6):557-60.
[31] Xiong, et al. Ginkgetin exerts growth inhibitory and apoptotic effects on osteosarcoma cells through inhibition of STAT3 andactivationofcaspase-3/9.Oncol. Rep. 2016,35: 1034-1040. doi.org/10.3892/or.2015.4427
[32] Kang JW, et al. Kaempferol and quercetin, components of Ginkgo biloba extract (EGb 761), induce caspase-3-dependent apoptosis in oral cavity cancer cells. Phytotherapy Research. 2010,24(S1): S77-82. doi.org/10.1002/ptr.2913
[33] Baek SH, et al. Ginkgetin blocks constitutive STAT3 activation and induces apoptosis through induction of SHP-1 and PTEN tyrosine phosphatases. Phytother. Res. 2016,30: 567-576. doi.org/10.1002/ptr.5557
[34] You O H, et al. Ginkgetin induces apoptosis via activation of caspase and inhibition of survival genes in PC-3 prostate cancer cells. Bioorg. Med. Chem. Lett. 2013,23: 2692-2695. doi.org/10.1016/j.bmcl.2013.02.080
[35] Yamashita Y, Sugimoto Y, and Fuwa H, Developmental

DOI:https://doi.org/10.54393/pbmj.v5i5.460

changes in properties of ginkgo (GinkgobilobaL.) nut starches. J. Home Econ Japan 41. 1990,723-732. doi.org/10.11428/jhej1987.41.723

[36] Ahlemeyer B, et al. Ginkgolicacids induce neuronaldeath and activate protein phosphatasetype-2C. Eur. J. Pharmacol. 2001,430: 1-7. doi.org/10.1016/S0014-2999(01)01237-7

[37] Mullaicharam AR. A review on evidence-based practice of Ginkgo biloba in brain health. Int. J. Pharmaceut. Chem. Anal. 2013,1:24-30.

[38] Augustin S, et al. Effect of a short-and long-term treatment with Ginkgo biloba extract on amyloid precursor protein levels in a transgenic mouse model relevant to Alzheimer's disease. Arch Biochem Biophys. 2009,481(2):177-1782. doi.org/10.1016/j.abb.2008.10.032

[39] Kobayashi D, et al. Toxicity of 4'-O-methylpyridoxine-5'-glucoside in Ginkgobiloba seeds. Food Chem. 2011,126: 1198-1202. doi.org/10.1016/j.foodchem.2010.12.001

[40] Hori Y, et al. Rapid analysis of4 Omethylpyridoxine in the serum of patients with Ginkgo biloba seed poisoning by ion-pair high-performance liquidchromatography. Biol. Pharm.Bull. 2004,27: 486-491. doi.org/10.1248/bpb.27.486

[41] Heinonen,T., and G Wilhelm, Cross matching observations on toxicological and clinical data for the assessment of toler ability and safety of Ginkgo biloba leaf extract. Toxicology. 2015,327: 95–115. doi.org/10.1016/j.tox.2014.10.013

[42] Houghton PJ. Synergy and polyvalence: paradigms to explain the activity of herbal products. Evaluation of herbal medicinal products. 2009,85:94.

[43] Dugoua JJ, Mills E, Perri D, Koren G. Safety and efficacy of ginkgo (Ginkgo biloba) during pregnancy and lactation. Can J Clin Pharmacol. 2006,13(3):e277-84

[44] Aragno M, et al. Oxidative stress-dependent impairment of cardiac-specific transcription factors in experimental diabetes. Endocrinology. 2006,147(12),5967–5974.doi.org/10.1210/en.2006-0728

[45] Tsiotra P C, C Tsigos, and S A.Raptis. TNF-alpha and leptin inhibit basal andglucose-stimulated insulin secretion and gene transcription in the HIT-T15 pancreatic cells. International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity. 2001,25(7): 1018–1026.doi.org/10.1038/sj.ijo.0801657

[46] Tao W, et al. Regulation effects on abnormal glucose and lipid metabolism of TZQ-F, a new kind of Traditional Chinese Medicine. Journal of Ethnopharmacology, 2010,128(3): 575–582. doi.org/10.1016/j.jep.2010.01.044

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Review Article

Gestational Diabetes and its Therapeutic Nutritional Care

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ABSTRACT

Gestational Diabetes mellitus (GDM) is another type of diabetes that is hyperglycemia that is recognized during pregnancy. It encloses non-diagnosed type 2 diabetes hyperglycemia which appears in pregnancy later. The major aim of this review paper study was to probe that how nutritional intake can be beneficial to overcome a leading community problem for gravid females termed as gestational diabetes. Insulin level management along with healthy eating habits were studied from more than 20 researches to conclude the healthy eating patterns of women in pregnancy suffering with gestational diabetes. Mediterranean diets have a superior role in effect of onset of diabetes mellitus in gravid women. Intake of some seeds like Picralima nitida, root and stems like Nauclea latifolia and leaves like Oxytenanthera abyssinica along with ginger plays a pivotal role as nutritional treatments in gestational diabetes. A number of studies have shown that history of diabetes, nutritional care and adequate insulin management declines the onset of gestational diabetes.

INTRODUCTION

Diabetes is such an endocrine disorder that characterizes hyperglycemia or hypoglycemia that results because of fault in insulin release, insulin action or even both. A long-term hyperglycemia results from defects causing insulin resistances, dysfunction, shutdown of other different organs of body, especially heart, blood vessels, nerves, kidneys and eyes. Hyperglycemia that specifically occurs during pregnancy is termed as Gestational Diabetes [1].

The two main sub types of Diabetes Mellitus (DM) are Type 1 diabetes mellitus (T1DM) and Type 2 diabetes mellitus (T2DM), which result from abnormal insulin secretion (T1DM) or action (T2DM) respectively. GDM is another type of diabetes that is hyperglycemia that is recognized during pregnancy. It encloses non-diagnosed T2DM hyperglycemia which appears in pregnancy later [1]. The insulin resistance ranges from which automatic

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destruction of the beta cells of islets of Langerhans in pancreas leading to insulin deficiency to anomalies that finally concludes into resistance in action capacity of insulin are that kind of several pathogenic processes that plays role in early onset of developmental phases of diabetes [2]. The major indicators of DM esp. hyperglycemia include weight loss polydipsia, polyuria, in some cases with blurred vision and polyphagia. Impaired development and vulnerability to certain bacterial and viral infections may also complement prolong hyperglycemia. Fatal concerns of uncontrolled diabetes are hyperglycemia with ketoacidosis or non-ketotic hyper-osmolar syndrome. Extended problems of diabetes include neuropathy of peripheral nerves with high risk of causing ulcers in the foot, retinopathy with potential loss of vision, nephropathy leading to renal failure; Charcot joints, amputations and autonomic neuropathy causing genitourinary, cardiovascular symptoms, gastrointestinal, and sexual dysfunction. Diabetic patients have an increased occurrence of cerebrovascular, atherosclerotic cardiovascular, arterial, peripheral and diseases. Increased blood pressure and defects in lipoprotein breakdown are often found in people who have diabetes. Majority of cases of diabetes are distributed into two broad pathogenic categories. In first category *i.e.* T1DM, the reason is a complete insufficiency of insulin discharge. Individuals at increased risk of developing this type of diabetes can often be recognized by presence of genetic markers in their serum that cause autoimmune pathological processes generating in the tissues called islets of Langerhans in pancreas. Second, much more predominant category, T2DM, the cause is a combination of opposition to insulin action and an insufficiency in insulin secretion being compensatory. The later type does not show clinical signs and symptoms but levels of glucose in blood are usually adequate enough to create any functional or pathological variations in many of the tissues that are targeted, but without, thus it might generate for longer time span without being diagnosed [3]. The world is going through rapid increase in cases T2DM. It is a disease which occurs due to resistance in insulin production. In this disease some beta cells who are actually responsible to produce insulin, in the receptors which secrete insulin slows down thus hindrance occurs in production of insulin causing a state of hyperglycemia, a constant state of high blood sugar levels resulting in disorders generating problems in maintenance of homeostasis of glucose levels in blood. In current era, DM is one of the major metabolic disorder for which many scientists are working day and night to cure this disease in fields of nutrition, pharmaceuticals, nutraceutics *etc.* The WHO protocols released in 2017 has termed Pakistan as one of the countries with most of the cases suffering with DM concluding it to be on 4th number according to prevalence statistics worldwide. In entire population of Pakistan, 27% of population currently suffers with this metabolic disorder [4]. The type of diabetes that occurs in pregnancy *i.e.* GDM is higher levels of blood sugar levels i.e. hyperglycemia that is identified in pregnancy. GDM is linked with a broad range of short- and long-term bad condition on effects of health for both mother and baby. Multiple factors are involved in etiology of this complicated disease, with inconvenience in glucose, lipid and gut microbiota. Therefore, its mentions as it is difficult, patients to be requiring to follow lifestyle modifications along with use of insulin [5].

Gestational Diabetes (GDM): Gestational diabetes mellitus (GDM) affects 7% of pregnant females in US, making it one of the common pregnancy complications. Its prevalence is increasing due to increase in obesity among women of reproductive age. There is always increase risk of complication for both mother and her offspring if mother is diabetic [6]. GDM is an of the numerous general medical problems in Asia. Still up within the air the commonness of, and hazard factors for GDM in Asia by means of an orderly survey and meta-examination. The analysts deliberately looked through Ovid, PubMed, Science Direct and Scopus for observational investigations in Asia from commencing to August 2017. The investigators announce the commonness and hazard factors of GDM through arbitrary impacts model that was utilized to measure the pooled pervasiveness of GDM and chances proportion with 95% certainty stretch. Research on role of diet in early pregnancy for GDM prevention is limited. In a recent research meta-analysis of randomized trials of the consequence of GDM treatment for the prevention of its subsequent morbidity, various interventions for blood glucose control, including diet, glucose monitoring, insulin use, and pharmaceuticals, did not considerably reduce the risk of some adverse antenatal and postnatal endpoints, including perinatal, neonatal and C-section deaths. Together, these data indicate that recognizing variable factors for the prevention of GDM could be vital for avoiding its associated adverse health outcomes [7].

GDM Prevalence: Most unfriendly ailments of pregnancy so far well-known is Gestational Diabetes. Global Diabetes Pandemic is exceeding and becoming challenging worldwide. A survey report of 2017 demonstrated that 21.3 million or one out of six births influences GDM. According to a researcher Yan *et al.,* who concluded that from 2012 to 2017 in Xiamen, China pervasiveness of GDM increased from 15.5 to 19.9 %. Particularly in fewer previous decade, studies show that GDM increments a quicker rise in lower

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and milder pay nations as compare to top level salary nations. A research study which took place from 1990 to 2010 by Lavery *et al.* further detailed the GDM prevalence by ensuring that fact of around 5.5 % increased. in USA. According to another review report performed in Spain declared that GDM prevalence incremented 4.8% increase over a time span of 10 years from 2006 to 2015.Most significant increased prevalence of GDM was observed in South East Asia i.e. of 26.6 % followed by prevalence of Africa, Europe, North Africa and Middle East by 18 %, 14 %,18%, 9.5% respectively. In middle income and low-income countries, critical well-being and monetary weights are the expanding predominant factors of GDM nationwide. According to a study conducted by Riaz M *et al.*, high frequency of GDM (11.8%) regardless of risk factors, and in all trimesters of pregnancy emphasizes higher need of universal screening in Pakistan [8]. Older age of women in pregnancy, a family history of diabetes, and race or ethnicity contributes as major risk factors for GDM. Variable factors include excess fat content in adipose tissues, physical activity, and diet [9].

Nutritional Treatment of GDM: Dietary parts related with GDM hazard incorporate large scale supplements, micronutrients, and individual food varieties, for example, refined sugars, immersed and trans fats, heme iron, and handled meat products. While concentrating on individual supplements might prompt the comprehension of significant organic components, appraisal of dietary examples offers an extensive and free methodology and might be more relevant to clinical and general well-being intercessions. Investigations in general food designs additionally represent any associations or synergistic impacts among individual food varieties or supplements. In the event that dietary examples usefully influence GDM hazard, it would be essential to disperse such data to ladies of re useful age [9]. Studies have set up that amount and type of dietary carbohydrates can affect glucose level of mother and wholesome proposals encourage ladies with GDM to restrict absolute admission [10]. Novel methodologies which assist ladies with GDM cling to nutritional proposals, for example, diabetes-explicit dinner substitutions (which give a characterized and complete wholesome piece with gradually processed CHO) and nonstop glucose screens (which give limitless checking of blood sugar level changes) have shown good result for both mothers and neonates. Proceeded with research is expected to comprehend and foster apparatuses to work with patient compliance to treatment goals, mediations and further develop results [10]. One more exploration found increased regularity of GDM among the Asian population. Asian women with ordinary risk factors especially among those with, natural irregularities, history of past GDM or macrosomia must get extra thought from specialist as precious cases of GDM in pregnancy. Normality of GDM is an of the various general clinical issues in Asia. Still up inside the air the normality of, and risk factors for GDM in Asia through a deliberate analysis and meta-assessment. So, the examination reviewed the clinical records of an illustration of 114 ladies within the associate who ensured on a useful survey that they have had a primary determination of GDM during a pregnancy of singleton, somewhere within the range of 1989 and 1991. Out of those ladies, 94% were affirmed to possess been determined to own GDM by a specialist on record review. All women enumerating this finding had verification of odd glucose homeostasis. Formal National Diabetes Data Group rules were used by most specialists for the finish of GDM. In this exploration similarly sent fortifying studies to 100 women declaring a gestation basic by GDM during the similar stretch. 83% uncovered a glucose stacking test, and each one announced ceaseless pee isolating pregnancy, unsurprising with a heavy level of observation during this partner [11]. A study in retrospect investigation shows the records of a cohort of 264 diagnosed cases of gravid females in their second trimester diagnosed with GDM ,using the International Association of Diabetes in Pregnancy Study Group (IADPSG) criteria, who received antenatal care at a hospital between January 2013 and December 2019. During this era of evolving COVID-19 pandemic Scientists are retrospectively using the Japanese GDM diagnostic strategy. This approach in the second trimester was well-defined as the COVID-19- GDM group; Fasting plasma glucose (FPG) ≥ 5.1 mmol/l (92 mg/dl), random plasma glucose (RPG) ≥ 9.0 mmol/l (162 mg/dl), HbA1c ≥ 38 mmol/mol (5.7%), or; no further testing (COVID-19 NFT)-group, fasting plasma glucose (FPG) < 5.1 mmol/lmg/dl), random glucose level (RPG) < 9.0 mmol/l (162 mg/dl) or HbA1c < 38 mmol/mol (5.7%) [12]. Another research study suggested a review of 11 months starting the month of November 2018 and ending in the month of September 2019. Complete 721 antenatal ladies (405 solid and 316 diagnosed cases of GDM) partook in the review. 28 participants (18 in charge and 10 in the event that)[13]. According to Mann-Whitney out of 693 subjects (387 in charge and 306 in the event that) were remembered for the investigation. Age of GDM participants was essentially above sound ($p < 0.001$). These dietary examples used for this study were "foods grown from the ground items", "red meat and plant-based food varieties", The prohibited dietary treatment involved "tidbits and high-fat food sources," and "carb rich food varieties". The aggregate change of four dietary examples given to the pregnant

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females was 29.45 % game changer. The "foods grown from the ground items" design comprised of 11.93 % of the change and contained new natural products, organic product, olive, juices and products that belong from dairy group of foods [14]. The "red meat and plant-based food varieties" design comprised the change of 6.67 % and primarily contained oats, vegetables, red meats and nuts. The "bites and high-fat food varieties" design comprised of 5.81% of the fluctuation, and including cake and desserts, fats and oils, organ meats, white meats. pungent tidbits (like fries). The "sugar rich food sources" design comprised of fluctuation of and predominantly includes different oats, starch sources (like potato), cooked vegetables and customary bread. Anthropometric records, age, work, amount of instruction, total pregnancies and financial standing were also analyzed [15]. In the same research study, smoking and active work level were not shown on the grounds that didn't track down any critical worth. The quartiles of "leafy foods items", moreover "bites and high-fat food varieties" food examples. The fourth section consists of "tidbits and high-fat food sources," gravida ladies that have had age lower than those in primary portion. BMI of females before pregnancy, gaining weight during pregnancy, consumption of energy, status of finance was analyzed and overweight females according to Roustazadeh *et al.*, were more prone to develop complications due to GDM [13]. Results of a research concludes that other dangerous factors which incorporates in increasing risk of Diabetes is if a BMI is greater than 25 kg/m 2 (OR 3.27, 95% CI 2.81 3.80); preclampsia (OR 3.20, 95% CI 2.19–4.68); history of diabetes in family (OR 2.77, 2.22–3.47); previous history of stillbirth (OR 2.39, 95% CI 1.68–3.40); polycystic ovary condition (OR 2.33, 95% CI1.72–3.17); history of early termination of pregnancy(OR 2.25, 95% CI 1.54–3.29); age more than 25years (OR 2.17, 95% CI 1.96–2.41); multiparous women (OR 1. 37, 95% CI 1.24–1.52); and history of preterm conveyance (OR 1.93, 95% CI 1.21–3.07) [16]. Dietary example is a powerful variable in the occurrence of numerous constant illnesses. Finding a proper dietary example, for example, "foods grown from the ground items" were well assisted for pregnant ladies with forestalling the GDM [17]. GDM grounds many signs and symptoms that may generate complications for mother and baby. A diet containing healthy elements plays a key role in prevention of GDM. A study designed to explore the relationship between GDM and major dietary patterns: total 693 pregnant females took part in this case control study out of which 386 were healthy and 306 were diagnosed with GDM. Anthropometric indices and basic information were noted and a questionnaire of food frequency table was finished. To dig out major patterns of dietary intake, the component which analysis according to principal was performed. Usage of multivariable regression logistic models were used to inspect if specific dietary habits were associated to the gravida pregnancy. Four dietary patterns which were identified are “fruits and dairy products”, “plant-based foods and red meat”, “high-fat foods and snacks” and “carbohydrate-rich foods”. Among these major extracted dietary patterns, “fruits and dairy products” showed an inverse association to the GDM. It was observed that using a healthy dietary patter. An exploration examination expected to perceive maternal dietary models and break down their relationship with GDM danger, and to survey the responsibilities of macronutrients admission to these affiliations. They involved 2755 pregnant Chinese women from the Tongji Maternal and Child Health Cohort [20]. These revelations recommended that a dietary model portrayed by low sugar utilization and high protein during gestation was connected with an increased chance of GDM, which provides huge bits of knowledge for guidance related to diet during perinatal period to hinder GDM [21].

Nutritional Treatments for GDM

GDM and Ginger: A research conducted from top to bottom relative investigations in which including bigger sample groups are expected to approve these discoveries, whose expectation will be to define rules for GDM mothers. Pre-gestational maternal stoutness; unnecessary gestational weight gain; gestational diabetes mellitus; perinatal results; fetal/placental weight proportion. In GDM, Mediterranean Diet *i.e.* (Med Diet) and gestational weight gain *i.e.* (GWG) during time span of COVID-19 was considered to be a better remedy for distinct population of people. Different researches have so far concluded that food varieties including organic products, vegetables, low-fat dairies, and so on as sound dietary example is related with reduced danger of GDM among pregnant ladies. Deciding solid dietary example during pregnancy, considering the food varieties devoured among pregnant ladies, as a helpful and commonsense aid during this period can be broadcasted for preparing healthful intercessions for future life [22].

CONCLUSION

Gestational Diabetes is a metabolic disorder in which health conditions of a gravid mother can cause hazardous effects on maternal and child health. Therefore, effective use of insulin and beneficial dietary patterns can lead to a healthy mother and her neonate. Ginger, Green leafy vegetables and some other herbs have an effective role in altering the symptoms of difficulty in pregnant women. GDM thus, is such a health disorder which needs attention

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and if not treated well generates mental and physical health problems for neonate and mother. Exceptional regard for dietary carbohydrates proposals for every single pregnant lady of GDM is essential.

REFERENCES

[1] Birgmeier J, Tierno A, Stenson P, Deisseroth C, Jagadeesh K, *et al.* AVADA improves automated genetic variant database construction directly from full-text literature. bioRxiv. 2018,doi.org/10.1101/461269.

[2] Ahlqvist E, Storm P, Käräjämäki A, Martinell M, Dorkhan M, Carlsson A, Vikman P, Prasad RB, Aly DM, Almgren P, Wessman Y. Novel subgroups of adult-onset diabetes and their association with outcomes: a data-driven cluster analysis of six variables. The lancet Diabetes & endocrinology. 2018,6(5):361-9.doi.org/10.1016/j.molmet.2017.06.019.

[3] Moller DE, Kaufman KD. Metabolic syndrome: a clinical and molecular perspective. Annu. Rev. Med. 2005,56:45-62. doi.org/10.3389/fimmu.2020.01582.

[4] Mario S, MD. Cleveland Clinic Journal of Medicine. 2017,84(57):61.doi.org/10.3949/ccjm.84.s1.07.

[5] Bellatorre A, Jackson SH, Choi K. Development of the diabetes typology model for discerning Type 2 diabetes mellitus with national survey data. PLoS One. 2017,12(3): e0173103. doi: 10.1371/journal.pone.0173103.

[6] Felman A, L Castiello, A Vikkie, Mustad I *et al.*Role of Dietary Carbohydrates in Gestational Diabetes-AGNP C. 2021,2(385):11. doi: 10.3390/nu12020385.

[7] Aranne N, P Glynis, J Hyett, Molyneaux M. Constantino A, *et al.*Gestational Diabetes Mellitus in Early Pregnancy Evidence for Poor Pregnancy Outcomes Despite Treatment-Affiliations expand Epub. 2015. doi:10.2337/dc15-0433.

[8] Quaresima P, F Visconti, E Chiefari, M Mirabelli, M Borelli, *et al.* Appropriate Timing of Gestational Diabetes Mellitus Diagnosis in Medium and Low-Risk Women-Effectiveness of the Italian NHS Recommendations in Preventing Fetal Macrosomia. 2020,53(939):52. doi.org/10.1155/2020/5393952.

[9] Lawrence RL, Wall CR, Bloomfield FH. Prevalence of gestational diabetes according to commonly used data sources: an observational study. BMC Pregnancy and Childbirth. 2019,19(1): 1-9.doi: 10.1186/s12884-019-2521-2.

[10] Alejandro EU, Mamerto TP, Chung G, Villavieja A, Gaus NL, *et al.* Gestational diabetes mellitus: a harbinger of the vicious cycle of diabetes. International journal of molecular sciences. 2020,21(14): 5003.doi: 10.3390/ijms21145003.

[11] Meinilä J, Koivusalo SB, Valkama A, Rönö K, Erkkola M, *et al.* Nutrient intake of pregnant women at high risk of gestational diabetes. Food & Nutrition Research. 2015,59(1): 26676.doi: 01.3402/fnr.v59.2667613.

[12] Bevier W, R Fischer and L Jovanovic. Affiliations Expand Treatment of women with an abnormal glucose challenge test but a normal oral glucose tolerance test decreases the prevalence of macrosomia-Am J Perinatol. 2008,16(6):269. doi: 10.1055/s-2007-993871.

[13] Wei K, L Siew, M Ching, R Vasudevan, A Yee, *et al.* Prevalence and Risk Factors of Gestational Diabetes Mellitus in Asia a Systematic Review and Meta-Analysis-Veettil Affiliations expand. doi: 10.1186/s12884-2131-4.

[14] Costa E, C Kirckpartick, C Gerday, A Kempeneer, A Vercoutere, *et al.* Change in prevalence of gestational diabetes and obstetric complications when applying IADPSG screening criteria in a Belgian French speaking University Hospital a Retrospective Cohort Study-BMC Pregnancy and Childbirth. 2019,2(49):20. doi: 10.1186/s12884-019-2406-4.

[15] Roustazadeh V, Mir H, Jafarirad S, Mogharab F, Hosseini S, *et al.* Dietary Pattern Rich in Fruits and Dairy Products is Inversely Associated to Gestational Diabetes a Case Control Study in Iran BMC Endocrine Disorders. 2021,41(2):29. doi: 10.1186/s12902-021-00707-8.

[16] Benjamin D and Bohrer M. An investigation of the formulation and nutritional composition of modern meat analogue products. 2019,8(4)320-329. doi.org/10.1016/j.fshw.2019.11.006.

[17] SunY, Shen Z, Zhan Y, Wang Y, Ma S, *et al.* Jiang. Effects of pre-pregnancy body mass index and gestational weight gain on maternal and infant complications-BMC Pregnancy and Childbirth. 2020,3(90). doi: 10.1186/s12884-020-03071-y

[18] Wei K, L Siew, M Ching, R Vasudevan, A Yee, *et al.* Prevalence and Risk Factors of Gestational Diabetes Mellitus in Asia a Systematic Review and Meta-Analysis-BMC Pregnancy and Childbirth Articlenumber Veettil Affiliations expand. 2018,18(49):4. doi: 10.1186/s12884-2131-4.

[19] Laura E, Jocelyn E, Berglund C and Rhonda C. Dietary Change during Pregnancy and Women's Reasons for Change-Published online Aug 8. 2018,10(8): 1032. doi: 10.3390/nu10081032.

[20] Lawrence RL, K Ward, C Wall and F New Zealand Women's Experiences of Managing Gestational Diabetes thought Diet a Qualitative Study-Bloomfield

DOI:https://doi.org/10.54393/pbmj.v5i5.445

BMC Pregnancy and Childbirth. 2021,21(81):9. doi: 10.1186/s12884-021-04297-0.

[21] Ding Y, Xu F, Zhong C, Tong L, Li F, *et al.* Association between Chinese Dietary Guidelines Compliance Index for Pregnant Women and Risks of Pregnancy Complications in the Tongji Maternal and Child Health Cohort. Nutrients. 2021,13(3): 829.doi: 10.3390/nu13030829.

[22] Jasmin S, C Schon, M Wargennau, L Pauly, S Schwejdaguttes, *et al.* Blood glucose response after oral intake of lactulose in healthy volunteers: A randomized, controlled, cross-over study-World J Gastrointest Pharmacol Ther. 2018,22(3) 22–30. doi: 10.4292/wjgpt. v9.i3.22.

[23] Xuezhen Z, R Chen, C Zhong, J Wu, X Li, *et al.* Maternal Dietary Pattern Characterised by High Protein and Low Carbohydrate Intake in Pregnancy is Associated with a Higher Risk of Gestational Diabetes Mellitus in Chinese women-A Prospective Cohort Study Affiliations expand. 120(9):1045 doi: 10.1017/S00071144180024518002453.

[24] Mariusz G, D Scukiewicz, M Choluj, W Sawicki and W Bojar. Fetal and Placental Weight in Pre-Gestational Maternal Obesity (PGMO) vs. Excessive Gestational Weight Gain (EGWG)A Preliminary Approach to the Perinatal Outcomes in Diet-Controlled Gestational Diabetes Mellitus Affiliations expand. 2020, 9(11):3530. doi: 10.3390/jcm9113530

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Review Article

Health Promoting Properties and Extraction of Specific Bioactive Compounds in Blueberries

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ABSTRACT

In addition to possessing well-known flavor attributes, blueberries are an exceptional source of health-promoting bioactive compounds. Blueberries have been developing in ubiquity over the world for decades. Blueberries are high in flavonoids (for the most part anthocyanidins), polyphenols (procyanidin), phenolic acids, pyruvic acid, chlorogenic acid, and other compounds that have anticancer, anti-obesity, anti-inflammation, defensive properties for vision and liver, avoid heart maladies, anti-diabetes, boost brain work, muscular bones, improve insusceptibility, anticipate cardiovascular maladies, and boost cognitive decay. Blueberry extraction procedures have progressed essentially in later a long time. Modern extraction technologies include Ultrasound-Assisted Extraction, Microwave Assisted Extraction, Pulsed Electric Field Extraction, and Supercritical Liquid extraction. This strategy strikes a stability between the fruit's dietary value and its occurrence. This improvement within the food division is due to customer expectations that are getting to be more health-conscious, prompting the industry to look for ways to dodge ailment.

INTRODUCTION

Different epidemiological surveys conducted in a range of countries appear that are diet wealthy in fruits and vegetables, counting fruit and vegetable items, decreases the chance of a variety of ways of infections, including cardiovascular illness and cancer, as well as other disorders such as rheumatoid joint pain, lung infection, cataract, Parkinson's disease, and Alzheimer's illness [1]. Blueberries are now widely acknowledged as one of the most important healthy food. The geographical region where high bush blueberries are cultivated has drastically expanded over the last 100 years, into hot and arid climates [2]. Blueberries (Vaccinium ssp.) are a member of the Ericaceae family, which comprises over 450 different species. Blueberries, like cranberries and lingonberries, were cultivated in the 20th century. Blueberries have risen in importance during the early 1990s. Blueberries were only commercially planted in ten nations in 1990, but in 2011, they were farmed in 27 nations [3]. Blueberry fruit includes dietary fiber, vitamins, protein, and nutritious elements that seems to be excellent for well beings, such as immunomodulatory compounds, tannic acid, folic acid, antimicrobial components, and antioxidants, in addition to being pleasant and flavorful. Bioactive substances and response modulators abound in blueberries [4]. Blueberries contain therapeutic properties and are good for human well-being [5]. The massive concentration of

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phytochemicals classified as polyphenols within blueberries has sparked renewed focus on their effects on health. Several epidemiological researches elaborate that the blueberries' elevated polyphenol component, notably a subcategory designated as anthocyanins, is to blame for their numerous advantages to health. Blueberries have recently gained popularity since they are abundantly rich in micronutrients, fiber, as well as polyphenols while being little in calories [6]. Blueberries too have an elevated concentration of phytochemicals such as ascorbic acid as well as phenolics. The bioactive qualities of the phytochemical components are associated with a few of the indicated favorable results of health-associated blueberry intake. Ascorbic corrosive, flavonols (counting kaempferol, quercetin, and myricetin), hydroxycinnamic acids (counting caffeic acids, ferulic acids, and coumaric acids), hydroxybenzoic acids (counting gallic acids and protocatechuic acids), pterostilbene, resveratrol is the foremost common bioactive constituent found in blueberries [7]. Chemical composition of blueberries is presented in table 1.

Nutrients in blueberries	Nutrients Amount per 100 g fresh weight (Fresh)	Nutrients Amount (Fresh)	Nutrients Amount (Frozen) unit/50 g.	Nutrients Amount of 1 cup of fresh blueberry
Energy	57 kcal	192 kJ	174.0 kcal	84 calories
Carbohydrate	14.5 g	9.7%	42.3 g	21.45 g
Water	-	84%	-	-
Fat	0.33 g	0.4%	-	0.49 g
Protein	0.74 g	0.6%	1.7 g	1.1 g
Dietary fiber	2.4 g	3-3.5%	93 g	3.6 g
Potassium	77 mg	-	204mg	114 mg
Fructose	4.97 g	-	-	-
Total beta carotene	31 µg	-	-	-
Vitamin C	9.7 mg	10 mg	86.0 mg	24%
Calcium	6 mg	-	15.0 mg	9 mg
Iron	0.28 mg	-	0.5 mg	-
Vitamin E	0.57 mg	-	-	-
Vitamin B1	0.04 mg	-	-	-
Vitamin B2	0.04 mg	-	-	-
Vitamin B6	0.05 mg	-	-	5%
Phosphorus	12 mg	-	-	18 mg
Sodium	-	-	8.0 mg	1 mg
Magnesium	6 mg	-	-	9 mg
Zinc	0.16 mg	-	-	0.24mg
Manganese	0.336 mg	-	-	-
Niacin	0.418 mg		-	-
		Michalska and Łysiak 2015 [3]	Basu et al., 2010 [8]	Ware 2017 [9]

Table 1: Chemical composition of blueberries

Bioactive constituents in blueberries

Phenolic compounds in blueberries: Throughout the last 15 years, the area of polyphenols and health has exploded. Polyphenols are antioxidant-active chemicals, which sparked a lot of recent interest in learning more about one's possible health advantages for individuals. Phenolic chemicals have also been demonstrated to have anti-inflammatory and cellular signalling properties, focusing attention on a variety of disease danger zones such as cardiovascular health, neuroprotection, and metabolic health [10]. Numerous meals contain organic phenolic constituents, including vegetables, fruits, tea, coffee, chocolate, wine, honey and oil [11]. Polyphenols are extensive groups of chemicals that are only formed in plants. Flavonoids, phenolic acids, stilbenes, lignans, and tannins are the primary groupings. Research has demonstrated that drinking polyphenol-rich blueberry or grape juice on a regular basis for 12 weeks improves episodic learning capacity in older folk [12] and also polyphenolic constituents in blueberries also demonstrated substantial and repeatable anti-aging advantages which have been distinct from antioxidant activities [13]. Diets high in phenolic constituents have been linked to a reduced likelihood of a variety of chronic illnesses, especially cancer [14]. Stilbenoids, tannins [hydrolyzable tannins (gallotannins and ellagitannins) and condensed tannins (proanthocyanidins) and flavonoids, including flavan-3-ols, and their polymeric condensation products, flavanones, flavonols (i.e., kaempferol, quercetin, myricetin), and flavones, are among the phenol Blueberries contain a lot of phenolics, which contribute for 50–80% of the total polyphenol content, which might also exceed up to 3000 mg/kg fresh and dry weight [15].

Anthocyanin in blueberries: Anthocyanins are glycosides of anthocyanidins, and they are the foremost critical category of water-soluble tints in plants. Indeed, on the off chance that more than 550 anthocyanins have in fact been distinguished, as it were just few anthocyanidins are display in lofty plants, and they are generally found in blossoms, pulps, and fruit peels (especially in berries) [16]. Anthocyanins are bioactive flavonoid molecules that are compelling in the treatment of a variety of chronic disorders. These are generally ingested within the kind of meals originating through plant sources, with blueberry being one of the fruits that's well-known for its enhanced and anthocyanin substance. It's one of the natural products with a part of anthocyanins and other polyphenolics, which have appeared to have antioxidant impacts [17]. Several of the primary flavonoid groups are anthocyanins, which seem to be natural pigments that give fruits their blue, purple, violet, and red tints [18-20].

CONCLUSIONS

Blueberry anthocyanidins and polyphenols have

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nutraceutical properties against chronic sicknesses.

REFERENCES

[1] Yin X, Quan J and Kanazawa T. Banana prevents plasma oxidative stress in healthy individuals. Plant foods for human nutrition. 2008;63(2):71-76. doi: 10.1007/s11130-008-0072-1.

[2] Lobos GA and Hancock JF. Breeding blueberries for a changing global environment: a review. Frontiers in plantscience.2015;6:782.doi:10.3389/fpls. 2015.00782.

[3] Michalska A and Łysiak G. Bioactive compounds of blueberries: post-harvest factors influencing the nutritional value of products. International journal of molecular sciences. 2015;16(8):18642-63. doi:10.3390/ijms160818642.

[4] Chan Ho PA, Yi Sub KW, Han Kyo SE and Hye Young KI. Assessing the values of blueberries intake on exercise performance, TAS, and inflammatory factors. Iranian journal of public health. 2018;47(Suppl 1):27.

[5] Kalt W and Dufour D. Health functionality of blueberries. HortTechnology. 1997;7(3):216-221. doi:10.21273/HORTTECH.7.3.216.

[6] Wood E, Hein S, Heiss C, Williams C and Rodriguez-Mateos A. Blueberries and cardiovascular disease prevention. Food & function. 2019;10(12):7621-33.doi:10.1039/C9FO02291K.

[7] Koupý D, Kotolová H and Kučerová J. Effectiveness of phytotherapy in supportive treatment of type 2 diabetes mellitus Billberry (Vaccinium myrtillus). Ceska a Slovenska farmacie: casopis Ceske farmaceuticke spolecnosti a Slovenske farmaceuticke spolecnosti. 2015;64(1-2):3-6.

[8] Basu A, Du M, Leyva MJ, Sanchez K, Betts NM and Wu M et al. Blueberries decrease cardiovascular risk factors in obese men and women with metabolic syndrome. The Journal of nutrition. 2010;140(9):1582-7.doi:10.3945/jn.110.124701.

[9] Ware M. Everything you need to know about blueberries. Medical News Today. 2017;30:2019.

[10] Zhong S, Sandhu A, Edirisinghe I and Burton-Freeman B. Characterization of wild blueberry polyphenols bioavailability and kinetic profile in plasma over 24-h period in human subjects. Molecular nutrition & food research. 2017;61(12):1-13. doi: 10.1002/mnfr.201700405.

[11] Olas B. Berry phenolic antioxidants–implications for human health? Frontiers in pharmacology. 2018;9(3):1-14. doi:10.3389/fphar.2018.00078.

[12] Bensalem J, Dudonné S, Gaudout D, Servant L, Calon F and Desjardins Y et al. Polyphenol-rich extract from grape and blueberry attenuates cognitive decline and improves neuronal function in aged mice. Journal of nutritional science. 2018;7(19):1-10. doi: 10.1017/jns.2018.10.

[13] Wilson MA, Shukitt-Hale B, Kalt W, Ingram DK, Joseph JA and Wolkow CA. Blueberry polyphenols increase lifespan and thermotolerance in Caenorhabditis elegans. Aging cell. 2006;5(1):59-68. doi: 10.1111/j.1474-9726.2006.00192.x.

[14] Yi W, Fischer J, Krewer G and Akoh CC. Phenolic compounds from blueberries can inhibit colon cancer cell proliferation and induce apoptosis. Journal of agricultural and food chemistry. 2005;53(18):7320-7329. doi: 10.1021/jf051333o.

[15] Müller D, Schantz M and Richling E. High performance liquid chromatography analysis of anthocyanins in bilberries (Vaccinium myrtillus L.), blueberries (Vaccinium corymbosum L.), and corresponding juices. Journal of Food Science. 2012;77(4):C340-5. doi.org/10.1111/j.1750-3841.2011.02605.x.

[16] You Q, Wang B, Chen F, Huang Z, Wang X and Luo PG. Comparison of anthocyanins and phenolics in organically and conventionally grown blueberries in selected cultivars. Food Chemistry. 2011;125(1):201-208. doi: 10.1016/j.foodchem.2010.08.063.

[17] Routray W and Orsat V. Blueberries and their anthocyanins: factors affecting biosynthesis and properties. Comprehensive Reviews in Food Science and Food Safety. 2011;10(6):303-320. doi: 10.1111/j.1541-4337.2011.00164.x.

[18] Lohachoompol V, Srzednicki G and Craske J. The change of total anthocyanins in blueberries and their antioxidant effect after drying and freezing. Journal of Biomedicine and Biotechnology. 2004;2004(5):248-252.

[19] Phan K, Van Den Broeck E, Van Speybroeck V, De Clerck K, Raes K and De Meester S. The potential of anthocyanins from blueberries as a natural dye for cotton: A combined experimental and theoretical study. Dyes and Pigments. 2020;176(2):1-43. doi: 10.1016/j.dyepig.2019.108180.

[20] Fang J. Bioavailability of anthocyanins. Drug metabolism reviews. 2014;46(4):508-20. doi: 10.3109/03602532.2014.978080.

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Review Article

Undernutrition with Special Reference to Iron-deficiency Anemia in Reproductive Age Group Females in Pakistan

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ABSTRACT

Undernutrition, especially micronutrient deficiency is one of the major but least addressed Global health issues. Wasting, underweight, stunting, and deficiencies of essential minerals and vitamins are results of undernutrition leading to increased mortality and morbidity. The developing countries especially the reproductive age group females are mainly affected by undernutrition. Reproductive age group females' especially pregnant females of the underprivileged rural populations are more prone to develop iron deficiency due to increased physiological requirements or administration of substances acting as inhibitors. Undernutrition is not only responsible for high mortality in women but also impacts their families, especially children and chronically undernourished females likely to give birth to an undernourished child. This pattern runs in generations. But increased usage of substances that act as adjutants can fulfill the physiological requirements of pregnancy. This review aims to explain the roles of different Nutraceuticals in the prevention of iron deficiency anemia, especially in reproductive age group pregnant females.

INTRODUCTION

Undernutrition is a "lack of adequate energy, protein, and micronutrients to meet basic requirements for body maintenance, growth, and development" and is one of the major but least addressed Global health issue [1,2]. Age group and living standards of females are among the significant risk factors but education, cast, religion and cast also influence undernutrition [3,4]. High Parity, lower education, unsafe water, Infectious diseases, lowered immunity, taboos attached to food and its intake, poor dietary intake, food distribution not based on equity within the household, inappropriate preparation and storage of food make the reproductive age females most vulnerable

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to undernutrition, especially rural population. Rural females in the African region are 68% more likely to be undernourished compared to urban [1]. Anemia is a condition in which "the number of red blood cells or the hemoglobin concentration within RBCs is lesser than normal" [4] is a grave public health concern worldwide that predominantly has an effect on children of younger age group and pregnant females. According to World Health Organization (WHO), globally one-third of all women of reproductive age group, 40% of pregnant females and more than 42% of children less than 5 years of age are anemic. Reproductive age group females (15-49 yrs) [5, 6] need high energy and nutrients during pregnancy and while working carrying heavy loads [7] and are more prone to develop iron deficiency due to multiple pregnancies, menstruation, and childbirth [8]. According to a study conducted in Azerbaijan 38.2% of the women were having Anemia, 34.1% had iron deficiency and 23.8% were having iron deficiency anemia (IDA),10.5% of women were having Vitamin A insufficiency 35.0%, Folate and 19.7%, vitamin B12 deficiency with vitamin A insufficiency. Iron deficiency is found as the main risk factor for anemia [9] increases the chances of perinatal mortality, maternal deaths, impaired cognitive development in children and reduced work capability in adults. Undernutrition is the underlying cause of 35% of the pre-school children's disease burden and in poor communities of the developing countries, 50% of children and roughly one-third of reproductive age group females are affected by anemia [5, 6]. IDA is among the principal reasons of disability globally and its effects on the health of adolescent females and women may have consequences affecting generations. As a result of gestational anemia, chances of preterm deliveries and low birth weight babies are high. It can also adversely affect the iron stores of the fetus impacting the motor, social-emotional and neurocognitive development of the child [10]. IDA-affected mothers are more prone to premature deliveries, babies born with low birth weight, newborns that are small for their gestational age, congenital birth defects, and growth impairment. IDA, the major contributor to disability-adjusted life years in women is prevalent in 30-60% of Pakistani women. "Pakistan has a high maternal (276 per 100,000 live births) and perinatal mortality (75 per 1000 pregnancies) and both are associated with acute blood loss in situations of chronic IDA". IDA accounts for 19.3% of births of newborns who are small for their gestational age and 25% of babies born with low birth weight in Pakistan [11]. According to EMRO WHO statistics More than one-fifth of females in Pakistan are suffering from Anemia [12].

Causes of Anemia: Iron, folate, vitamins B12, and vitamin A are all nutritional deficiencies, out of which Iron deficiency is the most frequent cause of anemia. But infectious diseases such as tuberculosis and HIV, malaria hemoglobinopathies, and parasitic infections are other causes of anemia [13-15]. Aging population, nutritional deficiency, chronic disease, and unexplained anemia which might be due to the progressive resistance to erythropoietin, and underlying chronic state are different causes. Anemia can be Aplastic or sickle cell or it can end up in Thalassemia. Nutritional Anemia can be due to Vitamin deficiency or Iron deficiency. Depending upon the deficiency and its duration anemia can be mild to severe, congenital or acquired due to any other condition. Anemia can occur if the blood is not having enough red blood cells or the body cannot synthesize sufficient red blood cells. Red blood cell loss occurs due to Bleeding more quickly than they can be replaced [16]. One of the most common types of nutrient deficiency anemia is due to Iron deficiency in the body [17]. Hematopoiesis requires an adequate amount of iron, folic acid, and vitamin B12. Vitamin deficiency anemia includes Folate and vitamin B-12 which are required for enough healthy red blood cell synthesis. But in the case of pernicious anemia, vitamin B-12 absorption remains the issue [10–13]. Megaloblastic anemia is caused by Folic acid deficiency which is widely distributed in green leafy vegetables [18]. Anemia of inflammation can occur due to acute or chronic inflammatory diseases. Aplastic anemia, leukemia can be life-threatening. Hemolytic anemia can be inherited or due to certain blood diseases which increase red blood cell destruction. Sickle cell anemia is caused by a defective form of hemoglobin resulting in abnormal crescent (sickle) shaped red blood cells which die prematurely, consequential to chronic deficiency of these cells [19, 20].

Risk Factors of Anemia: These are the factors that increase the risk of anemia including a diet lacking in Copper, iron, vitamin B12, and folate, certain Intestinal disorders which can affect the absorption of nutrients in the small intestine, reproductive age group females having menstrual loss, pregnancy which enhances requirement of folic acid and iron, chronic conditions which can cause a shortage or can deplete store of iron from body, causing IDA, age over 65years, autoimmune disorders, certain infectious blood diseases exposure to toxic chemicals and alcoholism, Family history is also significant, such as sickle cell anemia.

Iron deficiency anemia: It is the most common form of anemia globally [21] and is caused by iron deficiency in the body. There are four forms of proteins containing iron but more than half of total-body iron is contained within hemoglobin, the most abundant iron-containing protein. Iron requirement for erythropoiesis is generated by

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changes in oxygenation of tissues, red blood cell turnover, and blood loss. Bone marrow needs iron for hemoglobin synthesis and if sufficient iron is not available then red blood cells cannot have enough hemoglobin. Many pregnant women get affected if not provided with the iron supplementation required to fulfill the increased iron demand during pregnancy. Heavy menstrual bleeding or blood loss due to gastric or small intestinal ulcer or large intestine cancer and extensive consumption of pain-killers especially aspirin likely to cause stomach lining inflammation resulting in blood loss[22].

Signs and symptoms of Iron Deficiency Anemia: It includes fatigue, low physical and mental capacity, headache, vertigo, leg cramps, pagophagia, cold intolerance, koilonychias, mucosal paleness, angular stomatitis[23]. In cases of IDA due to blood loss, the signs or symptoms experienced may be due to the disease-causing blood loss[24]**.** Simple Iron deficiency (ID) can lead to anemia, and immune system problems, and in certain cases can cause a neurological problem like depression. A patient with IDA can show signs and symptoms of behavioral and mood disorders like depression[25].

Common Causes of Iron Deficiency Anemia include: Physiological Anemia can be seen in premature babies, during phases of rapid growth, and during pregnancy. Anemia can be due to Poor intake in situations like Malnutrition, pseudo-bulbar palsy, chronic illness, and poor socioeconomic status. Malabsorption in certain diseases, and in certain disease-causing blood loss[22, 26, 27]. IDA is caused by either blood loss or iron malabsorption. The major cause of bleeding in males and postmenopausal women is gastrointestinal tract lesions[28]. Some dietary practices, such as calcium intake, phytates (found in cereals), and tannins (found in tea and coffee) may induce lower iron absorption due to their inhibitory effect on iron absorption. Helicobacter pylori infection (competition for iron, higher pH, and lower vitamin C), gluten-induced enteropathy in celiac disease, increased pH due to atrophic gastritis, and inflammatory bowel illness are all associated with surgical methods and reduced iron absorption. Hookworm infections, schistosomiasis, and menstruation can cause physiologic and chronic blood loss. Drugs including salicylates, nonsteroidal anti-inflammatory drugs, anticoagulants, and corticosteroids can cause drug-induced blood loss by irritating the stomach mucosa directly or raising the risk of bleeding from other causes. Relative or functional IDA occurs when iron is seldom transferred from storage to circulation [29]. Iron-refractory Hepcidin levels rise and intestinal iron absorption falls in IDA, a rare recessive disorder[30-32].

Iron Deficiency Anemia Risk Factors: Adults 65 years and older, women of reproductive age who are menstruating, and youngsters during their rapid development phase (12-15 yr in boys; 10-13 yr in girls), Lactation and pregnancy Low-wage workers, Underweight, You can get IDA if you don't get enough iron or vitamin C in your diet.[33-35].

Iron deficiency anemia in Reproductive age group females: IDA is one of the key public health issues for low, middle, and high-level countries affecting all age groups inclusive of reproductive age group women[36]. One-third of the world's population is affected by anemia and half the cases are due to iron deficiency. Reproductive age group females, pregnant females, and children under five years of age are particularly at risk[37]. In the developing countries not fulfilled Iron demand increases in pregnancy affects 52% of pregnant females. As a result, babies born with poorer iron stores are more prone to develop iron deficiency anemia subsequently. In premature babies, early stop of breastfeeding also results in a reduction of iron stores and increases the risk for IDA. Poor dietary habits, diets with decreased iron consumption, and growing age heavy blood loss all are causes and risk factors for IDA. It ends up in decreased tissues Oxygen supply develops pallor look, tiredness, weakness, breathing difficulty, lethargy, apathy, headaches, tinnitus, palpitation, and hair loss. In Chronic iron deficiency cases, decreases tolerance to work, efficiency, and the quality of life increasing socio-economic difficulties and more chances to contract infections due to Dysfunction in the immune system. Even cardiac failure can develop in a more severe degree of anemia. IDA during pregnancy may result in "premature labor, intrauterine growth retardation, low birth weight, birth asphyxia, and neonatal anemia"[26]. So Maternal anemia can have effects (short-term and long-term) leading to infantile iron deficiency and compromised physical and cognitive development of the child. Reproductive age group females' having IDA ends up into a significant dual burden on the likely economic expansion and population welfare. Near term, the strength for taking care of the child, household preservation, relaxation time activities, and the labor itself decreases due to fatigue. Longer-term implications include causation of permanent decline in child's cognitive ability and socio-emotional execution having impacts on their creative competence throughout the life[38-40].

Treatment of iron deficiency anemia: Reproductive age group IDA is one of the major Public Health issues in developing countries. Iron stores of reproductive age group women get affected by factors like age, parity, socioeconomic status, and diet ending up in anemia and other adverse outcomes preventable through appropriate cost-effective timely interventions through an integrated

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approach [12, 42]. Diagnosis, effectual treatment through the use of medicines prevention through fortification of food, iron supplementation, and most important with lifestyle management are of grave significance. Although prevalent use for nearly a decade of intravenous iron formulations replenishes the iron stores safely and effectively, recommended first-line treatment of IDA is oral iron. So for preparations with varying iron content that fails due to oral iron intolerance, gastrointestinal side effects, excessive blood losses, or malabsorption of iron, then parenteral iron is recommended which can be given in the form of iron sucrose, iron dextran, and iron gluconate. Management through blood transfusion is also an option if not treated by oral preparations or parenteral iron [40-45, 24]. Microcytic anemia, on the other hand, is characterized by refractoriness to oral iron and a sluggish and partial response to intravenous iron infusions [31]. Children 6–23 months (10–12.5 mg elemental iron daily – drops/syrups, three consecutive months in a year), 24–59 months (30 mg elemental iron daily – drops/syrups/tablets, three consecutive months in a year), 5–12 years (30–60 mg elemental iron daily – tablets/capsules, three consecutive months in a year), 24–59 months (30 mg elemental iron daily – tablets/capsules, three consecutive months Iron supplementation for babies and children in malaria-endemic areas should be done in conjunction with public health interventions to prevent, diagnose, and treat malaria. Iron supplementation with 30–60 mg elemental iron daily tablets for three consecutive months in a year is also recommended by the WHO for menstruation adult women and teenage girls (non-pregnant females in the reproductive age range). Because medicines have negative effects, we should focus on eating, which includes both plant and animal-based meals. Geographic distribution, population, food pattern, diet categories, and study findings [46].

Dietary iron: It exists in heme found in hemoglobin or myoglobin of meat and non-heme form legumes, corn, wheat, barley animal-source foods, iron-fortified foods (bread, rice, pasta, and iron-fortified breakfast cereals), cooked spinach, eggs, and dairy products, nuts, seeds, prune juice, dried beans and peas, and dry fruits. These two forms of iron have different absorption and bioavailability. Heme iron has an absorption of 20%–30% and better bioavailability. Non-heme iron is the most copious in the diet and has absorption at a rate of less than 10%. Ascorbic acid and foods with a substantial content of heme iron maximize this absorption but certain Nutraceuticals like phytates, calcium, and polyphenols inhibit it [47]. Good nutrition during pregnancy can also prevent IDA by meeting the increased physiological demands. To improve the plant sources and supplements iron absorption orange juice, tomato juice, or strawberries high in vitamin C should be consumed, iron supplements Intake with orange juice is recommended but avoid the calcium-fortified variety should as it decreases iron absorption although calcium is an essential nutrient during pregnancy [48].

Lifestyle modification: Life style is equally important as obesity; anemia and diabetes mellitus like chronic diseases are associated with a sedentary lifestyle. An effective strategy for decreasing the magnitude of anemia is through food fortification [49]. The main focus should be lifestyle modifications and the use of herbs instead of medicines [50]. Ascorbic acid enhances iron absorption while calcium, phytates, cereals, and tannins consumption originating from tea and coffee inhibits iron absorption and should be considered when supplying iron-rich meals [51]. Ginger is also found effective [52,53]. The risk of iron oversupply should also be considered through adequate and appropriate iron administration [54-56]. A holistic approach is required as in spite of all the efforts made during the last decade to reduce Anemia, especially in women and children still it remains a public health problem globally. Reduce health interventions should be targeted at pregnant females for reducing anemia prevalence. Children and especially female children should be included in these interventions. Various measures to be taken to cure anemia includes health education regarding nutritious intake, de-worming, iron-rich foods intake, and supplements during pregnancy and breastfeeding, and adolescents' weekly usage of iron-folic supplements. These services provision along with fortified foods, screening, and treatment of non-nutritional causes of anemia especially in concern with Improving women's education and empowerment for making improved dietary choices not only for themselves and also for their families [57]. Anemia among reproductive age females can be reduced using a norms-based intervention project The Reduction in Anemia through Normative Innovations (RANI). Descriptive norms refer to people's perceptions about the prevalence of behavior – what they believe others are doing – and injunctive norms refer to pressures people feel to conform [58]. *Prevention* demands that all screening should be done for IDA amongst pregnant females and should be provided with iron supplementation except with genetic conditions like hemochromatosis. So, the strategy to manage should emphasize on prevention with a conservative approach in non-active bleeding cases and through transfusion in actively bleeding cases. Case-specific treatment plan should be opted before considering the therapy from the options available, oral iron and parenteral, blood transfusion, and recombinant

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human erythropoietin (rHuEPO). Severe anemia during pregnancy can be prevented through iron and another nutritional supplementation[59, 60].

CONCLUSION

Low levels of essential precursors such as iron and folate cause anemia in pregnancy instead of chronic blood loss or hemolysis, the fundamental approaches to IDA prevention are dietary changes and diversification to enhance the intake of iron and supplementation with medical therapy. Food combinations should be planned that have synergistic effects with iron complexes to enhance their absorption and bioavailability. However, the price and social taboos especially regarding the safety of the food can affect the iron-fortified foods' acceptability which is possible through education and awareness campaigns. For dealing with iron deficiency and IDA, food fortification through novel food processing methods can result in the materialization of novel approaches. The main focus should be lifestyle modifications and the use of herbs instead of medicines. To control IDA in reproductive age group females, a multifaceted approach is required targeting food insecurity along with iron supplementation and food fortification.

REFERENCES

[1] Kassie Tesema A, Liyew AM, Alem AZ, Yeshaw Y, Tesema GA and Teshale AB. Spatial distribution and determinants of undernutrition among reproductive age women of Ethiopia: A multilevel analysis. PLoS One. 2021,16(9):e0257664. doi: 10.1371/journal.pone.0257664.

[2] Mtumwa AH, Paul E and Vuai SA. Determinants of undernutrition among women of reproductive age in Tanzania mainland. South African Journal of Clinical Nutrition. 2016,29(2):75-81.

[3] Hazarika J, Saikia I and Hazarika PJ. Risk factors of undernutrition among women in the reproductive age group of India: evidence from NFHS-3. Am Eur J Sci Res. 2012,7(1):05-11. doi: 10.5829/idosi.aejsr.2012.7.1.6185.

[4] Pasricha SR. Anemia: a comprehensive global estimate. Blood. 2014,123(5):611-2. doi: 10.1182/blood-2013-12-543405.

[5] Simera I, Moher D, Hirst A, Hoey J, Schulz KF et al. Transparent and accurate reporting increases reliability, utility, and impact of your research: reporting guidelines and the EQUATOR Network. BMC medicine. 2010,8(1):1-6. doi.org/10.1186/1741-7015-8-24.

[6] Rohner F, Tschannen AB, Northrop-Clewes C, Kouassi-Gohou V, Bosso PE and Mascie-Taylor CN. Comparison of a possession score and a poverty index in predicting anaemia and undernutrition in pre-school children and women of reproductive age in rural and urban Cote d'Ivoire. Public Health Nutrition. 2012,15(9):1620-9. doi: 10.1017/S1368980012002819.

[7] Burgess A. Undernutrition in Adults and Children: causes, consequences and what we can do. South Sudan Medical Journal. 2008,1(2):18-22.

[8] Rahman MS, Mushfiquee M, Masud MS and Howlader T. Association between malnutrition and anemia in under-five children and women of reproductive age: Evidence from Bangladesh Demographic and Health Survey 2011. PloS one. 2019,14(7):e0219170. doi: 10.1371/journal.pone.0219170.

[9] Wirth JP, Rajabov T, Petry N, Woodruff BA, Shafique NB and Mustafa R et al. Micronutrient deficiencies, over-and undernutrition, and their contribution to anemia in Azerbaijani preschool children and non-pregnant women of reproductive age. Nutrients. 2018,10(10):1483. doi: 10.3390/nu10101483.

[10] Jones AD, Mundo-Rosas V, Cantoral A and Levy TS. Household food insecurity in Mexico is associated with the co-occurrence of overweight and anemia among women of reproductive age, but not female adolescents. Matern Child Nutr. 2017,13(4):e12396. doi: 10.1111/mcn.12396.

[11] Habib MA, Raynes-Greenow C, Soofi SB, Ali N, Nausheen S and Ahmed I et al. Prevalence and determinants of iron deficiency anemia among non-pregnant women of reproductive age in Pakistan. Asia Pacific journal of clinical nutrition. 2018,27(1):195-203.

[12] Mawani M, Ali SA, Bano G and Ali SA. Iron deficiency anemia among women of reproductive age, an important public health problem: situation analysis. Reproductive System & Sexual Disorders: Current Research. 2016,5(3):1. doi: 10.4172/2161-038X.1000187.

[13] Goddard AF, James MW, McIntyre AS and Scott BB. Guidelines for the management of iron deficiency anaemia. Gut. 2011,60(10):1309-16. doi:10.1136/gut.2010.228874.

[14] Cappellini MD and Motta I. Anemia in clinical practice—definition and classification: does hemoglobin change with aging?. InSeminars in hematology. 2015,52(4):261-269. WB Saunders. doi: 10.1053/j.seminhematol.2015.07.006.

[15] Freeman AM, Rai M and Morando DW. Anemia screening. 2018.

DOI:https://doi.org/10.54393/pbmj.v5i5.412

[16] Soundarya N and Suganthi P. A review on anaemia-types, causes, symptoms and their treatments. Journal of science and technology investigation. 2017,1(1).
[17] Afnan S, Mohamed H, Mosay T, Hesham A, Ahmed A and Hawra A et al. Anemia: its prevalence, causes, and management. Egyptian Journal of Hospital Medicine. 2018, 70(10): 1877-1879.
[18] Bhardwaj A, Kumar D, Raina SK, Bansal P, Bhushan S and Chander V. Rapid assessment for coexistence of vitamin B12 and iron deficiency anemia among adolescent males and females in Northern Himalayan state of India. Anemia. 2013,2013. doi: 10.1155/2013/959605.
[19] Wang M. Iron deficiency and other types of anemia in infants and children. American family physician. 2016,93(4):270-8.
[20] Saxena R, Chamoli S and Batra M. Clinical Evaluation of Different Types of Anemia. World. 2018,2(1):26-30.
[21] Longo DL and Camaschella C. Iron-deficiency anemia. N Engl J Med. 2015,372(19):1832-43. DOI: 10.1056/NEJMra1401038.
[22] Miller JL. Iron deficiency anemia: a common and curable disease. Cold Spring Harbor perspectives in medicine. 2013,3(7):a011866.
[23] Auerbach M and Adamson JW. How we diagnose and treat iron deficiency anemia. American journal of hematology. 2016,91(1):31-8. doi: 10.1002/ajh.24201.
[24] Means RT. Iron deficiency anemia. Hematology. 2013;18(5):305-6. doi: 10.1179/1024533213Z.000000000197.
[25] Gholamreza Noorazar S, Ranjbar F, Nemati N, Yasamineh N and Kalejahi P. Relationship between severity of depression symptoms and iron deficiency anemia in women with major depressive disorder. Journal of Research in Clinical Medicine. 2015,3(4):219-24. doi: 10.15171/jarcm.2015.034.
[26] Abu-Ouf NM and Jan MM. The impact of maternal iron deficiency and iron deficiency anemia on child's health. Saudi medical journal. 2015,36(2):146. doi: 10.15537/smj.2015.2.10289.
[27] Adelman S, Gilligan DO, Konde-Lule J and Alderman H. School feeding reduces anemia prevalence in adolescent girls and other vulnerable household members in a cluster randomized controlled trial in Uganda. The Journal of nutrition. 2019,149(4):659-66. doi: 10.1093/jn/nxy305.
[28] Liu K and Kaffes AJ. Iron deficiency anaemia: a review of diagnosis, investigation and management. European journal of gastroenterology & hepatology. 2012,24(2):109-16. doi: 10.1097/MEG.0b013e32834f3140.
[29] Donnelly LF, Grzeszczuk R, Guimaraes CV, Zhang W and Bisset III GS. Using a natural language processing and machine learning algorithm program to analyze inter-radiologist report style variation and compare variation between radiologists when using highly structured versus more free text reporting. Current Problems in Diagnostic Radiology. 2019,48(6):524-30. doi: 10.1067/j.cpradiol.2018.09.005.
[30] Cappellini MD, Musallam KM and Taher AT. Iron deficiency anaemia revisited. Journal of internal medicine. 2020,287(2):153-70. doi: 10.1111/joim.13004.
[31] De Falco L, Sanchez M, Silvestri L, Kannengiesser C, Muckenthaler MU and Iolascon A et al. Iron refractory iron deficiency anemia. haematologica. 2013,98(6):845. doi: 10.3324/haematol.2012.075515.
[32] Lopez A, Cacoub P, Macdougall IC and Peyrin-Biroulet L. Iron deficiency anaemia. The Lancet. 2016,387(10021):907-16. doi: 10.1016/S0140-6736(15)60865-0.
[33] Lee JO, Lee JH, Ahn S, Kim JW, Chang H and Kim YJ et al. Prevalence and risk factors for iron deficiency anemia in the Korean population: results of the fifth Korea National Health and Nutrition Examination Survey. Journal of Korean medical science. 2014,29(2):224-9. DOI: 10.3346/jkms.2014.29.2.224.
[34] Makhoul Z, Taren D, Duncan B, Pandey P, Thomson C and Winzerling J et al. Risk factors associated with anemia, iron deficiency and iron deficiency anemia in rural Nepali pregnant women. Southeast Asian Journal of Tropical Medicineand Public Health. 2012,43(3):735.
[35] da Costa AG, Vargas S, Clode N and Graça LM. Prevalence and risk factors for iron deficiency anemia and iron depletion during pregnancy: A prospective study. Acta medica portuguesa. 2016,29(9):514-8. doi: 10.20344/amp.6808.
[36] Rahman Km, Ali Km, Vijayalakshmi S, Ramkumar S and Hashmi G. Prevalence of Iron Deficiency Anaemia and its Associated Factors among Reproductive Age Women in a Rural Area of Karaikal, Puducherry, India. Journal of Clinical & Diagnostic Research. 2019,13(3).
[37] Engle-Stone R, Nankap M, Ndjebayi AO, Erhardt JG and Brown KH. Plasma ferritin and soluble transferrin receptor concentrations and body iron stores identify similar risk factors for iron deficiency but result in different estimates of the national prevalence of iron deficiency and iron-deficiency anemia among women and children in Cameroon. The Journal of nutrition. 2013,143(3):369-77. doi: 10.3945/jn.112.167775.

DOI:https://doi.org/10.54393/pbmj.v5i5.412

[38] Sedlander E, Rimal RN, Talegawkar SA, Yilma H and Munar W. The RANI Project: A socio-normative intervention to reduce anemia in Odisha, India: A formative research protocol. Gates open research. 2018,2(1):1-15. doi: 10.12688/gatesopenres.12808.2.

[39] Rizwan A, Khan QJ, Ullah A, Wasim M, Ramzan S and Hussain S et al. Iron deficiency anemia in reproductive age women: A survey study of district Bahawalpur, Punjab, Pakistan. Pakistan Journal of Pharmaceutical Sciences. 2019,32(3).

[40] Api O, Breyman C, Çetiner M, Demir C and Ecder T. Diagnosis and treatment of iron deficiency anemia during pregnancy and the postpartum period: Iron deficiency anemia working group consensus report. Turkish journal of obstetrics and gynecology. 2015,12(3):173. doi: 10.4274/tjod.01700.

[41] Enrera JA, Abdelrahman EA and Abrar RA. Iron deficiency anemia among pregnant women in Hail Kingdom of Saudi Arabia. IOSR Journal of Nursing and Health Science. 2015,4(2):74-80. DOI: 10.9790/0837-04217480.

[42] Nazar H and Usmanghani K. An integrated approach to iron deficiency anemia. InNutritional Deficiency. 2016. doi: 10.5772/63932.

[43] Aho, J.M. et al., Tube Thoracostomy: A Structured Review of Case Reports and a Standardized Format for Reporting Complications. World journal of surgery. 2015, 39(11):2691-2706. doi: 10.1007/s00268-015-3158-6

[44] Cook JD. Diagnosis and management of iron-deficiency anaemia. Best Practice & Research Clinical Haematology. 2005,18(2):319-32. doi: 10.1016/j.beha.2004.08.022.

[45] Percy L, Mansour D and Fraser I. Iron deficiency and iron deficiency anaemia in women. Best practice & research Clinical obstetrics & gynaecology. 2017,40:55-67.. doi: 10.1016/j.bpobgyn.2016.09.007.

[46] Sun J, Zhang L, Cui J, Li S, Lu H and Zhang Y et al. Effect of dietary intervention treatment on children with iron deficiency anemia in China: a meta-analysis. Lipids in health and disease. 2018,17(1):1-6. doi: 10.1186/s12944-018-0749-x.

[47] Aspuru K, Villa C, Bermejo F, Herrero P and López SG. Optimal management of iron deficiency anemia due to poor dietary intake. International journal of general medicine. 2011,4:741. doi: 10.2147/IJGM.S17788.

[48] Healthy Life style. Pregnancy week by week. 2020.

[49] Shubham K, Anukiruthika T, Dutta S, Kashyap AV, Moses JA and Anandharamakrishnan C. Iron deficiency anemia: A comprehensive review on iron absorption, bioavailability and emerging food fortification approaches. Trends in Food Science & Technology. 2020,99:58-75. doi: 10.1016/j.tifs.2020.02.021.

[50] Roy A and Dwivedi M. Dhatrilauha: Right choice for iron deficiency anemia in pregnancy. Ayu. 2014,35(3):283. doi: 10.4103/0974-8520.153745.

[51] Mazhar M, Faizi S, Gul A, Kabir N and Simjee SU. Effects of naturally occurring flavonoids on ferroportin expression in the spleen in iron deficiency anemia in vivo. RSC advances. 2017,7(38):23238-45. DOI: 10.1039/C7RA02138K.

[52] Kulkarni R, Deshpande A, Saxena K, Varma M and Sinha AR. Ginger supplementary therapy for iron absorption in iron deficiency anemia. 2012,11(1):78-80.

[53] Ding L, Xu L, Jin Y, Wei Y, Pan Y and Sattar S et al. Efficacy of SXN in the treatment of iron deficiency anemia: A phase IV clinical trial. Evidence-Based Complementary and Alternative Medicine. 2019,2019. doi: 10.1155/2019/8796234.

[54] Jimenez K, Kulnigg-Dabsch S and Gasche C. Management of Iron Deficiency Anemia. Gastroenterol Hepatol (N Y). 2015,11(4):241-50.

[55] Liberal Â, Pinela J, Vívar-Quintana AM, Ferreira ICFR and Barros L. Fighting Iron-Deficiency Anemia: Innovations in Food Fortificants and Biofortification Strategies. Foods. 2020,9(12):1871. doi: 10.3390/foods9121871.

[56] Pasricha SR, Drakesmith H, Black J, Hipgrave D and Biggs BA. Control of iron deficiency anemia in low- and middle-income countries. Blood, The Journal of the American Society of Hematology. 2013,121(14):2607-17. doi: 10.1182/blood-2012-09-453522.

[57] Kishore S, Singh M, Jain B, Verma N, Gawande K and Kishore S et al. A study to assess prevalence of anaemia among beneficiaries of Anaemia Mukt Bharat Campaign in Uttarakhand. Journal of Family Medicine and Primary Care. 2020,9(3):1691. doi: 10.4103/jfmpc.jfmpc_941_19.

[58] Yilma H, Sedlander E, Rimal RN, Pant I, Munjral A and Mohanty S. The reduction in anemia through normative innovations (RANI) project: study protocol for a cluster randomized controlled trial in Odisha, India. BMC Public Health. 2020,20(1):1-3. doi: 10.1186/s12889-020-8271-2.

[59] Singh KN and Bhargava J. Severe Anemia in Critically Ill Obstetric Patients. InPrinciples of Critical Care in Obstetrics 2016:139-144. doi: 10.1007/978-81-322-2686-4_15.

[60] Sadeghian M, Fatourechi A, Lesanpezeshki M and

DOI:https://doi.org/10.54393/pbmj.v5i5.412

Ahmadnezhad E. Prevalence of anemia and correlated factors in the reproductive age women in rural areas of tabas. J Family Reprod Health. 2013,7(3):139-44

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Review Article

A Review of Oral Lichen Planus and its Management with Herbal Treatment

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ABSTRACT

Oral Lichen Planus (OLP) is an inflammatory disorder that affects the mouth. Oral mucosa primarily affects women in their forties and fifties. OLP is a localized autoimmune disorder caused by T-cell malfunction, according to previous research. The tongue, buccal mucosa, and gingiva are the most prevalent sites for OLP. The distribution of oral lesions is always symmetrical and bilateral. Oral leukoplakia and oral erythro leukoplakia might be mistaken for plaque-like and atrophic/erosive OLP, respectively. Because OLP is an immunologically mediated condition, corticosteroids are the most effective treatment. Herbal medicine, which has anti-inflammatory and antioxidant qualities, appears to be a viable alternative therapy. As a result, the goal of this research was to describe the efficacy of different OLP treatments.

INTRODUCTION

Lichen Planus is an autoimmune disease induced by T cells [1-3]. It affects the skin, scalp, nails, and mucosa [4,5]. Symptoms include mouth discomfort, sensitivity to spicy foods, pain in the oral mucosa, ulceration, erythema, and bleeding [6,7]. There is yet to be discovered an effective medicine for the treatment of OLP disease [8-10]. Corticosteroids, retinoids, calcineurin inhibitors, laser, and phototherapy are some of the treatment choices. Although extensive research has been conducted in order to find safe and effective pharmaceuticals [11,12]. Herbal therapy with antioxidants and anti-inflammatory properties, for example, is a fantastic alternative medicine option [13]. Herbal medicine is widely used in China and Taiwan to cure inflammation of the mouth's mucous membranes and to reduce the negative effects of chemical medications [14]. Several researches comparing the effects of the herbal medication have been undertaken and corticosteroids, as well as the efficacy of their combination in the treatment of the disease. Combining herbal remedies with corticosteroids has been shown in recent studies to reduce unwanted effects while increasing the drug's efficiency [15-21].

Etiology: T cells produce OLP, a chronic inflammatory oral mucosal disease that affects both men and women with no recognized cause. The etiology has been linked to a number of causes, including[7,22,23].

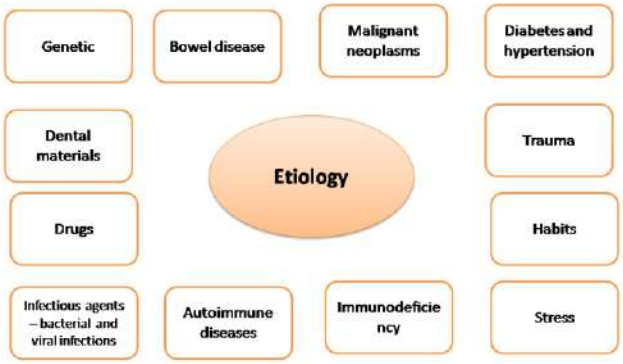

Figure 1: Causes of OLP

The clinical characteristics of the most common oral lichen planus and lichenoid diseases. Some of these conditions appear to be uncommon, while others are unclear or may be a misnomer[24].

Disease	Clinical
Oral lichen planus	White reticular patches on both sides, not necessarily symmetrical, commonly affect the buccal mucosae. At times, erosions and patches of atrophy can be seen. Scarring lesions are uncommon
Oral lichenoid contact lesion	It could be unilateral or bilateral. Amalgam fillings have a common topographic association. Gingiva is unusually affected.
Oral lichenoid drug reaction	OLP is similar, if not identical. There is sometimes a temporal link between new drug intake and new drug intake. When compared to OLP, unilateralism is more widespread.
Graft vs. Host disease	Chronic GVHD is similar to, if not identical to, OLP. Common scarring lesions that resemble leukoplakia Previously, you had a bone marrow transplant.
Erythema Multiforme	Chronic GVHD is similar to, if not identical to, OLP. Common scarring lesions that resemble leukoplakia Previously, you had a bone marrow transplant.
Discoid lupus Erythematosus	More commonly, core atrophic areas or shallow erosions generate asymmetric lesions with radiating white striae at edges and telengiectasie ('sunburst'). When compared to OLP, the properties are much less well defined.
Systemic lupus Erythematosus	Oral ulcers are similar to DLE and/or OLP. Erythema on the bridge of the nose and on the face's malar eminences ('butterfly rash')
Lichen planus pemphigoides	Cutaneous blisters, as well as oral and cutaneous characteristics that are suggestive of LP
Chronic ulcerat-l've stomatitis	OLP is similar, if not identical.
Paraneoplastic pemphigus	PNP stands for paraneoplastic pemphigus, a deadly autoimmune blistering condition caused by an underlying tumor.
Paraneoplastic autoimmune multiorgan syndrome	A variety of signs and symptoms characterize the paraneoplastic autoimmune multiorgan syndrome, including severe desquamative stomatitis and a polymorphous cutaneous eruption (PAMS).
Fixed drug eruption	Erythematous mucous membrane lesions that may or may not become ulcerated
Lichen sclerosis	Patches that are mostly white

Table 1: Classification of Oral Lichen Planus

Diagnosis: Following that, we'll look at several potential biomarkers for diagnosing OLP[25](Table 2).

Potential biomarker	Level in OLP patients
Antioxidants (vitamin C and E)	Decrease
Immunoglobulin	Increase
Peroxidation products	Increase
Cortisol	Decrease
GPCA (anti-gastric parietal cell autoantibody)	Increase

Table 2: Potential Biomarkers to Diagnose Oral Lichen Planus

Role of Herbal Medicine in Management of OLP: OLP is an immunological disease that mostly affects mucous membranes, particularly in the mouth. Nerviness and adaptogens are two herbal remedies that could be beneficial for treating symptoms or treating causes.

Herbs	Actions
Aloe vera	The juice and cream of aloe vera can be used to treat oral sores. Because of its anti-inflammatory properties, aloe vera gel can help relieve discomfort and shrink oral sores[26].
Curcumin	Curcuminoids at high doses are effective in reducing symptoms. Can help to lessen the size and pain of lesions. After the patient has been treated with corticosteroids, it may be useful as a preservation medicine[27].
Glycyrrhiza glabra	Clinical improvements have been reported at least 2-3 symptoms of OLP after treatment with . Glycyrrhizin[28].
Purslane	Can improve the symptoms and sign with the least side effects[29].
Traditional Chinese . medicine	Liuwei Dihuang, Tripterygium glycosides and Zengshengping are Chinese medicine and used as a treatment of OLP, which improve symptoms, including reducing the size of oral leukoplakia[30].
Raspberry leaf extract	Reduces the degree of discomfort, as well as the c linical aspects of erosion, reticulation, and ulceration, as well as cutaneous symptoms[31].
Lycopene	Can reduce the symptoms of OLP due to its antioxidant properties[32].

Table 3: Herbal Treatment of Oral Lichen Planus

CONCLUSION

OLP is a chronic autoimmune disease for which there is now no conclusive and comprehensive treatment. Corticosteroids, on the other hand, were regarded as a palliative treatment for this disease, despite their considerable side effects. As a result, numerous investigations have been conducted in order to develop an alternate treatment. Herbal therapy is more essential than other alternative therapies since it has fewer side effects and better cost-benefit ratios. However, many of the findings are from preliminary research and need to be validated.

REFERENCES

[1] Alrashdan MS, Cirillo N, McCullough M. Oral lichen planus: a literature review and update. Arch Dermatol Res. 2016 Oct;308(8):539-51. doi: 10.1007/s00403-016-1667-2.

[2] Boorghani M, Gholizadeh N, Taghavi Zenouz A, Vatankhah M, Mehdipour M. Oral lichen planus: clinical features, etiology, treatment and management; a review of literature. J Dent Res Dent Clin Dent Prospects. 2010 Winter;4(1):3-9. doi: 10.5681/joddd.2010.002.

[3] Chainani-Wu N, Madden E, Lozada-Nur F, Silverman S Jr. High-dose curcuminoids are efficacious in the reduction in symptoms and signs of oral lichen planus. J Am Acad Dermatol. 2012 May;66(5):752-60. doi: 10.1016/j.jaad.2011.04.022.

[4] Amirchaghmaghi M, Hashemy SI, Alirezaei B, Jahed Keyhani F, Kargozar S, Vasigh S et al Evaluation of Plasma Isoprostane in Patients with Oral Lichen Planus. J Dent (Shiraz). 2016 Mar;17(1):21-5.

[5] Hashemy SI, Gharaei S, Vasigh S, Kargozar S, Alirezaei B, Keyhani FJ et al. Oxidative stress factors and C-reactive protein in patients with oral lichen planus before and 2 weeks after treatment. J Oral Pathol Med. 2016 Jan;45(1):35-40. doi: 10.1111/jop.12326.

[6] Babaee N, Zabihi E, Mohseni S, Moghadamnia AA. Evaluation of the therapeutic effects of Aloe vera gel on minor recurrent aphthous stomatitis. Dent Res J (Isfahan). 2012 Jul;9(4):381-5.

[7] Cheng YS, Gould A, Kurago Z, Fantasia J, Muller S. Diagnosis of oral lichen planus: a position paper of the American Academy of Oral and Maxillofacial Pathology. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016 Sep;122(3):332-54. doi: 10.1016/j.oooo.2016.05.004.

[8] Amirchaghmaghi M, Delavarian Z, Iranshahi M, Shakeri MT, Mosannen Mozafari P, Mohammadpour AH et al. A Randomized Placebo-controlled Double Blind Clinical Trial of Quercetin for Treatment of Oral Lichen Planus. J Dent Res Dent Clin Dent Prospects. 2015 Winter;9(1):23-8. doi: 10.15171/joddd.2015.005.

[9] Das S, Bordoloi R, Newar N. A review on immune modulatory effect of some traditional medicinal herbs. Journal of Pharmaceutical, Chemical and Biological Sciences. 2014 May;2(1):33-42.

[10] Vibha JB, Choudhary K, Singh M, Rathore MS, Shekhawat NS. A study on pharmacokinetics and therapeutic efficacy of Glycyrrhiza glabra: a miracle medicinal herb. Botany Research International. 2009;2(3):157-63.

[11] Resende JP, Chaves Md, Aarestrup FM, Aarestrup BV, Olate S, Netto HD. Oral lichen planus treated with tacrolimus 0.1%. Int J Clin Exp Med. 2013 Oct 25;6(10):917-21.

[12] Ali S, Wahbi W. The efficacy of aloe vera in management of oral lichen planus: a systematic review and meta-analysis. Oral Dis. 2017 Oct;23(7):913-918. doi: 10.1111/odi.12631.

[13] Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. JAMA. 1998 Nov 11;280(18):1569-75. doi: 10.1001/jama.280.18.1569.

[14] Chiu CT, Chuang CY, Li JR, Huang HY, Chang SW, Hung YC. Greater therapeutic efficacy of prednisolone plus medicinal herbs than prednisolone or medicinal herbs alone in patients with oral lichen planus. Journal of Dental Sciences. 2010 Dec 1;5(4):209-15.

[15] Carbone M, Goss E, Carrozzo M, Castellano S, Conrotto D, Broccoletti R et al. Systemic and topical corticosteroid treatment of oral lichen planus: a comparative study with long-term follow-up. J Oral Pathol Med. 2003 Jul;32(6):323-9. doi: 10.1034/j.1600-0714.2003.00173.x.

[16] Lin LM, Qi XM. Comparative observation on the effects of Radix tripterygium hypoglaucum tablet and Tripterygium glycosides tablet in treating erosive oral lichen planus. Chin J Integr Med. 2005 Jun;11(2):149-50. doi: 10.1007/BF02836474.

[17] Ma FK. Comparison of catechu and tripterygium hypoglaucum hutch tablet in treating oral lichen planus of erosion type. Shanghai Kou Qiang Yi Xue. 2004 Aug;13(4):348-9.

[18] Sugerman PB, Savage NW, Walsh LJ, Zhao ZZ, Zhou XJ, Khan A et al. The pathogenesis of oral lichen planus. Crit Rev Oral Biol Med. 2002;13(4):350-65. doi: 10.1177/154411130201300405.

[19] Zhao ZZ, Savage NW, Sugerman PB, Walsh LJ. Mast cell/T cell interactions in oral lichen planus. J Oral Pathol Med. 2002 Apr;31(4):189-95. doi: 10.1034/j.1600-0714.2002.310401.x.

[20] Hirota J, Osaki T, Tatemoto Y. Immunohistochemical staining of infiltrates in oral lichen planus. Pathol Res Pract. 1990 Oct;186(5):625-32. doi: 10.1016/s0344-0338(11)80226-8.

[21] Yamamoto T, Yoneda K, Ueta E, Osaki T. Cellular immunosuppression in oral lichen planus. J Oral Pathol Med. 1990 Nov;19(10):464-70. doi: 10.1111/j.1600-0714.1990.tb00788.x.

[22] Scully C, Beyli M, Ferreiro MC, Ficarra G, Gill Y, Griffiths M et al. Update on oral lichen planus:

etiopathogenesis and management. Crit Rev Oral Biol Med. 1998;9(1):86-122. doi: 10.1177/10454411980090010501.
[23] Mollaoglu N. Oral lichen planus: a review. Br J Oral Maxillofac Surg. 2000 Aug;38(4):370-7. doi: 10.1054/bjom.2000.0335.
[24] Carrozzo M, Porter S, Mercadante V, Fedele S. Oral lichen planus: A disease or a spectrum of tissue reactions? Types, causes, diagnostic algorhythms, prognosis, management strategies. Periodontol 2000. 2019 Jun;80(1):105-125. doi: 10.1111/prd.12260.
[25] Liu P, Cheng H, Roberts TM, Zhao JJ. Targeting the phosphoinositide 3-kinase pathway in cancer. Nat Rev Drug Discov. 2009 Aug;8(8):627-44. doi: 10.1038/nrd2926.
[26] Soltani A, Salmaninejad A, Jalili-Nik M, Soleimani A, Javid H, Hashemy SI et al. 5 -Adenosine monophosphate-activated protein kinase: A potential target for disease prevention by curcumin. Journal of cellular physiology. 2019 Mar;234(3):2241-51.
[27] Das S, Bordoloi R, Newar N. A review on immune modulatory effect of some traditional medicinal herbs. Journal of Pharmaceutical, Chemical and Biological Sciences. 2014 May;2(1):33-42.
[28] Agha-Hosseini F, Borhan-Mojabi K, Monsef-Esfahani HR, Mirzaii-Dizgah I, Etemad-Moghadam S, Karagah A. Efficacy of purslane in the treatment of oral lichen planus. Phytother Res. 2010 Feb;24(2):240-4. doi: 10.1002/ptr.2919.
[29] Chiu CT, Chuang CY, Li JR, Huang HY, Chang SW, Hung YC. Greater therapeutic efficacy of prednisolone plus medicinal herbs than prednisolone or medicinal herbs alone in patients with oral lichen planus. Journal of Dental Sciences. 2010 Dec 1;5(4):209-15.
[30] Vickers ER, Woodcock KL. Raspberry leaf herbal extract significantly reduces pain and inflammation in oral lichen planus patients-a case series analysis. Open Journal of Dentistry and Oral Medicine. 2015 Aug 1;3(3):73-81.
[31] Saawarn N, Shashikanth MC, Saawarn S, Jirge V, Chaitanya NC, Pinakapani R. Lycopene in the management of oral lichen planus: a placebo-controlled study. Indian J Dent Res. 2011 Sep-Oct;22(5):639-43. doi: 10.4103/0970-9290.93448.
[32] Nevil BW, Damm DD, Allen CM, Chi AC. Oral and Maxillofacial Pathology 4th ed. philadelphia: WB. 2016: 385-386

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Review Article

Emerging Trends in Diagnosis and Treatment of Brain Tumor

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ABSTRACT

Brain tumors are rare but have high mortality rate among children and young adults. The purpose of this report is to portray the situation of imaging strategies and advancements for distinguishing reaction of cerebrum tumors to remedy within the placing of multicenter medical trials. Inside as of now utilized advances, usage of institutionalized image procurement and the usage of volumetric appraisals and subtraction maps are likely going to decorate tumor notion, depiction, and dimension. Throughout the subsequent couple of years, new innovations, for instance, 23Na MRI and CEST imaging improvements may be investigated for their usage in growing the ability to quantitatively photo tumor response in order to provide remedies in a scientific trial placing. The combination of poor visualization and absence of remedial choices urge the need to enhance clinical results for patients experiencing CNS malignancies.

INTRODUCTION

A brain tumor occurs when abnormal cell production starts to form in the brain. There are two types of tumors: one of them is benign, while the other one is malignant or cancerous. Typically, our body produces cells that usually die after aging or complete their cycle. The production of abnormal cells by the body and their accumulation in any part of the body leads to the formation of a tumor. Like other cells, the cancerous cells do not die, instead they multiply and cause the formulation of tumors in the body parts. Cancerous tumors are of two types: primary tumors are the ones that start within the brain, this one is the most common type of brain tumor in the adult stage and it develops in the cerebrum which is the main part of the brain. About a quarter of tumors (24%) develop in the meninges. These two membranes protect the spinal cord. Around 1 in 10 (10%) tumors start in the glands of the brain such as the pituitary gland or pineal gland [1]. The primary stage of tumors is named regarding the type of cells they affect and in which part of the brain they start their production. Gliomas, for example, are brain tumors that begin in the glial cells. Primary brain tumors are usually located in the brain's glial cells [2]. The formation of gliomas begins in the glial cells of the brain that are found in the supportive tissue of the brain. Various types of gliomas are classified according to the place they are found in the brain and how the formation of tumors started to occur. Various types of gliomas are as follows:

Astrocytoma: this tumor occurs in the shaped of star glial

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cells known as astrocytes. This may be of any grade, and it arises at the cerebrum part of the brain, that is usually occurred in adults.

Grade I or II astrocytoma: these are known as the low-grade gliomas.

Grade III astrocytoma: it is known as the high-grade glioma or in the other term it is anaplastic astrocytoma.

Grade IV astrocytoma: this type known as glioblastoma or in another term it is called astrocytic glioma [3].

Oligodendroglioma: this tumor could be found in the cells that make fatty substance and covers the nerves through that fatty substance. It could be found in the cerebrum part of the brain and it could affect middle-aged adults [4].

Meningiomas: such type of tumor is slow-growing, and meningiomas are usually found in the outer coverings of the brain, under the skull. This tumor type is very less common and affects one-third of adults worldwide. It is slow-growing and often found in the benign tumor and it could be of grade I, II, or III [5].

Common types of tumors among children are as follows:

Medulloblastoma: such tumor type found in the cerebellum part of the brain. The tumor arises from cerebellum and often called as neuroectodermal tumor. It could be of grade IV. **Grade I or II astrocytoma:** such tumors could occur anywhere in the brain. They are low grade tumors and the most common type of astrocytoma in children is "juvenile pilocytic astrocytoma". It could be of grade I among children [5,6].

Ependymoma: this type of tumor occurs in the ependyma tissues, these tissues are present in the CNS. It could be of grade I, II and III and could affect both adults and children.

Brainstem glioma: as its name shows that it will affect the lowest part of the brain that is known as its stem. Brainstem glioma's most common type is diffuse intrinsic pontine glioma. There is a slight difference among children around 6 out of 10 tumors start in the cerebellum and brain stem part of the brain. Only 40% start in the cerebrum [7]. Secondary tumors are those that have spread from other parts of the body, known as brain metastasis tumors [8] (Figure 1).

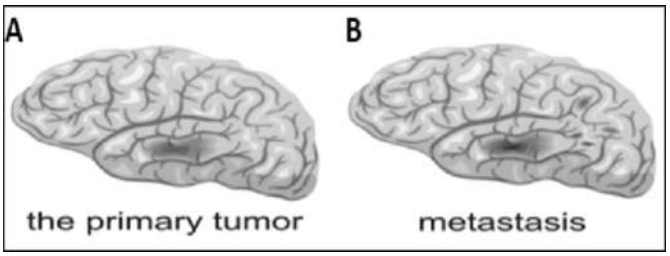

Figure 1: Difference between primary and secondary tumor. In (A) Tumor is shown in one part of brain where as in (B) tumor is in spread form

Every type of tumor causes different symptoms in human beings, symptoms depend on the type of tumor. Common symptoms of brain tumors are changes in mental habits and vision problems. Types of tumors that could be found in adults are meningiomas and astrocytomas *e.g;* glioblastomas. A common tumor type of brain in children is medulloblastoma, it is malignant. Upon medical examination, diagnosis is done through computed tomography or MRI. These are the most common techniques that are used to diagnose cancer. After diagnosis, it is decided that biopsy treatment, radiation therapy, chemotherapy, or surgery should be done [9,10].

Detection and Diagnosis: Brain tumors are diagnosed when the patient consults a doctor about the symptoms he is experiencing. If the symptoms show the possibility of brain tumor then different tests are performed like MRI, CT scan and sometimes biopsy is also useful for identification [11].

Symptoms: The symptoms of the brain tumor depend upon its or what is its size and location. Symptoms may appear when a tumor presses on a nerve or affects the activity of brain parts. It may also cause blockage and brain swelling because of increased fluid. People will experience those symptoms and it does not matter whether the tumor is benign or malignant. Primary or secondary brain tumors often show the same sign and symptoms. The most common symptoms of brain tumor are as follows: headaches, blurred vision, or inability to see properly, nausea, vomiting, hearing and speech problems, changes in the mood and other personality disorders, inability to walk properly, inability to focus or concentrate for the longest period of time, short term or long term memory loss in some cases occur, seizures and convulsions of the muscle and feeling of numbness and tingling sensations in the body or mostly in the arms and legs [12,13].

Diagnosis: If anyone has one of the above discussed symptoms then consultant will do physical examination and will ask about the family history regarding cancer. Following test will be performed for the confirmation of the tumor.

Neurologic exam: to examine the activities that your brain usually does, this test is performed to examine the attentiveness, concentration, vision, hearing, muscle co-ordination of the brain. Eyes are also examined to check the activity and swelling around the eyes that may be caused by the tumor, pressing the nerves [14].

Magnetic Resonance Imaging (MRI): MRI is performed by the machine to which the strong magnet is attached and it takes the images inside the brain to see the areas of the brain. Sometimes a dye is injected into the vessels through arm, so that it can show the colorful images so that the

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differentiation would be easy in the tissues of the brain. Identification of tumor is done through images taken by MRI machine[15].

CT scan: it is an X-ray machine that scans the head and take images of the parts of the brain. A dyed material injected so that it would be easy to find out the abnormal areas of the brain[16].

Angiogram: Angiogram is taken through injecting dye into the bloodstream through the vessels that reach the vessels of the brain and show the abnormal areas by highlighting them in the x-ray[17].

Spinal tap: in this test, sample of the cerebrospinal fluid is taken. Moreover, surgeon takes a thin needle to take the sample from the lowest part of spinal column. This procedure taking around 30 minutes. Spinal tap is performed through local anesthesia. After that sample is sent to the laboratory to find out if the cancer cells are present in it or not[18].

Biopsy: In biopsy, main purpose is to extract the tissue where tumor exists. The tissue examined under the microscope to check any sort of abnormality. Biopsy will help to identify changes in the cells that may results into the formation of cancerous cells. It is the only sure way through which we know the level or severity of it and can plan treatment according to it[19,20].

Advanced techniques for Diagnosis and Treatment:

Computational diagnosis: Propelled MRI strategies for example, attractive reverberation spectroscopy (MRS), attractive reverberation perfusion (MRP), dispersion Weighted imaging (DWI). Furthermore, dispersion tensor imaging (DTI) are utilized to their specificity. DTI, which hinges upon dissemination of water atoms along axons, is supportive with access the integument from claiming White matter (WM), and in addition those area and introduction from claiming WM tracts. Concerning illustration assistance with other imaging, this strategy needs supplemented pre-surgical arranging, also characterization from claiming intra-axial lesions with observe metastases starting with GBM. DWI and MPR have ability in differentiating metastatic tumors starting with cerebral abscesses [21-23]. Stimulated Raman Scattering (SRS) is used to observe the inner areas of brain tissue to identify tumor cells and to differentiate healthy brain tissue from the tumor in mice. After this experimentation they saw that it is possible to remove tumor like giloblastoma multifome (most deadly brain tumor) in humans[24]. In the SRS technique, weak light signals can be detected that comes out from the material when it hit with the light of non-invasive laser. Analyzing the colors of spectrum in the light signal is really helpful for the researchers to understand the chemical makeup of the sample. By amplifying the weak Raman signal by more than 10,000 times scientist has advanced the technique it's not impossible to make multicolor SRS images of living tissue. Biopsy is a good method for detecting and removing tumor [25].

The goal of cerebrum tumor surgery is to promote tumor rapture while preserving the underlying structure of the brain. This goal is tough to achieve since distinguishing tumor from non-tumor tissue is challenging. However, while routine histopathology provides information that can aid tumor depiction, it cannot be conducted repeatedly during surgery due to the time required to harden, segment, and recolor the tissue. Invigorated Raman dissipating (SRS) microscopy is a chemical compound imaging technology that allows for quick mapping of lipids and proteins within a single sample. This information can be transformed into pathology-like images. Despite the fact that SRS imaging has been utilized to quantify glioma cell thickness in murine orthotopic xenograft models and human cerebrum tumors, tissue heterogeneity in clinical mind cancers has yet to be fully quantified[26,27].

The Role of Focused Ultrasound in the Disruption of the Blood-Brain Barrier:

The use of focused ultrasound to disrupt the blood brain barrier (BBB) significantly, enhances the entry of BCNU through the barrier. Furthermore, using focused ultrasound before administering BCNU to tumor-embedded rats inhibited tumor migration and improved creature survival. This study expands on the utility and practicality of non-invasive focused ultrasound in improving the outcome of cerebrum tumor chemotherapy. Centered ultrasound disturbance of the BBB can likewise be utilized for additional top to bottom examinations on the advantages of locally expanding chemotherapeutic medication fixations, which at last could enhance the general nature of clinical treatment and watch over patients with mind tumors[28,29].

Magnetic nanoparticles: an advanced technology for malignant brain tumor imaging and therapy: Attractive nanoparticles (MNPs) focused on treatment and imaging of threatening cerebrum tumors. Usually conjugation of peptides or antibodies to the surface of MNPs permits focusing on the tumor cell surface and potential disturbance of dynamic flagging pathways show in tumor cells. Conveyance of nanoparticles to dangerous mind tumors speaks to an impressive test because of the nearness of the blood– cerebrum obstruction and invading disease cells in the ordinary mind. More up to date procedures allow better conveyance of MNPs fundamentally and by guide convection-upgraded conveyance to the mind. Consummation of a human clinical

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trial including direct infusion of MNPs into intermittent dangerous mind tumors for thermotherapy has built up their attainability, security and viability in patients. Future investigations are required to comprehend the promising effect of MNPs in the treatment of dangerous cerebrum tumors[30].

Correlated magnetic resonance imaging and Ultra-microscopy: (MRI-UM): Neo angiogenesis is important remedial focus in glioblastoma. Tumor imaging techniques are required to evaluate treatment impacts and malady movement. The tumor vasculature has been difficult to trace up to this point. To think about neo angiogenesis in glioma models, we've built together a combined appealing reverberation and optical toolbox. To study neovascularization, i*n vivo* attractive reverberation imaging (MRI) and correlative ultra-microscopy (UM) of *ex vivo* cleansed whole brains are combined. T2* imaging allows for the identification of single vessels in glioma progression and the subsequent quantification of neo vessels. Incomplete vascular standardization occurs as a result of pharmacological VEGF inhibition, with decreased vessel bore, thickness, and penetrability. Connected UM of fluorescently identified micro vessels in cleansed brains to resolve tumor microvasculature are used. UM settled run of the mill highlights of neo angiogenesis and tumor cell attack with a spatial determination of ~5 µm. MR-UM can be utilized as a stage for three-dimensional mapping and high-determination measurement of tumor angiogenesis [31,32].

CONCLUSION

With passing time and advancement new techniques are being introduced by the medical teams doing research all over the world. The advancement and new trends have shown that how new methods of diagnosis and treatment of cancers helped to explore new ways of treatment for the brain tumor. New diagnostic methods helped a lot to diagnose tumors quickly and at early stages. Advances in the field of cancer by the scientist have made it easy to diagnose cancer and its location.

REFERENCES

[1] Lauko A, Lo A, Ahluwalia MS, Lathia JD. Cancer cell heterogeneity & plasticity in glioblastoma and brain tumors. Semin Cancer Biol. 2022 Jul;82:162-175. doi: 10.1016/j.semcancer.2021.02.014.

[2] Yu Y, Hong H, Wang Y, Fu T, Chen Y, Zhao J et al. Clinical Evidence for Locoregional Surgery of the Primary Tumor in Patients with De Novo Stage IV Breast Cancer. Ann Surg Oncol. 2021 Sep;28(9):5059-5070. doi: 10.1245/s10434-021-09650-3.

[3] Dasari A, Shen C, Devabhaktuni A, Nighot R, Sorbye H. Survival According to Primary Tumor Location, Stage, and Treatment Patterns in Locoregional Gastroenteropancreatic High-grade Neuroendocrine Carcinomas. Oncologist. 2022 Apr 5;27(4):299-306. doi: 10.1093/oncolo/oyab039.

[4] Brandner S, McAleenan A, Jones HE, Kernohan A, Robinson T, Schmidt L et al. Diagnostic accuracy of 1p/19q codeletion tests in oligodendroglioma: A comprehensive meta-analysis based on a Cochrane systematic review. Neuropathol Appl Neurobiol. 2022 Jun;48(4):e12790. doi: 10.1111/nan.12790.

[5] Buerki RA, Horbinski CM, Kruser T, Horowitz PM, James CD, Lukas RV. An overview of meningiomas. Future Oncol. 2018 Sep;14(21):2161-2177. doi: 10.2217/fon-2018-0006.

[6] Brastianos PK, Galanis E, Butowski N, Chan JW, Dunn IF, Goldbrunner R et al. Advances in multidisciplinary therapy for meningiomas. Neuro Oncol. 2019 Jan 14;21(Suppl 1):i18-i31. doi: 10.1093/neuonc/noy136.

[7] Tubiana M, Feinendegen LE, Yang C, Kaminski JM. The linear no-threshold relationship is inconsistent with radiation biologic and experimental data. Radiology. 2009 Apr;251(1):13-22. doi: 10.1148/radiol.2511080671.

[8] Mustafa M, JamalulAzizi AR, Illzam EL, Nazirah A, Sharifa AM, Abbas SA. Lung cancer: risk factors, management, and prognosis. IOSR Journal of Dental and Medical Sciences. 2016;15(10):94-101.

[9] Prakash J, de Jong E, Post E, Gouw AS, Beljaars L, Poelstra K. A novel approach to deliver anticancer drugs to key cell types in tumors using a PDGF receptor-binding cyclic peptide containing carrier. J Control Release. 2010 Jul 14;145(2):91-101. doi: 10.1016/j.jconrel.2010.03.018.

[10] Frolkis M, Fischer MB, Wang Z, Lebkowski JS, Chiu CP, Majumdar AS. Dendritic cells reconstituted with human telomerase gene induce potent cytotoxic T-cell response against different types of tumors. Cancer Gene Therapy. 2003 Mar;10(3):239-49. doi.org/10.1038/sj.cgt.7700563.

[11] Mallidi S, Luke GP, Emelianov S. Photoacoustic imaging in cancer detection, diagnosis, and treatment guidance. Trends Biotechnol. 2011 May;29(5):213-21. doi: 10.1016/j.tibtech.2011.01.006.

[12] Madhusoodanan S, Ting MB, Farah T, Ugur U. Psychiatric aspects of brain tumors: A review. World J Psychiatry. 2015 Sep 22;5(3):273-85. doi: 10.5498/wjp.v5.i3.273.

[13] Reulecke BC, Erker CG, Fiedler BJ, Niederstadt TU, Kurlemann G. Brain tumors in children: initial

DOI:https://doi.org/10.54393/pbmj.v5i5.478

symptoms and their influence on the time span between symptom onset and diagnosis. J Child Neurol. 2008 Feb;23(2):178-83. doi: 10.1177/0883073807308692.

[14] Schroeder SR, Salomon MM, Galanter WL, Schiff GD, Vaida AJ, Gaunt MJ et al. Cognitive tests predict real-world errors: the relationship between drug name confusion rates in laboratory-based memory and perception tests and corresponding error rates in large pharmacy chains. BMJ Qual Saf. 2017 May;26(5):395-407. doi: 10.1136/bmjqs-2015-005099.

[15] Van den Berg PJ, Daoudi K, Steenbergen W. Review of photoacoustic flow imaging: its current state and its promises. Photoacoustics. 2015 Sep 1;3(3):89-99. doi.org/10.1016/j.pacs.2015.08.001.

[16] Brenner DJ, Hall EJ. Cancer risks from CT scans: now we have data, what next? Radiology. 2012 Nov;265(2):330-1. doi: 10.1148/radiol.12121248.

[17] Lee KW, Lo CP. Acute Cerebral Infarction Masked by a Brain Tumor. Case Reports in Neurology. 2011;3(2):179-84. doi.org/10.1159/000330302.

[18] De Mattos-Arruda L, Bottai G, Nuciforo PG, Di Tommaso L, Giovannetti E, Peg V et al. MicroRNA-21 links epithelial-to-mesenchymal transition and inflammatory signals to confer resistance to neoadjuvant trastuzumab and chemotherapy in HER2-positive breast cancer patients. Oncotarget. 2015 Nov 10;6(35):37269-80. doi: 10.18632/oncotarget.5495.

[19] Vaidyanathan R, Soon RH, Zhang P, Jiang K, Lim CT. Cancer diagnosis: from tumor to liquid biopsy and beyond. Lab on a Chip. 2019;19(1):11-34. doi: 10.1039/C8LC00684A.

[20] Simmons C, Miller N, Geddie W, Gianfelice D, Oldfield M, Dranitsaris G et al. Does confirmatory tumor biopsy alter the management of breast cancer patients with distant metastases? Ann Oncol. 2009 Sep;20(9):1499-1504. doi: 10.1093/annonc/mdp028.

[21] Noreen N, Palaniappan S, Qayyum A, Ahmad I, Imran M, Shoaib M. A deep learning model based on concatenation approach for the diagnosis of brain tumor. IEEE Access. 2020 Mar 5;8:55135-44. doi: 10.1109/access.2020.2978629.

[22] Dong H, Yang G, Liu F, Mo Y, Guo Y. Automatic brain tumor detection and segmentation using U-Net based fully convolutional networks. Inannual conference on medical image understanding and analysis 2017 Jul 11: 506-517. Springer, Cham. doi.org/10.1007/978-3-319-60964-5_44.

[23] Cao S, Strong MJ, Wang X, Moss WN, Concha M, Lin Z et al. High-throughput RNA sequencing-based virome analysis of 50 lymphoma cell lines from the Cancer Cell Line Encyclopedia project. J Virol. 2015 Jan;89(1):713-29. doi: 10.1128/JVI.02570-14.

[24] Yang W. Biomedical Applications of Stimulated Raman Scattering Microscopy (Doctoral dissertation).2017.

[25] Ji M, Orringer DA, Freudiger CW, Ramkissoon S, Liu X, Lau D et al. Rapid, label-free detection of brain tumors with stimulated Raman scattering microscopy. Sci Transl Med. 2013 Sep 4;5(201):201ra119. doi: 10.1126/scitranslmed.3005954.

[26] Petersen KD, Landsfeldt U, Cold GE, Petersen CB, Mau S, Hauerberg J et al. Intracranial pressure and cerebral hemodynamic in patients with cerebral tumors: a randomized prospective study of patients subjected to craniotomy in propofol-fentanyl, isoflurane-fentanyl, or sevoflurane-fentanyl anesthesia. Anesthesiology. 2003 Feb;98(2):329-36. doi: 10.1097/00000542-200302000-00010.

[27] Duffau H. The huge plastic potential of adult brain and the role of connectomics: new insights provided by serial mappings in glioma surgery. Cortex. 2014 Sep 1;58:325-37. doi.org/10.1016/j.cortex.2013.08.005.

[28] Liu HL, Hua MY, Yang HW, Huang CY, Chu PC, Wu JS et al. Magnetic resonance monitoring of focused ultrasound/magnetic nanoparticle targeting delivery of therapeutic agents to the brain. Proc Natl Acad Sci U S A. 2010 Aug 24;107(34):15205-10. doi: 10.1073/pnas.1003388107.

[29] Daneman R, Prat A. The blood-brain barrier. Cold Spring Harb Perspect Biol. 2015 Jan 5;7(1):a020412. doi: 10.1101/cshperspect.a020412.

[30] Wankhede M, Bouras A, Kaluzova M, Hadjipanayis CG. Magnetic nanoparticles: an emerging technology for malignant brain tumor imaging and therapy. Expert Rev Clin Pharmacol. 2012 Mar;5(2):173-86. doi: 10.1586/ecp.12.1.

[31] Kirschbaum K, Sonner JK, Zeller MW, Deumelandt K, Bode J, Sharma R et al. In vivo nanoparticle imaging of innate immune cells can serve as a marker of disease severity in a model of multiple sclerosis. Proc Natl Acad Sci U S A. 2016 Nov 15;113(46):13227-13232. doi: 10.1073/pnas.1609397113.

[32] Breckwoldt MO, Bode J, Kurz FT, Hoffmann A, Ochs K, Ott M et al. Correlated magnetic resonance imaging and ultramicroscopy (MR-UM) is a tool kit to assess the dynamics of glioma angiogenesis. Elife. 2016 Feb 2;5:e11712. doi: 10.7554/eLife.11712

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Review Article

The Association of COVID-19 Outbreak with Cancer Patients

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ABSTRACT

SARS-CoV-2 was perceived in China which forms a pandemic within weeks and affected the whole world population. Unfortunately, some people who were already suffering from cancer were affected severely and had more disease severity. COVID-19 badly affected cancer diagnosis and treatment resulting in increased mortality rate. A major issue that cancer patients had to face was a lack of access to necessary health care. The "Renin-angiotensin-aldosterone system (RAAS)" plays a role in cancer development, it was observed that COVID-19 affects the functioning of RAAS by affecting the Angiotensin-Converting Enzyme -2 (ACE-2) receptor with the assistance of spike proteins to gain entrance into the cells. It was proved that the ACE 2 receptor is a major link between cancer and COVID-19. Cancer patients are very sensitive to COVID-19 due to "macrophages". Macrophages induce inflammatory responses in both cancer and COVID-19 patients. It was also observed that COVID-19 may create a microenvironment for cancer development by increasing the activation of macrophages, and neutrophils as well as causing the overproduction of proinflammatory cytokines.

INTRODUCTION

Corona Virus-2 (SARS-CoV-2), the "acute respiratory syndrome" was first reported in "Wuhan", China, in December 2019, leading to a devastating outbreak of COVID-19. It became a pandemic in just a few weeks with over 30 million confirmed cases and over 0.2 million deaths, related to it. Around 15% of infected people had severe symptoms that demanded hospitalization and 3-10% of patients died because of Acute Respiratory Distress Syndrome (ARDS) [1-3]. Aside from an increased risk of contracting SARS-CoV-2, cancer patients also experienced more severe COVID-19 effects and/or have their prognosis impacted indirectly by delaying treatment [4]. A study was recently conducted with 105 cancer patients and 536 non-cancerous patients. According to these studies, cancer patients were found to have severe symptoms. Hematological, lungs, and stage IV cancer patients have shown the most severe symptoms and metastatic cancer patients had a increased death rate [5]. Another study shows that cancer patients (age around 63.1 years deteriorated quickly compared to younger cancer patients.) According to Desai et al., cancer patients have a two percent prevalence of COVID-19, and the patients who recently received chemotherapy or surgery had a75% highest risk of serious COVID-19 infection than COVID-19 patients without cancer, which had 43% chances [6]. In a study conducted by Zhang et al., 15 of 28 COVID-19 infected cancer patients experienced more severe COVID-19 signs and symptoms, and eight patients died. In these patients' lung, esophageal and breast cancer are the most common and he also shows that those patients who were on anti-cancer therapy developed more severe symptoms than those who were not on any cancer-related therapy [7].

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Mehta et al., showed that the death rate of COVID-19 infected patients was increasingly high in patients with lung cancer almost 55% with gastrointestinal cancer, almost 38% with pancreatic cancer, almost 67% with colorectal and 38% with gynecological cancer [8].
These studies are also shown graphically (Figure 1).

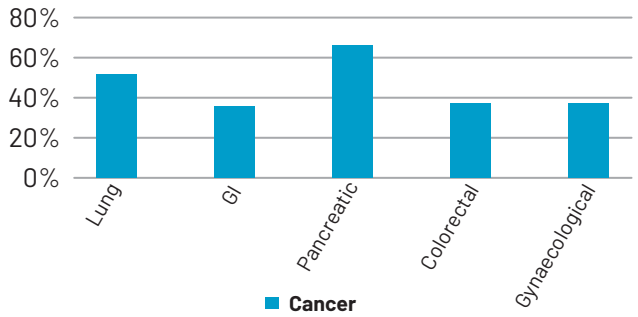

Figure 1: Death rate of COVID-19 in cancer patients

Cancer Care: Cancer care is also affected by COVID-19 because the routine checkups of cancer patients are highly delayed due to the pandemic as a reduction in routine checkups and mammography of healthy women also leads to ignorance of early symptoms of Breast Cancer which automatically leads to delayed diagnosis and treatment. The mortality rate of cancer also increases in the normal person [9]. Wang and Zhang said that the primary risk to cancer patients during the COVID-19 pandemic is slender access to medical care and the failure to get proper medical services promptly, especially in more hazardous epidemic areas like "Wuhan, China", where health staff and medical care facilities are in scarcity. Adverse effects of treatment in pulmonary cancer patients administered with the regulator of immune response (such as "severe myocarditis and pneumonitis") must be monitored by health care providers; such effects may harm the patients' endurance; thus, it is critical to investigate and treat such issues as soon as possible [10]. According to a newly published retrospective cohort analysis a study was conducted in which twenty-eight cancerous patients with COVID-19 were recruited from hospitals in "Wuhan", and this study states that patients infected with COVID-19 of cancer have more risk of poor clinical follow-ups, serious events, and impermanence. Therapy for cancer within 2weeks of COVID-19 detection was considered hazardous for serious events among these grave consequences that have been observed are acute respiratory distress syndrome which is at the risk of 28.6%, septic shock at three points six percent and acute myocardial infarction at 3.6% risk [7] (Figure 2).

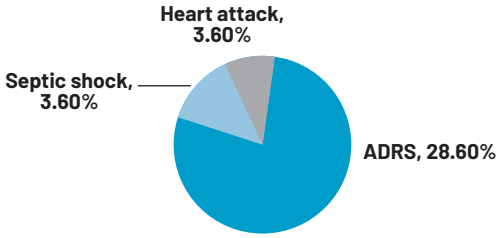

Figure 2: Risks that can be observed if cancer treatment is continued within 14 days of COVID-19 diagnosis

Mode of Action: In cancer biology, the "renin-angiotensin-aldosterone system" (RAAS) plays a role in the tumor cell modification and proliferation and cancer cells and it is also observed that COVID-19 affects the functioning of RAAS by using the angiotensin-converting enzyme -2 (ACE-2) Receptor to get entrance in the cell.

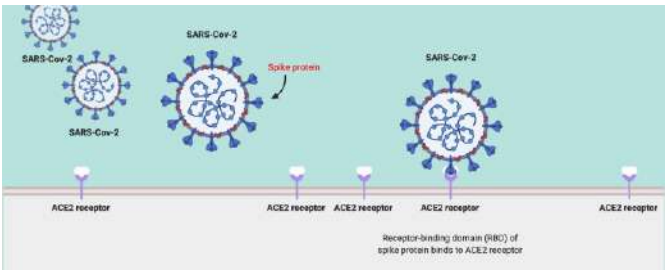

Figure 3: SARS-COV-2 binding to ACE receptor [11]

SARS-CoV2 when enters the body attaches with the ACE-2 receptor present on the exterior side of the host cell and causes diseases [12] (Figure 3). This receptor ACE-2 is found in the esophagus, nose, lungs, heart, stomach, colon, ileum, liver, and cornea, testis [13]. There is a protein called spike(S) protein that causes the virus attachment with the ACE-2, receptor, and these spike proteins are split by "host proteases such as transmembrane-protease-serine-2 (TMPRSS-2) cathepsin L, and furin." This S protein also helps in membrane breakdown which causes the excretion of viral RNA into the cytosol of the target cell [14,15].

Spike protein: The S protein, which is 180–200 kDa in size, is made up of two non-covalently linked subunits: an N-terminal subunit (S1) and a membrane-anchored subunit (S2) with separate roles. S is cleaved at the junction between the S1 and S2 subunits in many CoVs, although they remain non-covalently connected in the prefusion structure. As a result, when the virus interacts with the host cell, the S protein undergoes significant morphological changes, allowing the virus to connect to the host cell's membrane. The spikes are overspread with polysaccharide molecules to avoid detection by the host cell's immune system during entry [16,17]. 1273 AA is the length of the spike protein of SARS- CoV 2 and comprises of one peptide (amino acids 1–13). The "S1 subunit", also known as the N-terminal subunit contains 14-685 remnants of

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amino acid and 686–1273 residues make up the S2 subunit. In the "S1 subunit", there is the N-terminal sector and receptor-binding sector. The fusion-peptide, heptapeptide repeat sequence 1 (HR1), HR2, TM domain, and cytoplasm domain are all found in the "S2 subunit [18]. Visually it is observed that the viral fragments are encircled by a bulging, crown-shaped halo which is made up of S-protein trimers. According to the structural presentation of coronavirus S-protein monomers, the S1 forms the bulbous head and the S2 subunits from the stalk region [19]. Electron microscope with Cryo technique was used to analyze the atomic structure of the "SARS-CoV-2 trimeric S-protein" as well, which reveals the various configurations of the S-RBD sector in closed and open states, as well as their relevant activities [15,20]. In its native condition, the CoV S protein is an inactive precursor. During infection, target cell proteases such TMPRSS2 and furin split the S-protein into S1 and S2 subunits, which is essential for activating the membrane fusion sector after viral entry. The S-protein of "SARS-CoV-2" is broken into S1 and S2 subunits by proteases, similar to other coronaviruses, and the serine-protease "TMPRSS2" is employed as a primer [14,21,22]. In the infection S- proteins found on viral surfaces play an essential role. It is a "trimeric class-I TM glycoprotein", present in all domains of CoVs and other viruses including Ebola (Ebola virus glycoprotein), HIV (HIV glycoprotein 160, Env), influenza (influenza hemagglutinin, HA), paramyxovirus (paramyxovirus F), and paramyxovirus (paramyxovirus F). SARS-S CoV-2 is, similar to other corona-viruses, is also found to be a part of the identification of receptor, cell bonding, and fusion during viral infections. As a result, spike protein is only found in CoVs and similar viruses, and their primary target site is the ACE 2 receptor, which is abundant in cancer patients to prove this hypothesis scientists performing experiments [23-26].

The Knot between COVID-19 and Cancer: In the pathogenicity of the virus, the importance of the ACE-2 receptor was examined by inoculating a virus in a mice ACE-2 bearing transgenic mice. It was observed that ACE-2 infected mice lost weight and virus replication in the lungs as well as interstitial pneumonia, lymphocytes, and macrophage invasion in the alveolar interstitium were observed. There is also a macrophage buildup in the alveolar cavities so the viral antigens were found in the "bronchial and alveolar epithelial cells, also macrophages". On the second side, wild-type mice were not affected by the virus, because they do not contain human ACE-2 receptors. So, this experiment confirms the virulence of the virus only in those mice which contain human ACE-2 receptors [27]. According to a recent study, the appearance of ACE-2 in the lungs appears to rise with the years. People over the age of 60 years, as well as those with a weakened immune system, have been demonstrated to be particularly sensitive to COVID-19 infection, so this proves that ACE-2 expression increases in the lungs as the age increases. Moreover, ACE-2 expression is also found to be raised in the lungs of a patient who is a smoker or those patients who are suffering from smoking-related lung diseases i.e., lung cancer [28-31]. There is another relation between COVID-19 and cancer as is mentioned before host-protease TMPRSS-2, essential for "SARS CoV-2" to penetrate the target cell and isolate RNA of virus, these proteins are androgens regulatory genes that has been discovered to be significantly elevated in the prostate cancer as the "androgen's receptor" is found in "lungs and Prostate cells" it could play an important role in TMRSS-2 expression in these tissues [32]. A study found that "Prostate cancer patients" with "Androgen deprivation therapy" (ADT) experienced major depletion in COVID-19 patients compared to those patients who did not receive ADT or had other forms of cancer [33]. As in these studies, we observed a link between cancer and COVID-19 but there are some differences as well which are given below (Table 1),

Cancer	COVID-19
Series of genetic disease: genetic predisposition, DNA mutation	Single infectious disease
Environmentally influenced by: Inflammation, Microbiome	Environmentally influenced by ACE-2 receptor
Time duration is from month to year	Time duration from hours to days.
asymptomatic screening	Symptomatic screening

Table 1: Difference between cancer and COVID-19 [34]

Susceptibility of cancer patients toward COVID-19: According to all these previous studies, a question arises how does a patient become more susceptible to COVID-19? The answer to this question would be "macrophages" because they play a key role in the erythrogenic responses related to cancer and COVID-19. In COVID-19 infection, macrophages M-1 is activated and this activation is linked to "macrophage activating syndrome (MAS), cytokine storm, lymphopenia, endothelial damage, and an increase in intravascular blood coagulation" whereas in cancer patients macrophages M-2 is activated which suppresses the immune response while promoting tumor development as a result of immune-suppression the response against virus is compromised making cancer patients more porn viral infection [35]. SARS -CoV-2 like many other onco-viruses induces inflammation however it is not confirmed that this virus contains tumorigenic properties. When COVID-19 occurs in a patient the level of cytokines (IL-6) is raised greatly. This increased level of IL-6 initiates the inflammatory indicating pathway causing a cytokine storm

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and this condition indicates that "SARS-CoV-2" may contain carcinogenic abilities. There is a previous study about coronavirus endoribonuclease Nsp-15, interacting with tumor suppressor retinoblastoma protein, due to this there is a downregulation of retinoblastoma protein causing the alteration of gene expression and causing an increase in cell division and growth [36,37].

Association of COVID-19 with Cancer: During recent studies, it was suggested that SAR-CoV-2 may provide a preferable environment that helps in the growth of cancer cells and it also initiates the formation of constituents that initiate inactive cancer. The human immune system during COVID-19 exhibits increased "activation of macrophages neutrophils and monocytes as well as overproduction of proinflammatory cytokines, and lymphopenia also occurs these activated neutrophils secrete a substance called neutrophil extracellular traps (NETs)". It is a webby structure of DNA and protein and it causes tissue injury. A recent study revealed increased neutrophil infiltration in the lungs of deceased COVID-19 patients during autopsy. Another study showed that NETs are involved in the generation of immune thrombosis in COVID-19 patients. It's suggested that NETs could reactivate dormant cancer cells in the COVID-19 inspired pro-inflammatory environment and increase the risk of cancer recurrence and metastasis [38]. From this discussion, it is indicated that the coronavirus may possess the ability to cause cancer and may promote carcinogenesis, but further research work is required to understand the tumorigenic activity of coronaviruses

CONCLUSION

During recent years, the COVID-19 pandemic brings misery to mankind. Mankind is trying her best to eradicate this deadly virus and in this situation cancer patients suffer more because SARS-CoV-2 badly affects the health care systems which are dealing with cancer diagnosis and treatment. Scientists found a molecular knot between COVID-19 and cancer which includes "ACE-2 pro-inflammatory cytokines" and this evidence might help to cope with the fatal attack of COVID-19 and cancer but still more work is required. Scientific research communities must conduct detailed studies which will assist us to gain knowledge about the interaction between COVID-19 and cancer so that we can effectively treat those cancer patients that are affected by COVID-19.

REFERENCES

[1] Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA. 2020 Apr 7;323(13):1239-1242. doi: 10.1001/jama.2020.2648.

[2] Terpos E, Engelhardt M, Cook G, Gay F, Mateos MV, Ntanasis-Stathopoulos I et al. Management of patients with multiple myeloma in the era of COVID-19 pandemic: a consensus paper from the European Myeloma Network (EMN). Leukemia. 2020 Aug;34(8):2000-2011. doi: 10.1038/s41375-020-0876-z.

[3] Mian H, Grant SJ, Engelhardt M, Pawlyn C, Bringhen S, Zweegman S et al. Caring for older adults with multiple myeloma during the COVID-19 Pandemic: Perspective from the International Forum for Optimizing Care of Older Adults with Myeloma. J Geriatr Oncol. 2020 Jun;11(5):764-768. doi: 10.1016/j.jgo.2020.04.008.

[4] Dai M, Liu D, Liu M, Zhou F, Li G, Chen Z et al. Patients with Cancer Appear More Vulnerable to SARS-CoV-2: A Multicenter Study during the COVID-19 Outbreak. Cancer Discov. 2020 Jun;10(6):783-791. doi: 10.1158/2159-8290.CD-20-0422.

[5] Liang W, Guan W, Chen R, Wang W, Li J, Xu K et al. Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China. Lancet Oncol. 2020 Mar;21(3):335-337. doi: 10.1016/S1470-2045(20)30096-6.

[6] Desai A, Sachdeva S, Parekh T, Desai R. COVID-19 and Cancer: Lessons From a Pooled Meta-Analysis. JCO Glob Oncol. 2020 Apr;6:557-559. doi: 10.1200/GO.20.00097.

[7] Zhang L, Zhu F, Xie L, Wang C, Wang J, Chen R et al. Clinical characteristics of COVID-19-infected cancer patients: a retrospective cas.e study in three hospitals within Wuhan, China. Ann Oncol. 2020 Jul;31(7):894-901. doi: 10.1016/j.annonc.2020.03.296.

[8] Mehta V, Goel S, Kabarriti R, Cole D, Goldfinger M, Acuna-Villaorduna A et al. Case Fatality Rate of Cancer Patients with COVID-19 in a New York Hospital System. Cancer Discov. 2020 Jul;10(7):935-941. doi: 10.1158/2159-8290.CD-20-0516.

[9] Alagoz O, Lowry KP, Kurian AW, Mandelblatt JS, Ergun MA, Huang H et al. Impact of the COVID-19 Pandemic on Breast Cancer Mortality in the US: Estimates From Collaborative Simulation Modeling. J Natl Cancer Inst. 2021 Nov 2;113(11):1484-1494. doi: 10.1093/jnci/djab097.

[10] Wang H, Zhang L. Risk of COVID-19 for patients with cancer. Lancet Oncol. 2020 Apr;21(4):e181. doi: 10.1016/S1470-2045(20)30149-2.

[11] Khan IH, Zahra SA, Zaim S, Harky A. At the heart of COVID-19. Journal of cardiac surgery. 2020

DOI:https://doi.org/10.54393/pbmj.v5i5.438

Jun;35(6):1287-94. doi.org/10.1111/jocs.14596.
[12] Wu F, Zhao S, Yu B, Chen YM, Wang W, Song ZG et al. Author Correction: A new coronavirus associated with human respiratory disease in China. Nature. 2020 Apr;580(7803):E7. doi: 10.1038/s41586-020-2202-3.
[13] Sungnak W, Huang N, Bécavin C, Berg M, Queen R, Litvinukova M et al. SARS-CoV-2 entry factors are highly expressed in nasal epithelial cells together with innate immune genes. Nat Med. 2020 May;26(5):681-687. doi: 10.1038/s41591-020-0868-6.
[14] Hoffmann M, Kleine-Weber H, Schroeder S, Krüger N, Herrler T, Erichsen S et al. SARS-CoV-2 Cell Entry Depends on ACE2 and TMPRSS2 and Is Blocked by a Clinically Proven Protease Inhibitor. Cell. 2020 Apr 16;181(2):271-280.e8. doi: 10.1016/j.cell.2020.02.052.
[15] Walls AC, Park YJ, Tortorici MA, Wall A, McGuire AT, Veesler D. Structure, Function, and Antigenicity of the SARS-CoV-2 Spike Glycoprotein. Cell. 2020 Apr 16;181(2):281-292.e6. doi: 10.1016/j.cell.2020.02.058.
[16] Watanabe Y, Allen JD, Wrapp D, McLellan JS, Crispin M. Site-specific glycan analysis of the SARS-CoV-2 spike. Science. 2020 Jul 17;369(6501):330-333. doi: 10.1126/science.abb9983.
[17] Bosch BJ, van der Zee R, de Haan CA, Rottier PJ. The coronavirus spike protein is a class I virus fusion protein: structural and functional characterization of the fusion core complex. J Virol. 2003 Aug;77(16):8801-11. doi: 10.1128/jvi.77.16.8801-8811.2003.
[18] Xia S, Zhu Y, Liu M, Lan Q, Xu W, Wu Y et al. Fusion mechanism of 2019-nCoV and fusion inhibitors targeting HR1 domain in spike protein. Cell Mol Immunol. 2020 Jul;17(7):765-767. doi: 10.1038/s41423-020-0374-2.
[19] Tang T, Bidon M, Jaimes JA, Whittaker GR, Daniel S. Coronavirus membrane fusion mechanism offers a potential target for antiviral development. Antiviral Res. 2020 Jun;178:104792. doi: 10.1016/j.antiviral.2020.104792.
[20] Wrapp D, Wang N, Corbett KS, Goldsmith JA, Hsieh CL, Abiona O et al. Cryo-EM structure of the 2019-nCoV spike in the prefusion conformation. Science. 2020 Mar 13;367(6483):1260-1263. doi: 10.1126/science.abb2507.
[21] Bertram S, Dijkman R, Habjan M, Heurich A, Gierer S, Glowacka I et al. TMPRSS2 activates the human coronavirus 229E for cathepsin-independent host cell entry and is expressed in viral target cells in the respiratory epithelium. J Virol. 2013 Jun;87(11):6150-60. doi: 10.1128/JVI.03372-12.
[22] Du L, Kao RY, Zhou Y, He Y, Zhao G, Wong C et al. Cleavage of spike protein of SARS coronavirus by protease factor Xa is associated with viral infectivity. Biochem Biophys Res Commun. 2007 Jul 20;359(1):174-9. doi: 10.1016/j.bbrc.2007.05.092.
[23] Weissenhorn W, Dessen A, Calder LJ, Harrison SC, Skehel JJ, Wiley DC. Structural basis for membrane fusion by enveloped viruses. Mol Membr Biol. 1999 Jan-Mar;16(1):3-9. doi: 10.1080/096876899294706.
[24] Gui M, Song W, Zhou H, Xu J, Chen S, Xiang Y et al. Cryo-electron microscopy structures of the SARS-CoV spike glycoprotein reveal a prerequisite conformational state for receptor binding. Cell Res. 2017 Jan;27(1):119-129. doi: 10.1038/cr.2016.152.
[25] Hulswit RJ, de Haan CA, Bosch BJ. Coronavirus Spike Protein and Tropism Changes. Adv Virus Res. 2016;96:29-57. doi: 10.1016/bs.aivir.2016.08.004.
[26] Yan R, Zhang Y, Li Y, Xia L, Guo Y, Zhou Q. Structural basis for the recognition of SARS-CoV-2 by full-length human ACE2. Science. 2020 Mar 27;367(6485):1444-1448. doi: 10.1126/science.abb2762.
[27] Bao L, Deng W, Huang B, Gao H, Liu J, Ren L et al. The pathogenicity of SARS-CoV-2 in hACE2 transgenic mice. Nature. 2020 Jul;583(7818):830-833. doi: 10.1038/s41586-020-2312-y.
[28] Barbry P, Muus C, Luecken M, Eraslan G, Waghray A, Heimberg G et al. Integrated analyses of single-cell atlases reveal age, gender, and smoking status associations with cell type-specific expression of mediators of SARS-CoV-2 viral entry and highlights inflammatory programs in putative target cells.
[29] Sidaway P. COVID-19 and cancer: what we know so far. Nat Rev Clin Oncol. 2020 Jun;17(6):336. doi: 10.1038/s41571-020-0366-2.
[30] Pinto BGG, Oliveira AER, Singh Y, Jimenez L, Gonçalves ANA, Ogava RLT et al. ACE2 Expression Is Increased in the Lungs of Patients With Comorbidities Associated With Severe COVID-19. J Infect Dis. 2020 Jul 23;222(4):556-563. doi: 10.1093/infdis/jiaa332.
[31] Smith JC, Sausville EL, Girish V, Yuan ML, Vasudevan A, John KM et al. Cigarette Smoke Exposure and Inflammatory Signaling Increase the Expression of the SARS-CoV-2 Receptor ACE2 in the Respiratory Tract. Dev Cell. 2020 Jun 8;53(5):514-529.e3. doi: 10.1016/j.devcel.2020.05.012.
[32] Stopsack KH, Mucci LA, Antonarakis ES, Nelson PS, Kantoff PW. TMPRSS2 and COVID-19: Serendipity or Opportunity for Intervention? Cancer Discov. 2020 Jun;10(6):779-782. doi: 10.1158/2159-8290.CD-20-0451.
[33] Montopoli M, Zumerle S, Vettor R, Rugge M, Zorzi M,

DOI:https://doi.org/10.54393/pbmj.v5i5.438

Catapano CV et al. Androgen-deprivation therapies for prostate cancer and risk of infection by SARS-CoV-2: a population-based study (N = 4532). Ann Oncol. 2020 Aug;31(8):1040-1045. doi: 10.1016/j.annonc.2020.04.479.

[34] Newman LA, Winn RA, Carethers JM. Similarities in risk for COVID-19 and cancer disparities. Clinical Cancer Research. 2021 Jan 1;27(1):24-7. doi.org/10.1158/1078-0432.CCR-20-3421.

[35] Sica A, Colombo MP, Trama A, Horn L, Garassino MC, Torri V. Immunometabolic Status of COVID-19 Cancer Patients. Physiol Rev. 2020 Oct 1;100(4):1839-1850. doi: 10.1152/physrev.00018.2020.

[36] Bhardwaj K, Liu P, Leibowitz JL, Kao CC. The coronavirus endoribonuclease Nsp15 interacts with retinoblastoma tumor suppressor protein. J Virol. 2012 Apr;86(8):4294-304. doi: 10.1128/JVI.07012-11.

[37] Geisslinger F, Vollmar AM, Bartel K. Cancer Patients Have a Higher Risk Regarding COVID-19 - and Vice Versa? Pharmaceuticals (Basel). 2020 Jul 6;13(7):143. doi: 10.3390/ph13070143.

[38] Francescangeli F, De Angelis ML, Baiocchi M, Rossi R, Biffoni M, Zeuner A. COVID-19-Induced Modifications in the Tumor Microenvironment: Do They Affect Cancer Reawakening and Metastatic Relapse? Front Oncol. 2020 Oct 26;10:592891. doi: 10.3389/fonc.2020.592891

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Original Article

Anatomical Sites of Superficial Basal Cell Cancers Demonstrate Higher Rates of Mixed Histology

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ABSTRACT

Historically, "aggressive" histologic subsets (HSs) of basal cell carcinoma (BCC) seem to be more likely to statistically exhibit Subclinical extension and require more phases during Mohs micrographic surgery (MMS) and consequently larger margins upon excision. The "Mohs Suitable Use Criteria (MAUC)" for the most appropriate therapy of superficial basal cell carcinoma. **Objective:** To evaluate if aggressive subtypes of superficial Basal Cell Carcinoma are common among healthy, immunocompromised patients and high-risk anatomical sites. **Methods:** The study was carried out in Khyber Teaching Hospital Peshawar, from November 2021-march to 2022, A total of 100 Mohs surgeries on superficial basal cell carcinoma were performed. Under light microscope slides were examined for any pattern of histology besides superficial basal cell carcinoma for statistical analysis MAU anatomical site healthy individuals and immuno compromised patients were grouped accordingly. **Results**: Among health and immuno compromised individuals' zone H and zone L were significantly increased in mixed histology. While in healthy individuals' the association between L Zone and M zone was incredibly significant but in immunocompromised was not significant. **Conclusions:** The mixed histology of SBCC was higher in the head and neck region. Researchers say that the MAUC scoring technique for SBCC is supported by a high incidence in SBCC of the head and neck.

INTRODUCTION

The "Mohs Appropriate Use Criteria" (MAUC) was developed by a joint effort in 2012 [1]. For the treatment of skin carcinoma, A guideline supported by evidence was to be provided to help in clinical management [2,3]. Mohs surgery relevance was determined using a scoring system based on cancer type, a feature of histology, medical diameter, anatomical site, and patient immunological response [4,5]. The MAUC recommendations were based on accurate evidence available, and circumstances that were not supported by scientific research were instructed by the review panel's expert opinion [6]. In the current edition of the MAUC, most superficial basal cell carcinomas

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are considered "appropriate" for Mohs surgery [7,8]. Mohs surgery should be avoided in cases of SBCC because it is "uncertain" or "inappropriate," according to the authors, because of the low skin invasion [9]. Due to the fact that many SBCCs may concurrently have more high growth patterns over non-surgical therapy methods. This is called mixed histology (MH) and the proportion of MH in all basal carcinoma specimens ranges from 32% to 40% [10,11]. Kamyab-Hesari et al., 2017 compared the histological Basal Carcinoma of punch biopsy with consecutive excisions, patterns of aggressive growth are missed by the initial biopsies in 38% of patients [12,14]. As a result, these researchers assume that Mohs surgery may be a good option for many SBCCs [14,15]. They had little choice but to rely heavily on their own personal history in making their judgments of these tumors because of SBCC's efforts and the success of Mohs surgery in curing this illness [16]. The MAUC, on the other hand, is meant to be a continuing process that evolves in response to the best available data [17-19]. The Mohs surgery-treated superficial basal carcinomas (SBCCs) are the topic of this study, which aims to evaluate the frequency with which SBCCs disclose MH as a concomitant nodular or high-risk subtype that was not found on the initial biopsy. Patients were divided into groups based on their immune systems' ability to operate and where they were located in the body. Lesions were categorized as the individual risk that uses the same criteria for a diagnosis that underpins the current MAUC grading system.

METHODS

The study was carried out in Khyber Teaching Hospital Peshawar, from November 2021-March to 2022, A total of 100 Mohs surgeries on superficial basal cell carcinoma were performed. Under light microscope slides were examined for any pattern of histology besides superficial basal cell carcinoma for statistical analysis MAU anatomical site healthy individuals and immuno-compromised patients were grouped accordingly. During the study period, the hospital pathology search was undertaken to find all biopsies identified as SBCC. Patients with SBCC who could benefit from Mohs surgery were identified by comparing their medical record numbers with those in the Mohs surgery case log. The Mohs and biopsy reports were used to investigate the anatomical location. A dermatologist examined all Moh slides for the presence of distinct histological subtypes. At the time of the slide inspection, we didn't know the patient's immunological state or anatomical location. "Superficial basal carcinoma the pattern of histology was assessed by Nodular Basal carcinoma, as the depth of invasion not extending beyond the superficial papillary plexus high-risk BCC (inclusive of morphea form, infiltrative, and micro- nodular patterns) Histologic patterns recorded included superficial BCC" The review of histology of slides was followed by the immune status of patients like pharmacologic immuno-suppression/ transplantation of organ/hematological disorders.

The anatomical zones were classified on MAUC criteria

"Zone H = central face, eyelids, eyebrows, nose, lips, chin, ear, periauricular sulci, temple, hands, feet, ankles, genitalia, nipples, and nail units"

"Zone M = cheeks, forehead, scalp, neck, jawline, and a pretibial leg"

"Zone L = trunk and extremities excluding areas included in Zone H"

The Chi-Square test, with a significance threshold of p0.05., was used to determine the relative frequency of MH in the study populations and subgroups.

RESULTS

The 2015 pathological reports were obtained from the pathology department, while in total 200 patients had undergone Moh surgery. There were 133 patients with characterized tumors on Mohs after the histopathologic examination. As shown in Table 1 the descriptive analysis of the study population, describes tumor characteristics such as the MAUC anatomical area, the immune state of patients, and the histology observed.

Cases	Sites involved	Anatomical Zone H	Anatomical Zone M	Anatomical Zone L
Total cases	100	46	56	34
MH mixed histology	78	32	35	7
SBCC	57	13	20	26
Immunocompromised cases	36	14	12	10
Mh Mixed Histology	34	11	10	5
SBCC	24	3	9	4
Healthy Cases	100	33	45	26
Mh Mixed Histology	53	21	27	5
SBCC	47	11	17	21

Table 1: Shows the descriptive study involved

Table 2 shows the frequency of Mixed Histology documented in several MAUC anatomical locations and then categorized by patient immunological condition. As a result, the facial/ head and neck tumor had an increased significance level of mixed histology, unlike tumor extremities and trunk. "When Zone H as compared to Zone L, all patients had a significantly higher risk of Mixed Histology" (p =.0001), Immunocompromised individuals (p =.48), as well as healthy patients (p =.001). Similarly, for all patients (p=.003) and healthy was (p=.003), Zone M had a considerably greater risk of Mixed Histology than Zone L,

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however immunocompromised patients do not have statistical significance (p =20)(Table 3). The prevalence of Mixed Histology within a certain MAUC anatomic zone is dependent on patients' immunological state as part of their investigation. Variations in the patient immunological state did not describe any significant increases in Mixed Histology within a single anatomic zone.

Anatomical site involved	Total cases %	healthy individuals %	Immunocompromised status%
All sites involved	59	55	71
Zone H MAUC	74	70	86
Zone M MAUC	66	65	74
Zone L MAUC	25	18	45

Table 2: Shows the mixed histology frequency

Groups Comparison	Rates Relatives of Mixed Histology	P-Value
All patients: Zone H vs Zone L	74% vs 25 %	.0001
Healthy: Zone H vs Zone L	70% vs 18%	.001
Immunocompromised: Zone H vs Zone L	86% vs 45%	.48
All patients: Zone M vs Zone L	66% vs 25%	.0003
Healthy: Zone M vs Zone L	65%vs 18%	.0003
Immunocompromised: Zone M vs Zone L	74%vs 44%	.20
H zone: healthy vs immunocompromised	70% vs 86%	.29
M zone: healthy vs immunocompromised	65% vs 73%	.58
L zone: healthy vs immunocompromised	18% vs 45%	.089

Table 3: Shows the statistical analysis

DISCUSSION

The researcher investigated the incidence of Mixed Histology in SBCC among various MAUC anatomic zones and adjusted for changes in patient immunological status in order to give scientific data directly applied to the MAUC. The data collected in this study indicate that there is a distinct anatomical component to tumor activity. The incidence of Mixed Histology SBCC on the head is higher than on the extremities or trunk. There was a considerably greater rate of MIXED Histology in tumors found in Zones H / M than in Zone l across the total study population (74% and 66% vs 25%) accordingly. When separating healthy (55%and 70% vs 18%) or immunocompromised patients (71% and 86% vs 74%), the only analysis of subgroup among immunocompromised patients that could be considered incredibly significant statistically was one that compared L Zone to M Zone. Most SBCCs of Zones H and M are now classified by the MAUC system as "suitable" for Mohs surgery because of their nodular/high-risk characteristics (best outcome, 65%; worst-case scenario, 85%). In 2016, Bartos V et al., and Ghanadan A et al., studied Mixed Histology in Basal Cell carcinoma at scales ranging from 32% to 40% [20-22]. The authors wanted to get identical results for SBCC particularly, hence these trials were conducted on index biopsy of any type of Basal carcinoma. The researchers found a 58% MH ratio across all index sBCC biopsies in their study cohort. This figure is about 20% to 30% higher than any previous report's value for BCC in general in the literature. According to this research, SBCC has a larger likelihood of mixed histology (MHC) than an arbitrary Basal Carcinoma of any category, and about 60% of all cases might likely get poor therapy if Mohs surgery is usually seen as "inappropriate" [23-25]. All anatomical locations were shown to have a higher prevalence of mixed histology in immunosuppressed individuals, with an overall rate of 70% and as high as 86% in the most at-risk area. The frequency of mixed histology tumors in Zone L is nearly three times higher in immunosuppressed patients than in healthy ones, even though no subgroup correlations were statistically significant (45% vs. 18%, p-value. 089). This difference is statistically significant in a larger sample population. Even though the patient's immunological condition has little influence on whether a given SBCC is Mohs-appropriate in Zones L under the existing MAUC, this information is nevertheless useful in determining therapy decisions. According to the findings of the researchers, over half of the SBCCs found inside Zone L in immunocompromised persons had a nodular feature or worse. Mohs surgery is regarded as "suitable" for these patients. The patient's immunological status may have an impact on the present grade of Zone L SBCC lesions, hence a thorough study is necessary.

CONCLUSION

The findings indicate that SBCC in the head and neck area has a greater rate of Mixed Histology, providing good evidence for the standard MAUC scoring. In light of these findings, modifying the MAUC in a way that prevents patients from undergoing SBCC surgery on high-risk anatomical locations would be erroneous.

REFERENCES

[1] Hoorens I, Vossaert K, Ongenae K, Brochez L. Is early detection of basal cell carcinoma worthwhile? Systematic review based on the WHO criteria for screening. Br J Dermatol. 2016 Jun;174(6):1258-65. doi: 10.1111/bjd.14477.

[2] Christenson LJ, Borrowman TA, Vachon CM, Tollefson MM, Otley CC, Weaver AL et al. Incidence of basal cell and squamous cell carcinomas in a population younger than 40 years. JAMA. 2005 Aug 10;294(6):681-90. doi: 10.1001/jama.294.6.681.

[3] Muthanna F, Karuppannan M, Abdulrahman E, Uitrakul S, Rasool BA, Mohammed AH. Prevalence and Associated Factors of Anemia among Breast Cancer Patients Undergoing Chemotherapy: A Prospective Study. Advances in Pharmacological and Pharmaceutical Sciences. 2022 Apr 14;2022.

DOI:https://doi.org/10.54393/pbmj.v5i5.451

doi.org/10.1155/2022/7611733.

[4] Betti R, Radaelli G, Bombonato C, Crosti C, Cerri A, Menni S. Anatomic location of Basal cell carcinomas may favor certain histologic subtypes. J Cutan Med Surg. 2010 Nov-Dec;14(6):298-302. doi: 10.2310/7750.2010.09081.

[5] Arif S, Zia T, Qayyum Z, Mustafa G, Ateeq M, Farhad S et al. Prevalence and Risk Factors of Covid-19 Mortality and its Impact on Social Life of Pakistani Population. Pakistan Journal of Medical & Health Sciences. 2022 Apr 27;16(03):800-.doi.org/10.53350/pjmhs22163800.

[6] Telfer NR, Colver GB, Morton CA; British Association of Dermatologists. Guidelines for the management of basal cell carcinoma. Br J Dermatol. 2008 Jul;159(1):35-48. doi: 10.1111/j.1365-2133.2008.08666.x.

[7] Mosterd K, Arits AH, Thissen MR, Kelleners-Smeets NW. Histology-based treatment of basal cell carcinoma. Acta Derm Venereol. 2009;89(5):454-8. doi: 10.2340/00015555-0710.

[8] Arif S, Zia T, Mustafa G, Qayyum Z, Ateeq M, Faiz MJ et al. Knowledge, Attitude and Practices of Medical Students Regarding Covid-19, Pakistan. Pakistan Journal of Medical & Health Sciences. 2022 Apr 27;16(03):783-.doi.org/10.53350/pjmhs22163783.

[9] Kauvar AN, Cronin T Jr, Roenigk R, Hruza G, Bennett R; American Society for Dermatologic Surgery. Consensus for nonmelanoma skin cancer treatment: basal cell carcinoma, including a cost analysis of treatment methods. Dermatol Surg. 2015 May;41(5):550-71. doi: 10.1097/DSS.0000000000000296.

[10] Scrivener Y, Grosshans E, Cribier B. Variations of basal cell carcinomas according to gender, age, location and histopathological subtype. Br J Dermatol. 2002 Jul;147(1):41-7. doi: 10.1046/j.1365-2133.2002.04804.x.

[11] Muzic JG, Schmitt AR, Wright AC, Alniemi DT, Zubair AS, Olazagasti Lourido JM et al. Incidence and Trends of Basal Cell Carcinoma and Cutaneous Squamous Cell Carcinoma: A Population-Based Study in Olmsted County, Minnesota, 2000 to 2010. Mayo Clin Proc. 2017 Jun;92(6):890-898. doi: 10.1016/j.mayocp.2017.02.015.

[12] Kimyai-Asadi A, Alam M, Goldberg LH, Peterson SR, Silapunt S, Jih MH. Efficacy of narrow-margin excision of well-demarcated primary facial basal cell carcinomas. J Am Acad Dermatol. 2005 Sep;53(3):464-8. doi: 10.1016/j.jaad.2005.03.038.

[13] Mina MA, Picariello A, Fewkes JL. Superficial basal cell carcinomas of the head and neck. Dermatol Surg. 2013 Jul;39(7):1003-8. doi: 10.1111/dsu.12178.

[14] Kwasniak LA, Garcia-Zuazaga J. Basal cell carcinoma: evidence-based medicine and review of treatment modalities. International Journal of Dermatology. 2011 Jun;50(6):645-58. doi.org/10.1111/j.1365-4632.2010.04826.x.

[15] Stanoszek LM, Wang GY, Harms PW. Histologic Mimics of Basal Cell Carcinoma. Arch Pathol Lab Med. 2017 Nov;141(11):1490-1502. doi: 10.5858/arpa.2017-0222-RA.

[16] Betti R, Radaelli G, Mussino F, Menni S, Crosti C. Anatomic location and histopathologic subtype of basal cell carcinomas in adults younger than 40 or 90 and older: any difference? Dermatol Surg. 2009 Feb;35(2):201-6. doi: 10.1111/j.1524-4725.2008.34410.x.

[17] Gupta A, Veness M, De'Ambrosis B, Selva D, Huilgol SC. Management of squamous cell and basal cell carcinomas of the head and neck with perineural invasion. Australas J Dermatol. 2016 Feb;57(1):3-13. doi: 10.1111/ajd.12314.

[18] Mosterd K, Thissen MR, van Marion AM, Nelemans PJ, Lohman BG, Steijlen PM et al. Correlation between histologic findings on punch biopsy specimens and subsequent excision specimens in recurrent basal cell carcinoma. J Am Acad Dermatol. 2011 Feb;64(2):323-7. doi: 10.1016/j.jaad.2010.06.001.

[19] Muthanna FM, Hassan BA, Karuppannan M, Mohammed AH. Evaluation of the impact of anaemia on quality of life among breast cancer patients undergoing chemotherapy in Malaysia. Journal of Pharmaceutical Health Services Research. 2021 Jun;12(2):310-2. doi.org/10.1093/jphsr/rmaa033.

[20] Ghanadan A, Abbasi A, Rabet M, Abdollahi P, Abbasi M. Characteristics of Mixed Type Basal Cell Carcinoma in Comparison to Other BCC Subtypes. Indian J Dermatol. 2014 Jan;59(1):56-9. doi: 10.4103/0019-5154.123496.

[21] Bartoš V, Kullová M. Basal cell carcinoma of the skin with mixed histomorphology: a comparative study. Cesk Patol. 2016 Fall;52(4):222-226.

[22] Muthanna FMS, Karuppannan M, Hassan BAR, Mohammed AH. Impact of fatigue on quality of life among breast cancer patients receiving chemotherapy. Osong Public Health Res Perspect. 2021 Apr;12(2):115-125. doi: 10.24171/j.phrp.2021.12.2.09.

[23] Peris K, Fargnoli MC, Garbe C, Kaufmann R, Bastholt L, Seguin NB et al. Diagnosis and treatment of basal cell carcinoma: European consensus-based interdisciplinary guidelines. Eur J Cancer. 2019 Sep;118:10-34. doi: 10.1016/j.ejca.2019.06.003.

[24] Kuzmina N, Talme T, Lapins J, Emtestam L. Non-

DOI:https://doi.org/10.54393/pbmj.v5i5.451

invasive preoperative assessment of basal cell carcinoma of nodular and superficial types. Skin Res Technol. 2005 Aug;11(3):196-200. doi: 10.1111/j.1600-0846.2005.00120.x.

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Original Article

Association between Foot Pain and High Heeled Shoes in Working Women

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ABSTRACT

Women have been wearing high heels for decades and they remain a must-have for females going out on the town or to the workplace every day. It causes prolonged pressure on the muscles, bones, and tissues of the feet and ankles, on the other hand, may cause chronic foot discomfort or abrupt injuries that need surgical intervention in the feet and ankle. **Objective:** To determine an association between foot pain and high-heeled shoes in working women. **Methods:** A cross-sectional study was conducted to measure the prevalence of foot pain among females wearing heeled footwear, focusing only working women. A sample size of 285 was taken. Foot Health Status Questionnaire was used to collect data from the respondents from different areas of Lahore. The data was collected from office workers and school teachers. Considering inclusion and exclusion criteria. females were requested to participate. The questionnaire consisted of 13 questions that were used in this survey. The questionnaire had multiple options out of which only one option was to be selected which was nearest to representing their condition of foot. All the data was analyzed on SPSS (version 25) software. A scoring of 0-100 was used to calculate the results. **Results:** According to this study, a majority of 162 females had mild to moderate foot pain, 84.4% of females had foot pain and 15.6% of females had no pain. Foot pain had a statistically significant association with walking, climbing stairs, and doing work or activities, (P-value 0.000). Respondents having foot pain couldn't do all the above activities normally. Restrictions and limitations were found among the respondents with foot pain. A P-value of less than 0.05 indicates that there is a significant association between the severity of foot pain and difficulties during work or activities of daily life **Conclusions**: The study concluded that there is very high prevalence of foot pain (96%) among females wearing high heels. Long term use of high heels significantly affects the foot health and activities of respondents

INTRODUCTION

Fashion pressures and modern lifestyles have encouraged women to wear high-heeled shoes and have become a dominant choice of these women among all footwear. High heel shoes on one side enhance attractiveness [1]. On the other hand, the long term use can cause severe harm to the lower limb and many other parts of the body. Despite of knowing their harm, females still use high heels. According to much research, 37%-69% of females wear high-heeled shoes on daily basis. Once the humankind felt need of something that would protect them from ground, hot and cold soil and help them to cover their feet and protect them from sharp objects and thus shoes were formed for protection purposes [2,3]. A high heel consists of three components a heel, a sole and an upper. The heel lifts the body and foot in an upward direction and on the other hand supports the heel of foot, while the sole is present between foot and floor, and the upper holds the foot and remain it in the shoe so that walking must be done conveniently [4]. Wearing heels also cause forced change in the distribution of pressure on foot and lower extremities. The planter

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pressure of the foot is also severely disturbed [5]. Use of high heels on daily bases has a negative effect to foot structure and morphology leading to forefoot and first metatarsal being affected the most [6]. The feet are the only body part that connects the body to the ground while bearing all the body weight and ground reaction forces during standing and walking positions. According to the past studies high heels alter pressure distribution on front of the feet and could transfer third, fourth and fifth metatarsals toward the first and second metatarsal heads [7]. In short, the females who wear high heels on regular basis are at risk of having foot pain, several musculoskeletal problems of foot and changed gait patterns [8]. The intensity of foot pain may depend upon the frequency and duration of use of heels. This may change the foot function and biomechanics of lower extremities [9]. When wearing heels foot discomfort may be felt anywhere in the foot, especially in toes, arches and sole are affected the most. The sub-tallar joint is also affected which is responsible for eversion and inversion [10]. For instance, the long arch of the foot is elevated in vertical direction and uneven pressure distribution is observed all the weight is forwarded towards the forefoot and toes [11]. Pointed-toe box shoes cause hallus valgus (bunion formation) [12] as it produces high peak pressure on medial heel area as well as hyperkeratosis skin around the fifth digit due to its style [13]. Similarly, many other types of high heel shoes cause different deformities. Other than foot problems include ankle sprain, back pain, knee pain, poor posture and gait, Achilles tendonitis, planter fascia becoming tight and many others. But still high heel footwears are one of the top choices of females in every society [14]. But sometimes in some professions, high heel is not a choice, women have to wear high heels to meet the professional demands as in corporate professional customer-facing office roles and many others. Sometimes, to meet leg length discrepancy, some people also use heels to keep both legs equal. In this case, males are also affected due to heel wearing [15]. High heels will shift the force of each footstep so that the most pressure ends up on the ball of the foot and on the neighboring bones at the base of the toes. When wearing flats, the entire foot would absorb this impact [16]. Foot pain has been highly prevalent among females wearing high-heeled footwear [17]. Most of the females wear high heels and this increases the chance of foot pain [18]. Foot biomechanics and structural disturbances also occur causing pain [19].

METHODS

This was cross-sectional survey study. The data was collected from different areas of Lahore including Thokar Niaz Baig (Pride school, Quaid-e-Azam Public School, Oxford Grammar School, Allied School,) and Shahdra (Railway Station Office) Sample size of 285 was calculated by using Rao Software. Population size: 20,000, Confidence interval: 95%, Margin of error: 5%. The study was performed in working women including school teachers and office workers. Convenient sampling technique was used to collect data for prevalence of foot pain among females wearing high heels. The sample was collected by the following criteria, females, age above 15 years, wearing high heels for minimum 4-5 hours/day for 6 months for 2 years. Having a history of diabetes, musculoskeletal problems, rheumatoid arthritis, osteoarthritis, previous foot trauma, foot surgery or any other disease related to the foot, Abnormal gait etc were excluded. Data was analyzed using SPSS excel (version 25). The measuring tool for this study was Foot Health Status Questionnaire (FHSQ) which was a standard questionnaire. The questionnaire consists of 13 questions. Questions provide information about the respondent's intensity of foot pain, activities limited by foot pain; difficulties were choosing footwear and foot health. The questionnaire don not provide a global score and the data was analyzed by using a scoring method ranging from 0-100 [20,21]. The questionnaire requires a single response from the respondents. Each question gave several options out of which respondents must choose a single option. Different responses were received from different people and then the results were analyzed. The reliability of the scale used is 0.82 and its validity is 0.86

RESULTS

The demographic information of the participants is given in Figure 1 as shown.

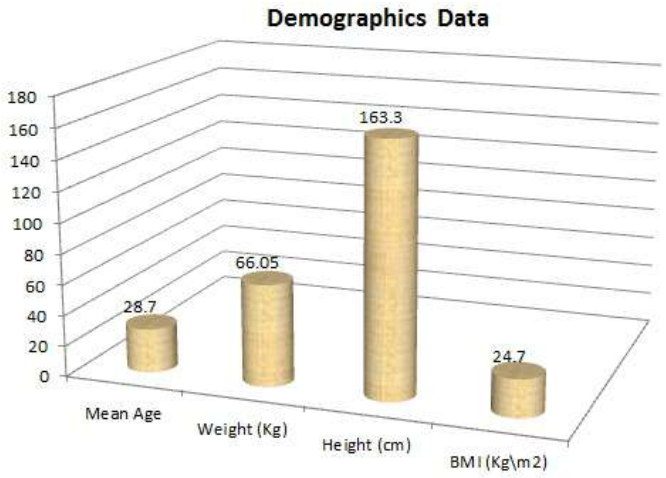

Figure 1: Demographic Data of the Participants

Table 1 shows that out of 39 respondents having no foot

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pain during the past week, 16 faced no difficulties in work or activities, 20 had slight, 3 moderate and no one had severe difficulties. Out of 36 respondents having very mild pain, 6 had no difficulties, 16 slight, 7 moderately, 7 quite a bit and no one had extreme difficulties. Out of 90 respondents having mild pain 7 had not at all, 28 had slight, 33 moderate, 15 quite a bit and 7 had extreme difficulties. Out of 63 respondents having moderate foot pain, 2 had no difficulties, 14 slightly, 25 moderately, 19 quite a bit and 3 were extremely disturbed. Out of 22 respondents having severe pain no one had no difficulties, 2 had slight difficulties, 3 moderate, no one had quite a bit of difficulties and 17 faced extreme difficulties during work or activities due to foot pain. Proved from the crosstab majority of the respondents i.e. 33 have mild pain and moderate difficulties. The calculated value of chi-square (178.753) and p-value of less than 0.05 indicate that there is a significant association between the severity of foot pain and difficulties during work or activities of daily life.

Table 1: Cross Table Between Respondents Level of Foot Pain Vs Foot Health Status

DISCUSSION

This study mainly focused on the prevalence of foot pain among females who were long-term users of heels [22]. This study provides knowledge about foot pain, reasons of foot pain, frequency of footwear and effect of foot pain upon their normal activities, work, walking, climbing stairs, type of footwear either they are limited in selecting footwear or not and what type of footwear comfortable for them during foot pain [23]. Moreover, foot health and frequency of foot pain is also discussed in the survey. Responses of the respondents show their level of foot pain and condition of foot health. The selected questionnaire gives information to be collected about foot health, foot pain, footwear and activities that are restricted due to foot pain. According to this survey, 36% (n=90) respondents had mild foot pain and 25.2% (n=63) had moderate foot pain.

The overall prevalence rate of foot pain in high heel users in this study is 84% which is higher than that conducted by CL Hill *et al.*, in Australia which was 17.4% [24]. It was nearest to a study conducted by Jill Dawson *et al.*, 83% [25]. According to this study, 84%(n=211) females out of 250 had foot pain and 15.6% (n=39) had no pain which contradicts the study conducted by N Venkatesh Kuma *et al.*, according to which 44%(n=44) females out of 100 had heel pain and 56% (n=56) had no pain due to wearing heels [23,26]. The study conducted by Yeok Pin Chua1 *et al.*, gathered information from 400 females out of which 50% females had foot pain which contradicts this study [27]. According to a study conducted by Saima Jabbar *et al.*, 77.5% of the population in their study was affected by heels that is closer tour study [28]. A study Conducted by Max Barmish *et al.*, also shows that wearing high heels is detrimental to female's health that shows similarity with the result of this study [29]. This study also gives knowledge about females' shoe wear selection with foot pain. 26.9% (n=74) females strongly agreed to have difficulties in finding shoes that do not hurt their feet, 25.2% (n=63) females had a few difficulties in finding shoes that fit in their feet and 24.8% (n=62) had severe limitations in wearing number of shoes. These results negate the study carried out by Moira McRitchie *et al.* In 2018 upon 67 females who received podiatric treatment due to wearing narrower and such shoes that do not fit in their feet, a high prevalence of 91% (n=61) was observed [30]. A large ratio of females having no difficulties in foot wear and selection was observed. This study also negates a study conducted by Yeok Pin Chua in 2013 which gives a percentage of 68.4% females that had foot pain due to foot wear and these were mostly working women [27]. Many females use high heeled foot wears in their routine. This study was conducted to improve the foot health of women; the study was undertaken because a few population based studies have examined the association of foot pain and high heeled shoe wear. Foot pain related to shoe wear is common yet only few studies were found which examined this condition. To give awareness of problems originating from the use of high heeled shoes among females. The study emphasizes to give awareness to the females about the side effects of using heels *e.g.* long term use of heels leads to chronic foot pain and other dysfunctions. Females should be guided either to wear flat shoes or lessen the use of heels in order to avoid further discomforts. For shoe industry this is recommended to make shoes of good quality having a good sole and if high heels, and then maintain the quality of shoe as well as heel. Medicated shoes must be promoted on a larger level and awareness must be created to ear medicated shoes especially in females.

CONCLUSION

The study concluded that very high prevalence of foot pain among females wearing high heels. Long term use of high heels significantly affects foot health and activities of respondents.

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REFERENCES

[1] Lewis DMG, Russell EM, Al-Shawaf L, Ta V, Senveli Z, Ickes W et al. Why Women Wear High Heels: Evolution, Lumbar Curvature, and Attractiveness. Front Psychol. 2017 Nov 13;8:1875. doi: 10.3389/fpsyg.2017.01875.

[2] Broega AC, Righetto M, Ribeiro R. Female high heel shoes: a study of comfort. InIOP Conference Series: Materials Science and Engineering 2017 Oct 1;254(23):232001.

[3] Ko DY, Lee HS. The Changes of COP and Foot Pressure after One Hour's Walking Wearing High-heeled and Flat Shoes. J Phys Ther Sci. 2013 Oct;25(10):1309-12. doi: 10.1589/jpts.25.1309.

[4] Singh NK, Thomas M, Parkes A. High heel shoe. Google Patents. 2016.

[5] Melvin JM, Price C, Preece S, Nester C, Howard D. An investigation into the effects of, and interaction between, heel height and shoe upper stiffness on plantar pressure and comfort. Footwear Science. 2019 Jan 2;11(1):25-34. doi.org/10.1080/19424280.2018.1555862.

[6] Wang M, Gu Y, Baker JS. Analysis of foot kinematics wearing high heels using the Oxford foot model. Technol Health Care. 2018;26(5):815-823. doi: 10.3233/THC-181264.

[7] Rahimi A, Sayah A, Hosseini SM, Baghban AA. Studying the Plantar Pressure Patterns in Women Adapted to High-Heel Shoes during Barefoot Walking. Journal of Clinical Physiotherapy Research. 2017;2(2):70-4.

[8] Gu Y, Rong M, Ruan G. The outsole pressure distribution character during high-heeled walking. Procedia environmental sciences. 2011 Jan 1;8:464-8. doi.org/10.1016/j.proenv.2011.10.073.

[9] Khodair SA, Younes RL. Wearing high heels and plantar fasciitis; MRI evaluation. Imaging. 2019;8(1):1-5. doi: 10.11648/j.ijmi.20200801.11.

[10] Yin CM, Pan XH, Sun YX, Chen ZB. Effects of duration of wearing high-heeled shoes on plantar pressure. Human Movement Science. 2016 Oct 1;49:196-205. doi.org/10.1016/j.humov.2016.06.005.

[11] Smith EO, Helms WS. Natural selection and high heels. Foot & ankle international. 1999 Jan;20(1):55-7. doi.org/10.1177/107110079902000113.

[12] Menz HB, Roddy E, Marshall M, Thomas MJ, Rathod T, Peat GM et al. Epidemiology of shoe wearing patterns over time in older women: associations with foot pain and hallux valgus. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences. 2016;71(12):1682-7. doi.org/10.1093/gerona/glw004.

[13] Dananberg H, Hughes BG. Heel stabilizer for footwear. Google Patents. 2016.

[14] Chen LM, Hustad KC, Kent RD, Lin YC. Dysarthria in Mandarin-Speaking Children With Cerebral Palsy: Speech Subsystem Profiles. J Speech Lang Hear Res. 2018;61(3):525-48. doi.org/10.1044/2017_JSLHR-S-17-0065.

[15] Zhang X, Li B, Liang K, Wan Q, Vanwanseele B. An optimized design of in-shoe heel lifts reduces plantar pressure of healthy males. Gait & posture. 2016;47:43-7. doi.org/10.1016/j.gaitpost.2016.04.003.

[16] Chorna OD, Guzzetta A, Maitre NL. Vision Assessments and Interventions for Infants 0-2 Years at High Risk for Cerebral Palsy: A Systematic Review. Pediatr Neurol. 2017;76:3-13. doi.org/10.1016/j.pediatrneurol.2017.07.011.

[17] Kumar NV, Prasanna C, Sundar VS, Venkatesan A. High heels footwear causes heel pain and back pain: myth or reality. International Journal of Scientific Study. 2015;3(8):101-4.

[18] Basha FYS, Devi RG, Priya AJ. A survey on comparative effects of wearing high heels among long-term and short-term users. Drug Invention Today. 2018;10(11).

[19] Lee S, Li JX. Effects of high-heeled shoes and asymmetrical load carrying on lower-extremity kinematics during walking in young women. Journal of the American Podiatric Medical Association. 2014;104(1):58-65. doi.org/10.7547/0003-0538-104.1.58.

[20] López DL, López MR, Prego MdlÁB, Mónaco LM, Iglesias MEL, Canosa JLS et al. Quality of life impact related to foot health in a sample of sea workers. Journal of tissue viability. 2015;24(4):146-52. doi.org/10.1016/j.jtv.2015.07.003.

[21] Bennett PJ, Patterson C, Wearing S, Baglioni T. Development and validation of a questionnaire designed to measure foot-health status. Journal of the American Podiatric Medical Association. 1998;88(9):419-28. doi.org/10.7547/87507315-88-9-419.

[22] Sullivan J, Burns J, Adams R, Pappas E, Crosbie J. Plantar heel pain and foot loading during normal walking. Gait & posture. 2015;41(2):688-93. doi.org/10.1016/j.gaitpost.2015.01.025.

[23] Barnish MS, Barnish J. High-heeled shoes and musculoskeletal injuries: a narrative systematic review. BMJ open. 2016;6(1):e010053. doi.org/10.1136/bmjopen-2015-010053.

[24] Hill CL, Gill TK, Menz HB, Taylor AW. Prevalence and correlates of foot pain in a population-based study:

DOI:https://doi.org/10.54393/pbmj.v5i5.419

the North West Adelaide health study. Journal of foot and ankle research. 2008;1(1):2. doi.org/10.1186/1757-1146-1-2.

[25] Dawson J, Thorogood M, Marks SA, Juszczak E, Dodd C, Lavis G et al. The prevalence of foot problems in older women: a cause for concern. Journal of Public Health. 2002;24(2):77-84. doi.org/10.1093/pubmed/24.2.77.

[26] Kumar N, Prasanna C, Sundar V, Venkatesan A. High heels footwear causes heel pain and back pain: myth or reality. Int J Nurs Stud. 2015;3(8):101-4.

[27] Chua YP, Tan WJ, Yahya T, Saw A. Prevalence of nontraumatic foot pain among urban young working women and its contributing factors. Singapore Med J. 2013;54(11):630-3. doi.org/10.11622/smedj.2013223.

[28] Jabbar S, Sabir S, Irum S, Raza H, Wassi A, Subazwari AB. Prevalence of Forefoot Pain among High Heel Wearing Female Teachers and Students of Different Universities in Faisalabad. Health Science Journal. 2020;14(2):1-4.

[29] Barnish M, Morgan HM, Barnish J. The 2016 HIGh Heels: Health effects And psychosexual BenefITS (HIGH HABITS) study: systematic review of reviews and additional primary studies. BMC Public Health. 2018;18(1):1-13. doi.org/10.1186/s12889-017-4573-4.

[30] McRitchie M, Branthwaite H, Chockalingam N. Footwear choices for painful feet–an observational study exploring footwear and foot problems in women. Journal of foot and ankle research. 2018;11(1):23. doi.org/10.1186/s13047-018-0265-2

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Original Article

Awareness and Knowledge of Human Immunodeficiency Virus Transmission and Prevention from Mother to Child: A Cross-Sectional Study among Female Sex Workers

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ABSTRACT

Human Immunodeficiency Virus (HIV) can be transferred during pregnancy from the infected mother to the fetus through the placenta or to her infant during delivery or breastfeeding. **Objective:** To evaluate awareness and understanding of HIV transmission and prevention from mother to child among female sex workers having and expecting pregnancy. **Methods:** It is a cross-sectional survey conducted in three cities: Lahore, Faisalabad and Islamabad, Pakistan. A sample size of 150 was considered as per convenience and collected using the snowball sampling technique. The data was collected using a specially designed questionnaire which was pilot tested by 10 health experts. The female sex workers of fertile age group 15-49 years who were pregnant or expecting pregnancy in the future were included. The female sex worker who was infertile or was on birth control was excluded from the study. Data were analysed with the help of the SPSS version 22. **Results:** The minimum and maximum age of female sex workers was 15 and 49 years respectively, with a mean age of 31.7±7.76 years. The female sex workers responded that 63(42%) know the mother-to-child transmission while the majority 87(58%) do not know that HIV infected mothers can transmit HIV to their children. The responses regarding mother-to-child transmission show that 61(21.3%) know about the trans-placental route, 100(35%) vaginal delivery, 58(20.3%) cesarean section, and 25(8.7%) breastfeeding. The response regarding the prevention of HIV from mother to a child shows that only 59(25.8%) prefer cesarean section, 29(12.7%) prefer no breastfeeding and very few 21(9.2%) prefer the use of antiretroviral therapies among infected women and children. **Conclusions:** In conclusion, the female sex workers were unaware of the prevention of HIV from breastfeeding and vaginal delivery. Moreover, they were unaware of precautions such as cesarean section and the usage of anti-retroviral therapies for infected mothers before delivery.

INTRODUCTION

The human immunodeficiency virus (HIV) causes acquired immunodeficiency syndrome (AIDS). AIDS is a life-threatening disease caused by a deterioration of the immune system [1]. Infected patients present with sweats, recurring fever, chronic diarrhea, weakness, persistent white spots on the tongue, and unusual lesions in the mouth [2]. The transmission of HIV is facilitated by sexually transmitted diseases (STDs) and the probability increased by 8-10 times [3,4]. In STDs, ulcers are produced in the perineal or vaginal area of an uninfected partner and this increases the spread quickly [5,6]. Injection drug users (IDUs), commercial sex workers, young heterosexuals, homosexuals (transgender) (sexual minorities), bisexual males (gay), and infected mothers are spreading AIDS [7,8]. In 2010, over 34 million people worldwide were infected with HIV, as per the Joint United Nations Program on HIV/AIDS (UNAIDS) [9]. Among them 16.8 million were mothers and 3.4 million were kids [10]. Around 25 million individuals die just because of AIDS [11]. The estimated number is 5 million persons who become infected with HIV every year [12]. The annual incidence of HIV could reach more than a million new cases as the disease spread across

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Asia's population [13]. According to World Health Organization (WHO), predicted 0.7% (37.7million) of individuals aged 15-49 years are suffering from AIDS globally [14]. In 2013, number of infected patients increased from 4500 to 24,331 according to registered persons with National AIDS Control Program (NACP) [15]. HIV is present in all body fluids including blood, tears, saliva, perspiration, vaginal fluid, and breast milk [16]. HIV is present in higher concentrations in blood, semen, and pre-ejaculate fluids and these fluids spread infection very quickly [17]. HIV can be primarily transferred by contaminated blood transfusions, mother to child, hypodermic needles, and unprotected sexual contact (anally, vaginally, or orally) [17,18]. HIV can be passed from an infected woman to her fetus through the placenta or to her neonate during delivery or breastfeeding [19]. The rate of infection transfer is 15-30% if no breastfeeding is done and 45%, if breastfeeding is prolonged [20]. Transmission of infection-causing virus accounts for 1/3rd to 2/3rd during the per-partum period of the total number of infected population and this per-partum period is specially focused on preventive efforts [21]. Pregnant women who are newly infected with HIV or who have recently suffered from AIDS are at a higher risk of infection [22-24]. Females who are infected or who are at high risk of contracting AIDS must avoid conceiving as they can pass the infection to the fetus or newborn child [19-25]. For successful control in HIV spread rate, pregnant females must understand the transmission factors of HIV from mother to child and must learn how to control this mother to child Transmission Bridge [26]. Physicians, policymakers, and public health experts must guide pregnant females infected with HIV about correct preventive measures to stop transmission from mother to child [27]. HIV-infected pregnant females are facing harsh attitudes toward society [28]. The public should be educated about AIDS and preventive guidelines through all forms of media and educational materials [29]. The elective caesarian section before commencement of labor, avoiding breastfeeding, and antiretroviral medication prophylaxis can almost ensure complete prevention of the transmission of HIV from mother to child [30,31]. The current study enables the physicians and public health care workers to develop an accurate strategy or policy for the management and prevention of the transfer of HIV from mother to child. This current study contributes to the expansion of knowledge about HIV transmission and provides helpful information to aid in the prevention of transmitting HIV from mother to baby.

METHODS

It is a cross-sectional survey conducted in three cities (Lahore, Faisalabad and Islamabad) of Punjab, Pakistan. A sample size of 150 was considered as per convenience. The data was collected using a specially designed questionnaire which was pilot tested by 10 health experts. The female sex workers of fertile age group 15-49 years who were pregnant and expecting pregnancy in the future were included. The female sex worker who was infertile and was on birth control was excluded from the study. The data was collected using the Snowball Sampling technique for 11 months i.e. January 2021 to November 2021. The data was gathered through questionnaire distribution among female sex workers in red light areas while the majority of the female sex workers were contacted through social networking and over the telephone, the questionnaire was filled online considering their privacy and satisfaction. Data was analysed with the help of the SPSS version 22. Descriptive statistics about age were calculated and Frequencies and Percentages were mentioned as the response to the question.

RESULTS

The data from 150 female sex workers were recorded on a designed collection sheet and analysed in the form of frequency tables and bar charts. The female sex workers of fertile age group 15-49 years who were pregnant and expecting pregnancy in the future were included. The results includes the awareness and understanding of the prevention of HIV from mother to child among female sex workers. The age of female sex workers as a minimum of 15 years and a maximum of 49 years with a mean age of 31.7±7.76. Table 1 show the response of female sex workers as the majority 139(92.7%) were aware that HIV is an incurable disease while only a few 11(7.3%) does not know about HIV/AIDS. Only 63(42%) know about the mother-to-child transmission (perinatal) while the majority 87(58%) do not know that HIV infected mothers can transmit HIV to their children. The risk of getting HIV infection through unsafe sexual contact in female sex workers was asked among which 109(72.7%) agreed that female sex workers can get easily infected whereas the 41(27.3%) disagreed about its awareness and disagreed about spread from sex through females. Table 2 show the response of female sex workers regarding the route of HIV transmission in which 128(26.7%) know the unsafe sexual route, injecting drugs 101(21%), contaminated blood transfusions 91(19%), use of contaminated syringes 98(20%) and from mother to child (perinatal) as 62(12.9%). The responses were recorded on which routes from which HIV can be transferred from mother to child. 61(21.3%) know about the trans-placental route, 100(35%) vaginal delivery, 58(20.3%) cesarean section, 25(8.7%) breastfeeding, and 42(14.7%) don't know

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about the routes of mother to child transmission Table 3 shows the response of female sex workers regarding the prevention of transmitting HIV from mother to child. Only 59(25.8%) prefer cesarean section, 106(46.3%) vaginal delivery, 29(12.7%) prefer no breastfeeding, very few 21(9.2%)prefer the use of antiretroviral therapies. Whereas 14(6.1%) don't know how to prevent transmission from mother to child.

Are you aware that HIV/AIDS is an incurable disease	
Valid	**Frequency (%)**
Yes	139 (92.7)
No	11 (7.3)
Total	150 (100)
Do you know that HIV infected mother can transmit HIV to her Children	
Yes	63 (42.0)
No	87 (58.0)
Total	150 (100)
Do you agree that female sex workers are at risk of getting and transmitting HIV	
Agree	109(72.7)
Disagree	41(27.3)
Total	150(100.0)

Table 1: Questions asked from respondents

Which are route of transmission of HIV	
Valid	**Frequency (%)**
Unsafe sexual contact	128(26.7)
Injecting drugs	101(21.0)
Contaminated blood transfusions	91(19.0)
Use of contaminated similar syringes	98(20.4)
Mother to child	62(12.9)
Total	480(100.0)
Vaginal Delivery	100(35.0)
Cesarean section	58(20.3)
Breast feeding	25(8.7)
Don't know	42(14.7)
Total	286(100.0)

Table 2: Which are the routes of transmission of HIV?

Methods of preventing transmission of HIV from mother to child	
Valid	**Frequency (%)**
Cesarean section	59(25.8)
Vaginal Delivery	106(46.3)
No Breastfeeding	29(12.7)
Antiretroviral therapies	21(9.2)
Don't know	14(6.1)
Total	229(100.0)

Table 3: Methods of preventing transmission of HIV from mother to child

DISCUSSION

The current study was conducted among 150 female sex workers. The female sex workers of fertile age group 15-49 years who were pregnant and expecting pregnancy in the future were included. The female sex worker who was infertile and was on birth control was excluded from the study. Among some of the findings are female sex professionals' awareness and understanding of HIV prevention from mother to child. The current study shows the response of female sex workers regarding the route of HIV transmission in which 128(26.7%) know the unsafe sexual route, injecting drugs 101(21%), contaminated blood transfusions 91(19%), use contaminated syringes 98(20%) and from mother to child (perinatal) as 62(12.9%). According to a study conducted by Yang Luo in 2008, 91% of those women were conscious that HIV/AIDS can coexist with pregnancy, which was also observed in the current study. Only 64% of the respondents had heard of mother-to-child transmission, according to the current findings of 12.9%. The current study also explained the assessment of routes of other transmissions in which the responses were related to the Yang Lou in which Trans -the placental route was 85%, vaginal delivery 60%, and breastfeeding 20% were identified as routes of transmission from mother to child 20% [6]. Another study shows the percentage of pregnant women who had a thorough understanding of how to avoid HIV transmission from mother to child was 52% [28]. Similarly, in the current study, the respondent's responses regarding the route of transmission were recorded in which routes from which HIV can be transferred from mother to child. 61(21.3%)know about the trans-placental route, 100(35%)vaginal delivery, 58(20.3%) cesarean section, 25(8.7%) breastfeeding, and 42(14.7%) don't know about the routes of mother to child transmission. About 42% know about the mother-to-child transmission (perinatal) while the majority 58% do not know that HIV-infected mothers can transmit HIV to their children. Regarding the response of prevention, only 59(25.8%) prefer cesarean section, 106(46.3%) vaginal delivery, 29(12.7%) prefer no breastfeeding, very few 21(9.2%)prefer the use of antiretroviral therapies. Whereas 14(6.1%) don't know how to prevent transmission from mother to child. Similarly, a previous study by Yang Luo in 2008 shows that 55% of respondents felt a cesarean section was a channel of transmission while no one recognized that cesarean section is a technique of preventing mother-to-child transmission. The current study also explains the risk of getting HIV infection through unsafe sexual contact in female sex workers. The response was recorded from female sex workers in which 109(72.7%) agreed that female sex workers can get easily infected [6]. According to a study conducted in 2013, more than 94% of trafficked women and 78% of drug addicts were aware of the HIV/AIDS transmission route. They could claim that HIV/AIDS is spread through contaminated needles, shaving

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with a razor blade and unprotected sex with HIV infected partners and that it is most common among female sex workers. Both the findings from recent and previous found that they are aware of its consequences but due to customer satisfaction and financial crisis they put their and others' lives at risk. The female sex workers and HIV-positive mother should know that during pregnancy, delivery, breast feeding, an HIV-positive woman might transfer the virus to her infant and the profession of sex work increase the risk of getting and transmitting HIV. If a sex worker wants to get pregnant, she should be tested and if pregnancy and HIV accompany the medication a combination of HIV drugs (often known as antiretroviral therapy or ART) can prevent HIV transmission to your baby while protecting women's health [31]. The current study recommends that HIV testing should be done among sex workers before and during pregnancy. HIV awareness regarding antenatal services such as safe childbirth, appropriate infant feeding, and antiretroviral therapies should be addressed among sex workers through information & awareness campaigns.

CONCLUSION

The current study concluded that the female sex workers agreed that their profession can get them easily infected by HIV. The respondents were aware of HIV transmission through unsafe sexual routes, injecting drugs, contaminated blood transfusions, and use of contaminated syringes but very few of them were aware of mother-to-child transmission. The majority of them responded with no knowledge and awareness regarding mother-to-child transmission and prevention. They were unaware to prevent HIV from breastfeeding and vaginal delivery. Moreover, they were unaware of preventive methods such as cesarean section and the usage of anti-retroviral therapies for infected mothers and children.

REFERENCES

[1] Ratnam M, Suresh Babu J, Swarnalatha C, Kalyan M, Deivanayagi M, et al. Corrected and Republished: Human immunodeficiency virus-associated thrombocytopenia: Profiling hematological changes in the human immunodeficiency virus-infected and AIDS patients. Indian Journal of Health Sciences and Biomedical Research KLEU-Volume. 2019,12(1):235.

[2] Blenkinsopp A, Duerden M, Blenkinsopp J. Symptoms in the pharmacy: a guide to the management of common illnesses: John Wiley & Sons; 2018.

[3] Mohammed H, Blomquist P, Ogaz D, Duffell S, Furegato M, et al. 100 years of STIs in the UK: a review of national surveillance data. Sexually transmitted infections. 2018,94(8):553-8.doi.org/10.1136/sextrans-2017-053273

[4] John A. Evaluation of Awareness and Preventive Measures among Transgender Regarding Sexually Transmitted Diseases. Lahore Garrison University Journal of Life Sciences. 2022,6(01):83-94.

[5] Sabovic EKM, Turel G, Sever M. Perianal herpetic ulcer with rapid spreading: a sign of acquired immunodeficiency syndrome (AIDS). Acta Dermatovenerologica Alpina, Pannonica et Adriatica. 2021,30(4):157-60. doi.org/10.15570/actaapa.2021.36

[6] Luo Y, HE GP. Pregnant women's awareness and knowledge of mother-to-child transmission of HIV in South Central China. Acta obstetricia et gynecologica Scandinavica. 2008,87(8):831-6.doi.org/10.1080/00016340802226342

[7] John A, Rana MS, Hanif A, Faridi TA, Noor S, et al. Knowledge, Attitudes and Practices of Male Transgenders in Transmission of Human Immunodeficiency Virus in Lahore, Pakistan: Male Transgenders in Transmission of HIV. Pakistan BioMedical Journal. 2021,4(1). doi.org/10.54393/pbmj.v4i1.84

[8] Walters SM, Coston B, Neaigus A, Rivera AV, Starbuck L, et al. The role of syringe exchange programs and sexual identity in awareness of pre-exposure prophylaxis (PrEP) for male persons who inject drugs. International Journal of Drug Policy. 2020,77:102671. doi.org/10.1016/j.drugpo.2020.102671

[9] Granich R, Gupta S, Hersh B, Williams B, Montaner J, et al. Trends in AIDS deaths, new infections and ART coverage in the top 30 countries with the highest AIDS mortality burden; 1990–2013. PloS one. 2015,10(7):e0131353. doi.org/10.1371/journal.pone.0131353

[10] Abtew S, Awoke W, Asrat A. Knowledge of pregnant women on mother-to-child transmission of HIV, its prevention, and associated factors in Assosa town, Northwest Ethiopia. HIV/AIDS (Auckland, NZ). 2016,8:101. doi.org/10.2147/HIV.S100301

[11] Bradshaw D, Msemburi W, Dorrington R, Pillay-van Wyk V, Laubscher R, Groenewald P. HIV/AIDS in South Africa: how many people died from the disease between 1997 and 2010? Aids. 2016,30(5):771-8.doi.org/10.1097/QAD.0000000000000947

[12] Platt L, Easterbrook P, Gower E, McDonald B, Sabin K, McGowan C, et al. Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis. The Lancet infectious diseases. 2016,16(7):797-808. doi.org/10.1016/S1473-3099(15)00485-5

DOI:https://doi.org/10.54393/pbmj.v5i5.422

[13] Nayagam S, Thursz M, Sicuri E, Conteh L, Wiktor S, Low-Beer D, et al. Requirements for global elimination of hepatitis B: a modelling study. The Lancet Infectious Diseases. 2016,16(12):1399-408.doi.org/10.1016/S1473-3099(16)30204-3

[14] Nzelu C. Stigma and Discrimination's Effect on HIV Testing of Pregnant Women in Nigeria: Walden University; 2022.

[15] Batra S, Memon ZA, Ochani RK, Awan S, Bhimani S, Siddiqui Y, et al. Knowledge, attitude and practice of medical students towards HIV patients in their pre-clinical and post-clinical years in Karachi, Pakistan: a dual-center cross-sectional study. Le Infez Med. 2020,28(2):231-37.

[16] Calvet GA, Kara EO, Giozza SP, Bôtto-Menezes CHA, Gaillard P, de Oliveira Franca RF, et al. Study on the persistence of Zika virus (ZIKV) in body fluids of patients with ZIKV infection in Brazil. BMC infectious diseases. 2018,18(1):1-17.doi.org/10.1186/s12879-018-2965-4

[17] Kelly MC. Pre-ejaculate fluid in the context of sexual assault: A review of the literature from a clinical forensic medicine perspective. Forensic science international. 2021,318:110596.doi.org/10.1016/j.forsciint.2020.110596

[18] Alemu YM, Habtewold TD, Alemu SM. Mother's knowledge on prevention of mother-to-child transmission of HIV, Ethiopia: A cross sectional study. PloS one. 2018,13(9):e0203043.doi.org/10.1371/journal.pone.0203043

[19] Silasi M, Cardenas I, Kwon JY, Racicot K, Aldo P, Mor G. Viral infections during pregnancy. American journal of reproductive immunology. 2015,73(3):199-213. doi.org/10.1111/aji.12355

[20] Garofoli F, Civardi E, Zanette S, Angelini M, Perotti G, Zecca M, et al. Literature review and an Italian hospital experience about post-natal CMV infection acquired by breast-feeding in very low and/or extremely low birth weight infants. Nutrients. 2021,13(2):660. doi.org/10.3390/nu13020660

[21] Kimbui E. Prevalence and factors associated with alcohol use and depression in pregnant adolescents attending Kangemi health centre Nairobi: University of Nairobi; 2017.

[22] Awofala AA, Ogundele OE. HIV epidemiology in Nigeria. Saudi journal of biological sciences. 2018,25(4):697-703.doi.org/10.1016/j.sjbs.2016.03.006

[23] Ghany MG, Morgan TR, panel AIhCg. Hepatitis C guidance 2019 update: American Association for the Study of Liver Diseases–Infectious Diseases Society of America recommendations for testing, managing, and treating hepatitis C virus infection. Hepatology. 2020,71(2):686-721. doi.org/10.1002/hep.31060

[24] Aishat U, Olubunmi A. Prevention of mother-to-child transmission of HIV/AIDS: perception of health care workers in rural areas of Oyo state. Scientifica 2016. doi.org/10.1155/2016/4257180

[25] Cerveny L, Murthi P, Staud F. HIV in pregnancy: Mother-to-child transmission, pharmacotherapy, and toxicity. Biochimica et Biophysica Acta (BBA)-Molecular Basis of Disease. 2021,1867(10):166206.doi.org/10.1016/j.bbadis.2021.166206

[26] Mutabazi JC, Gray C, Muhwava L, Trottier H, Ware LJ, Norris S, et al. Integrating the prevention of mother-to-child transmission of HIV into primary healthcare services after AIDS denialism in South Africa: perspectives of experts and health care workers-a qualitative study. BMC health services research. 2020,20(1):1-18. doi.org/10.1186/s12913-020-05381-5

[27] World Health Organization. Global guidance on criteria and processes for validation: elimination of mother-to-child transmission of HIV and syphilis. 2017.

[28] Echenique M, Rodriguez VJ, LaCabe RP, Privette CK, Jones DL, Potter JE, et al. Behaviorally and perinatally HIV-infected young women: targets for preconception counseling. AIDS care. 2017,29(3):372-7.doi.org/10.1080/09540121.2016.1220483

[29] Leung H, Shek DT, Leung E, Shek EY. Development of contextually-relevant sexuality education: Lessons from a comprehensive review of adolescent sexuality education across cultures. International journal of environmental research and public health. 2019,16(4):621.doi.org/10.3390/ijerph16040621

[30] Navér L, Albert J, Carlander C, Flamholc L, Gisslén M, Karlström O, et al. Prophylaxis and treatment of HIV-1 infection in pregnancy–Swedish recommendations 2017. Infectious Diseases. 2018,50(7):495-506.doi.org/10.1080/23744235.2018.1428825

[31] Huq AO, Chowdhury T, Rana M, Alam J, Moktadir SG, Manir M. Nutritional status and KAP about HIV/AIDS among floating drug addicted and commercial sex workers in Dhaka City, Bangladesh. Journal of AIDS and HIV Research. 2013,5(9):334-40

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Original Article

Cauda Equina Syndrome Outcome: Early Vs Late Surgery

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ABSTRACT

There is no reservation that the superlative result for Cauda Equina Syndrome (CES) requires decompression by surgery. **Objective:** The goal of our study was to determine the effect of surgical procedure, with relation to time, on bladder and bowel symptoms. **Methods:** A retrospective analysis of patients undergoing surgical decompression by CES was done. The subjects with persistent symptoms were surveyed for at least two-years. BASS criteria were applied to classify CES: painless urinary retention (CESR), incomplete (CESI) and CES suspicious (CESS). The resolution of presenting autonomic symptoms was assessed following surgery. **Results:** A total of 120 patients were confirmed with CES and referred for surgery. Surgical treatment included all cases of laminectomy or lumbar discectomy. 60 patients reported CESR, 24cases of CESI and 36 cases of CESS. No statistical alteration in sex, age, alcohol comorbidities score and smoking by the time of surgery was noted. All patients with CESR and CESI showed a positive response in bladder and bowel dysfunction following surgery. There was no substantial change in the recovery of autonomic dysfunction associated with the time of surgery. **Conclusions:** Surgical decompression is an operative method of treatment that suggestively alleviates the symptoms of CES involved autonomic system. Early decompression by surgery 24 hours after start of symptoms does not seems to improve resolving of bladder or bowel dysfunction significantly.

INTRODUCTION

In 1858, Luschka 1st defined the lumbar disc prolapse. It was 50 years formerly the 1st discectomy was performed and another three decades a description of Cauda Equina Syndrome (CES) [1,2]. Fortunately, it is aninfrequentailment with a frequency contributing to 2-4% of lumbar disc surgery [3,4]. The natural history and pathogenesis of CES are not evidently well-defined. One theory is that a huge prolapse of the medial or central disc causes lumbosacral nerve roots compression beneath the Conus Medullaris level [5,6]. It is not clear what measures significant compression of canal resulting in CES [7], as it happened in cases with less than 25% compromise of spinal canal. Additional theory is that CES is chemically facilitated by inflammatory and swollen structures of neuron originate in pathological samples [8,9], like that happen in compartment syndrome. It can manifest as a number of signs. These comprise sensory deficits in the lower limbs and perineum, back pain, leg weakness, leg pain and impaired bowel and bladder function [10] Consequently, the CES clinical diagnosis is devoid of specificity and sensitivity without a single sign or symptom that effectively predicts the outcome and management [11]. The goal of our study was to determine the effect of surgical procedure, with relation to time, on bladder and bowel symptoms.

METHODS

This retrospective analysis was held in the Department of Neurosurgery of a tertiary care referral center for three-years duration from January 2019 to January 2022. All subjects with confirmed or suspected CES were included, making a total of 120 cases. All CES cases were surgically

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decompressed as soon as possible after admission. Surgical treatment consisted in all cases of laminectomy or lumbar discectomy. 60 patients reported CESR, 24cases of CESI and 36 cases of CESS. The patients were followed-up in the OPD to evaluate the improvement. Data gathered encompassed patients' age, sex, prior medical history, duration of onset of symptoms and time to surgery, and postoperative results. For the purposes of this analysis, we define the beginning of symptoms as the moment when the patient returns with worsening of chronic symptoms or any new symptoms, prompting him to pursue medical help. The patient's medical record was assessed. All statistics were composed and analyzed. Charlson Co-morbidity Index (CCMI) was applied to assess the medical history. The CCMI is an approved scoring system for estimating additional mortality and morbidity. The results are classified as high risk(5+), moderate(3-4) and mild(1-2). MRI confirmed CES in 56 patients; 4 patients were confirmed by Cine myelo gram due to non-compatibility with MRI. The study used the CES classification of the British Association for Spine Surgery.

CESR (painless retention with urinary or fecal incontinence)

CES' (CESS plus urgency, dysuria or change in urine sensation)

CES (suspected CES without dysfunction of sphincter)

These subjects with persistent symptoms were surveyed for at least two months to make sure there were no patients with previous CES problems. The primary results were to assess the effect of BASS CES classification and operative time on clinical results after decompression by surgery. Secondary outcomes were to evaluate the other variables that might forecast the results of surgery. SPSS 22.0 was applied for Statistical analysis. Statistical significance was assessed using the chi-square test and Fisher's exact test. The level of significance was established at 0.05.

120 total patients had surgical treatment consisted in all cases of decompressive laminectomy and discectomy. 60 patients reported CESR, 24cases of CESI and 36 cases of CESS. No patient was lost during follow-up upto 24 months. Postoperative symptoms remained constant after 6 months. Secondary measures of outcomes such as gender, age and smoking did not differ statistically from time to operation (all exact Fisher p-values > 0.05). No statistically substantial association between poor outcome and elevated CCMI score in any of the subgroups was noted. (P values were > 0.05 in Fisher's exact test). Table 1 displays the studied variables.

Table 1: Demographics of studied patients

Table 2: Timing to surgery

Most patients were operated after 24 hours due to delayed presentation (95%) with greater proportion in after 48 hours category (77.5%). Every possible measure was taken to have de-compressive laminectomy as soon as reasonably feasible after the diagnosis was made and hence there was no intentional delay from the surgeons'. Chi-square analysis showed no significant differences in <24 and >24 hrs (P 0.14). 10 patients experienced problems after surgery. This comprised dural tears in 5 patients (4%), 1 re-operated for persistent compression, and in the remainder wound infection was noted (4 patients)(Table 2).

Table 3: Complete and Incomplete Bladder and Bowel Symptoms

Table 3 shows the frequency of fecal incontinence, complete and incomplete urinary symptoms. The subjects were not transferred to other subgroups of CES after surgery. This was to help check for improvement or even deterioration after surgery

Table 4: Impact of timing to surgery on CESR group

DISCUSSION

Fortunately, CES is a non-frequent disorder that accounts for 2-4% of lumbar disc surgery [3,4]. Regardless of the cause and presenting symptoms, the recommendation by almost all the surgeons is to treat CES as emergency

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[12,13]. The main goal of this analysis was to analyze the autonomic symptoms accompanying CES and to recognize the in-hospital outcome predictors for the disease. This is a retrospective analysis, though collection of data was performed systematically on the basis of admission notes. The ultrasound for post-void and bladder function were not routinely accomplished on every subject in the ward. So, subjective patients reported about symptoms of bladder were cast-off in this study. This study originates that timing did not affect outcomes significantly in people with incomplete urination symptoms or faecal incontinence. Although we followed these patients for at least 2 years, we noticed that no additional development was found in residual bowel and bladder symptoms after six-months. However, we noticed that one study showed sustained improvement for up to 3 to 4 years. There were a significant number of people at CESR who saw significant improvements, or even improvements, in symptoms after surgery, regardless of the timing. The procedure must be achieved under ideal environments and not as early as possible basis, irrespective of the time of day. There are different clarifications of the CES in the meta-analysis [14-20]. CES was defined based on the frequency of symptoms or classified conferring to the clinical picture at the onset time. It is generally recognized that a CES critical aspect is the cauda equine compression, which leads to autonomic dysfunction. It is suitable to view CES as a development of an ongoing process that ultimately results in possible bladder and bowel dysfunction. In adding, protracted pressure may be related with greater neurological damage even after CESR. Instead, the focus should be on recognizing other determinants of poor performance and increased time of recovery [21,22]. Perhaps the 1984 Rydevik pig model is worth considering. It is worth noting that longer compression times may only extend recovery time, not eventual morbidity, but compression pressure is more critical. While CES classifications allow for group data analysis, CES is more likely to behave like many biological systems and degrade in a linear rather than incremental manner [23,24]. Therefore, it may be difficult to establish boundaries for subclasses. This study revealed that there is a significant improvement in bladder and bowel function after decompression surgery that is not dependent on the subclass of CES or the timing to surgery. Although it is still recommended that the earlier the surgery, the better the outcome is expected.

CONCLUSION

CES have a disturbing impact on life quality, put a heavy load on medicinal facilities, and have significant medico-legal ramifications in terms of the supposed consequences of postponements. There was no strong indication in this study that operative time adversely affects post-surgical decompression outcomes for Cauda Equina Syndrome. The CES may progress gradually from CESS to CESI and then CESR. Though timing does not affect the results, classification does have an impact and so medically attended patients should not be allowed worsening in CES class after admission. We believe that surgery should be considered pragmatically as quickly as possible, but not at the cost of safety of the patients.

REFERENCES

[1] Srikandarajah N, Wilby M, Clark S, Noble A, Williamson P, Marson T. Outcomes reported after surgery for cauda equina syndrome: a systematic literature review. Spine. 2018 Sep 1;43(17): E1005.doi.org/10.1097/BRS.0000000000002605

[2] Heyes G, Jones M, Verzin E, McLorinan G, Darwish N, Eames N. Influence of timing of surgery on cauda equina syndrome: outcomes at a national spinal centre. Journal of Orthopaedics. 2018 Mar 1;15(1): 210-5.doi.org/10.1016/j.jor.2018.01.020

[3] Long B, Koyfman A, Gottlieb M. Evaluation and management of cauda equina syndrome in the emergency department. The American Journal of Emergency Medicine. 2020 Jan 1;38(1): 143-8.doi.org/10.1016/j.ajem.2019.158402

[4] Hoeritzauer I, Pronin S, Carson A, Statham P, Demetriades AK, Stone J. The clinical features and outcome of scan-negative and scan-positive cases in suspected cauda equina syndrome: a retrospective study of 276 patients. Journal of neurology. 2018 Dec;265(12): 2916-26.doi.org/10.1007/s00415-018-9078-2

[5] Korse NS, Pijpers JA, Van Zwet E, Elzevier HW, Vleggeert-Lankamp CL. Cauda Equina Syndrome: presentation, outcome, and predictors with focus on micturition, defecation, and sexual dysfunction. European Spine Journal. 2017 Mar;26(3):894-904. doi.org/10.1007/s00586-017-4943-8

[6] Dias AL, Araújo FF, Cristante AF, Marcon RM, Barros Filho TE, Letaif OB. Epidemiology of cauda equina syndrome. What changed until 2015. Revista Brasileira de Ortopedia. 2018 Jan; 53: 107-12.doi.org/10.1016/j.rboe.2017.11.006

[7] Woodfield J, Hoeritzauer I, Jamjoom AA, Pronin S, Srikandarajah N, Poon M, et al. Understanding cauda equina syndrome: protocol for a UK multicentre prospective observational cohort study. BMJ open. 2018 Dec 1;8(12): e025230. doi.org/10.1136/bmjopen-2018-025230.

DOI:https://doi.org/10.54393/pbmj.v5i5.430

[8] Korse NS, Veldman AB, Peul WC, Vleggeert-Lankamp CL. The long term outcome of micturition, defecation and sexual function after spinal surgery for cauda equina syndrome. PLoS One. 2017 Apr 19;12(4): e0175987. doi.org/10.1371/journal.pone.0175987

[9] Srikandarajah N, Noble A, Clark S, Wilby M, Freeman BJ, Fehlings MG, et al.Cauda Equina Syndrome Core Outcome Set (CESCOS): An international patient and healthcare professional consensus for research studies. PloS one. 2020 Jan 10;15(1): e0225907. doi.org/10.1371/journal.pone.0225907

[10] Jain A, Menga E, Mesfin A. Outcomes following surgical management of cauda equina syndrome: does race matter? Journal of Racial and Ethnic Health Disparities. 2018 Apr;5(2): 287-92.doi.org/10.1007/s40615-017-0369-6

[11] Hogan WB, Kuris EO, Durand WM, Eltorai AE, Daniels AH. Timing of surgical decompression for cauda equina syndrome. World Neurosurgery. 2019 Dec 1;132: e732-8.doi.org/10.1016/j.wneu.2019.08.030

[12] Hussain MM, Razak AA, Hassan SS, Choudhari KA, Spink GM. Time to implement a national referral pathway for suspected cauda equina syndrome: review and outcome of 250 referrals. British Journal of Neurosurgery. 2018 May 4;32(3):264-8. doi.org/10.1080/02688697.2018.1457771

[13] Pronin S, Koh CH, Bulovaite E, Macleod MR, Statham PF. Compressive pressure versus time in cauda equina syndrome: a systematic review and meta-analysis of experimental studies. Spine. 2019 Aug 1;44(17): 1238.doi.org/10.1097/BRS.0000000000003045

[14] Li P, Qiu D, Shi H, Song W, Wang C, Qiu Z, et al. Isolated decompression for transverse sacral fractures with cauda equina syndrome. Medical Science Monitor: International Medical Journal of Experimental and Clinical Research. 2019; 25:3583. doi.org/10.12659/MSM.916483

[15] Yang SD, Zhang F, Ding WY. Analysis of clinical and neurological outcomes in patients with cauda equina syndrome caused by acute lumbar disc herniation: a retrospective-prospective study. Oncotarget. 2017 Oct 13;8(48):84204. doi.org/10.18632/oncotarget.20453

[16] Lee DG, Kwak SG, Chang MC. Prediction of the outcome of bladder dysfunction based on electrically induced reflex findings in patients with cauda equina syndrome: a retrospective study. Medicine. 2017 May;96(21). doi.org/10.1097/MD.0000000000007014

[17] Kaiser R, Krajcová A, Waldauf P, Srikandarajah N, Makel M, Beneš V. Are there any risk factors associated with the presence of cauda equina syndrome in symptomatic lumbar disk herniation? World neurosurgery. 2020 Sep 1;141: e600-5. doi.org/10.1016/j.wneu.2020.05.260

[18] Wang Y, Jiangsu N. Percutaneous endoscopic lumbar discectomy as an emergent surgery for cauda equina syndrome caused by lumbar disc herniation. Pain Physician. 2020 May;23: E259-64.doi.org/10.36076/ppj.2020/23/E259

[19] Reddy AP, Mahajan R, Rustagi T, Chhabra HS. Bladder recovery patterns in patients with complete cauda equina syndrome: a single-center study. Asian spine journal. 2018 Dec;12(6): 981.doi.org/10.31616/asj.2018.12.6.981

[20] Srikandarajah N, Noble AJ, Wilby M, Clark S, Williamson PR, Marson AG. Protocol for the development of a core outcome set for cauda equina syndrome: systematic literature review, qualitative interviews, Delphi survey and consensus meeting. BMJ open. 2019 Apr 1;9(4): e024002.doi.org/10.1136/bmjopen-2018-024002

[21] Greenhalgh S, Finucane L, Mercer C, Selfe J. Assessment and management of cauda equina syndrome. Musculoskeletal Science and Practice. 2018 Oct 1; 37:69-74. doi.org/10.1016/j.msksp.2018.06.002

[22] Sangondimath G, Mallepally AR, Mascharenhas A, Chhabra HS. Sexual and bladder dysfunction in cauda equina syndrome: correlation with clinical and urodynamic studies. Asian Spine Journal. 2020 Dec;14(6): 782.doi.org/10.31616/asj.2019.0305

[23] Dave BR, Samal P, Sangvi R, Degulmadi D, Patel D, Krishnan A. Does the surgical timing and decompression alone or fusion surgery in lumbar stenosis influence outcome in cauda equina syndrome? Asian Spine Journal. 2019 Apr;13(2):198. doi.org/10.31616/asj.2018.0168

[24] Fountain DM, Davies SC, Woodfield J, Kamel M, Majewska P, Edlmann E, et al. Evaluation of nationwide referral pathways, investigation and treatment of suspected cauda equina syndrome in the United Kingdom. British Journal of Neurosurgery. 2019 Nov 2;33(6):624-34. doi.org/10.1080/02688697.2019.1648757

[25] This study revealed that there is a significant improvement in bladder and bowel function after decompression surgery that is not dependent on the subclass of CES or the timing to surgery. Although it is still recommended that the earlier the surgery, the better the outcome is expected.

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Original Article

Correlation between Mobility Restriction, Body Image Perception and Prosthesis Satisfaction among Lower Limb Amputee Prosthesis Users

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ABSTRACT

Amputation is known as the surgical removal of the body part. Amputation occurs as a result of many conditions. The most common reason is poor blood circulation which results in a result of narrowing or damage of arteries. **Objective:** To determine the correlation between mobility restriction, body image perception and prosthesis satisfaction among lower-limb amputee prosthesis users. **Methods:** This cross-sectional study was conducted on 63 participants after taking consent from ethical review board of Faculty of Allied Health Sciences, The University of Lahore. The data was collected from Pakistan Society for the Rehabilitation of the Disabled (PSRD), Ghurki Trust Teaching Hospital of Lahore. Both male and female amputees were included with 18 to 60 years. Data was collected by using TAPES, Amputee Body Image Scale and Amputee Mobility Predictor Assessment Scale. **Results:** The results showed that the average age out of 63 amputees was 39.37 years. Females were 21 (33.3%) and males were 42 (66.7%). According to result people with below the knee amputation had more mobility (20.00), more satisfaction level (62.04) and less disruption of body image (18.15) in comparison with people who had above the knee level amputation (15.50, 68.50 and 16.50). The results showed that the satisfaction level and mobility were directly correlated with one another but on the other hand inverse correlated relationship was seen for body image disruption with mobility and satisfaction level ($P<0.05$). **Conclusions:** Based on these results, it was concluded that body image perception, mobility and prosthesis satisfaction are correlated to one another in people with lower limb amputation who uses a prosthesis.

INTRODUCTION

'Amputation' came from the Latin word 'amputee' (to excise, to cut out), it is defined as removal of a region or all of a body part surrounded by skin [1]. Amputation is known as the surgical removal of the body part. Without proper circulation, proper oxygen exchange from the cell is not possible due to which affected tissue is infected or results in cell death [2]. Amputation can be of the upper limb or lower limb. The most common amputation is of the lower limb. Lower limb amputation (LLA) is divided into two parts major and minor. Major lower limb amputation is done on the ankle or above. Major lower limb amputation is defined as the surgical removal of a part or whole limb proximal to the ankle [3]. Lower extremity amputation is regarded as an utmost health event that can adversely influence an individual's functional mobility. Lower extremity amputation impacts a person's functional, psychological and social elements. Prosthesis use after an amputation holds a beneficial influence on an individual's psychosocial position and quality of life. It plays a major role in improving and or restoring physical function and capacity, independence in ADLs, body image. A satisfactory prognosis relies on physical and mental aspects and prosthesis adaptation. Lower extremity amputation yields a considerable socioeconomic impact and reduces functional capacity, independence, and quality of life [4]. Researchers studying these challenges often depicted the

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personified experience after amputation, including coping with body image stress, identity changes, the meaning of using a prosthesis, negative thoughts, reactions and emotions about their amputation, and social distress [5]. Patients with amputation normally suffer from body image problems which lead to anxiety or depression. This depression or anxiety sometimes leads to phantom pain which causes further anxiety [6]. Amputation is a life-saving procedure with a consequent change in an amputee's functional, social and psychological aspects of life. Besides the change in mobility because of prosthesis fitting and corresponding prosthesis satisfaction, an amputee may encounter psychological issues as well i.e., depression, low self-esteem due to many factors such as a change in perception of body image [7]. All of these factors alone or collectively contributes to a reduced quality of life of a lower limb amputee. So the objective of this study is to correlate mobility, body image perception and prosthesis satisfaction in amputees and to encourage further research about this topic. This will help the health care professionals in providing better care to amputees improving their quality of life and allowing them to enhance their independence. According to the researcher's knowledge, this study hasn't been done in Pakistan previously.

METHODS

This is a cross-sectional study. The inclusion criteria for this study was both genders, prosthesis users from 18 to 60 years of age, both bilateral and unilateral amputees, people who used prosthesis daily for the past 6 months and people who were amputated by peripheral vascular disease, diabetes, trauma, infection, cancer and clot cases were included. Exclusion criteria was patients who were affected by comorbidities such as induce fear of fall, bedridden people, patient not using prosthesis, patients with any neurological and cognitive problem and lastly people who were not willing to participate. This study was conducted on 63 participants. It was done as there is less chance of error occurrence in a large sample size due to skewed data in the small population data. A large sample size helps in giving more accurate results with minimum chances of the error margin. Due to less availability of the patients and less time duration data of only 63 participants were collected. The data was collected from different hospital settings. Data was collected by using the Trinity amputation and prosthesis experience scale, Amputee body image scale and amputee mobility predictor assessment scale. The amputee mobility predictor scale was used to assess the mobility of the amputee. It is scored by calculating K0, K1, K2, K3 and K4. K0 was calculated by adding questions 1, 2, 3, 4, 5, 6 and 7. K1 was calculated by adding questions 4, 6, 7,9, 10, 13 and 14. K2 was calculated by adding questions 7, 9, 10, 15, 16 and 17. K3 was calculated by adding question 9, 10, 12, 15, 16, 17, 19 and 20. K4 was calculated by adding questions 9, 15, 16, 17, 18, 19 and 20. The greater the score greater was the mobility [8]. TAPES was used to assess prosthesis satisfaction. This questionnaire consists of nine subscales. It psychosocial scale assesses 3 further subscales known as social adjustment, limitation adjustment and general adjustment. It activity scale assess further three subtypes which are functional activity, social activity and athletic activity limitation. Its last scale which is used to assess the satisfaction level of patient's further divide into three subscales which are functional satisfaction, aesthetic and weight satisfaction. In this study only prosthetic satisfaction was assessed based on these three subtypes [9]. Functional satisfaction was calculated by adding 5 questions whose score range is from 5 to 25. Aesthetic satisfaction was calculated by adding 5 questions ranging scores between 4 and 20. Weight satisfaction was calculated by the sum of one question. The greater the score greater was the patient satisfaction level. Amputee body image was calculated by adding all 20 item questions. Its score range from 20 to 100. Higher the score higher was the disruption of image disturbance [10].

RESULTS

Several participants who encountered the inclusion criteria were registered i.e. N= 63. Data was collected by using Trinity amputation and prosthesis experience scale, Amputee body image scale and amputee mobility predictor assessment scale for all 63 participants of both genders. The results showed that the Mean age was 40.06 years. Females were 21 (33.3%) and males were 42 (66.7%). The results showed that the average value of amputees with tumor cases out of 63 was 2 with a percentage of 3.2%, an amputee who had an accident out of 63 were 12 (19.0%), amputees who were diabetic had an average value of 48 (76.2%) and amputee who were amputated due to other causes was 1 (1.6%). The average value of amputee laterality with left side amputation cases out of 63 was 29 (46.0%), amputees who had bilateral leg amputation out of 63 were 6 (9.5%), and amputees who had right side amputation was 28 (44.4%). Amputees who had below the knee amputation had an average value of 55 (87.3%) and amputees who had amputation above the knee had an average value of 8 (12.7%). The average value of prosthetic satisfaction was 19.43, mobility was 17.94 and body image was 62.86. Above the knee amputee patients lie in k1 and k2 level of amputee mobility level and below the knee amputee patients lie in k0, k2, k3 and also k4 level of amputee mobility. According to result people with below the knee amputation had more mobility (18.14), more satisfaction

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level (20.00), and less disruption of body image (62.03) in comparison with people who had above the knee level amputation (16.50, 15.5,0 and 68.50). The result of the normality test showed the data is not normally distributed as the p value was less than the significant value (P<0.05). So, for this unequally distributed data non-parametric test of spearman correlation was applied. The result of this test shows that the P-value or the significant value is less than 0.05 for all three variables which shows that all three variables are correlated with one another (P<0.05). The result showed that satisfaction level and mobility are directly correlated with one another but on the other hand inverse correlated relationship is seen between body image disruption with mobility and satisfaction level (P<0.05). The results showed that people with below the knee amputation had more mobility (20.00), more satisfaction level (62.04) and less disruption of body image (18.15) in comparison with people who had above the knee level amputation (15.50, 68.50 and 16.50) (Table 1).

Amputation type		Satisfaction	Body Image	Mobility
Above the knee	Mean	15.5000	68.5000	16.5000
	SD	12.22410	29.30139	11.17395
	Minimum	6.00	22.00	4.00
	Maximum	34.00	93.00	33.00
Below the knee	Mean	20.0000	62.0364	18.1455
	SD	11.99691	27.05205	9.2904
	Minimum	4.00	10.00	14.00
	Maximum	43.00	98.00	35.00

Table 1: Comparison of Amputation type with Mobility, Body Image and Satisfaction Level

The results of Table 2 showed that the P-value or the significant value is less than 0.01 for all three variables which shows that all three variables are strongly correlated with one another. The table shows that satisfaction level and mobility are positively correlated with one another but on the other hand, strong negative correlation is seen of body image disruption with mobility and satisfaction level.

Amputation type			Body Image	Satisfaction	Mobility
Spearman's rho	Body Image	Correlation Coefficient	1.000	-.886**	-.830**
		Sig. (2-tailed)	.	.000	.000
		N	63	63	63
	Satisfaction	Correlation Coefficient	-.886**	1.000	.886**
		Sig. (2-tailed)	.000	.	.000
		N	63	63	63
	Mobility	Correlation Coefficient	-.830**	.886**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	63	63	63

Table 2: Spearman's Correlation

DISCUSSION

Amputation is a lifesaving process that is impacted by an amputee's functional, social and psychological aspects of life [11]. Besides the change in mobility because of prosthesis fitting and corresponding prosthesis satisfaction, an amputee may encounter psychological issues as well depression, low self-esteem due to many factors such as a change in perception of body image [12]. This cross-sectional study was conducted on 63 participants. The data was collected from different hospital settings. Data was collected by using Trinity amputation and prosthesis experience scale, Amputee body image scale and amputee mobility predictor assessment scale. The result of this study shows that average people who went below the knee showed satisfaction of 20.00 with the level of the prosthesis. This satisfaction rate was slightly more than that of the knee patient. This is due to the increased atrophy rate at the higher level in comparison to the lower level. People with the stump at the lower knee level provide more stability and balance than stump in higher-level amputation [13]. Patient satisfaction with the prosthesis act as a major indication for the quality of life assessment. This quality of life is associated with the mobility of the prosthesis [14]. Studies have shown that this satisfaction is majorly dependent upon the mobility of the prosthesis. It is stated that if there is more mobility patients more satisfaction is achieved and if there is less mobility, there is less patient satisfaction rate [15]. It is stated that people with proximal level amputation are less satisfied than distal level amputation. This is due to the weight and decreased mobility of the prosthesis [16]. Results include that body image is more disturbed above the knee level than below the knee. This depends upon a person's satisfaction with his or her appearance. It is stated that body image appearance depends upon a person's fitness or health which entirely depends upon a person's mobility [17]. More mobility less time will take for the rehabilitation process and more satisfied a person would be with his or her appearance. Person appearance has an impact on a person's self-esteem more impacted a person's appearance and mobility is more will be his or her dissatisfaction level [18]. It is stated that the main factors of beauty, body image and self-esteem are definitely affected during amputation but its value entirely depends upon the level of amputation. The higher the amputation more impacted the self-esteem would be causing more disturbance in disrupting body image [19]. Studies have shown that disruption in body image causes depression, anxiety and many other psychological disturbances. This psychological disturbance impacts a person's quality of life leading towards reduction in mobility. This reduction

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causes a person a more severe disability. This impact of disability on a person creates less satisfaction feeling towards prosthesis [20]. As below the knee, amputation shows a better result with better functional outcome in comparison to above knee level amputation [21]. Mobility in the below the knee level amputation was more (18.15) than above the knee amputation (16.50). In another study, Smith et al., stated that in the case of people where the popliteal pulse is still present below the knee level amputation is a better option than above the knee [22]. In another study, it was concluded that the higher the level of amputation, lower is the degree of rehabilitation process [23]. Below the knee, amputation works in the area between ankle and knee which provides the patient with more range for movement and can allow patient to walk this is why below the knee is a preferred choice than above the knee amputation [24]. Conflicting debate states that mobility and body image perception are not related but according to recent research findings. These results didn't support the results of our study as the results of our study indicates that the way a person perceives their body image does impact a person's ability to train which ultimately helps a person to improve their mobility. In a study, it was stated that lower body satisfaction or self-esteem results in poor body image [25]. Previous studies have shown similar findings related relationship between mobility, prosthesis satisfaction and body image. Our study on the contrary explained the relationship between body image and quality of life in terms of improving mobility along with personal satisfaction level. Hence based on all previous studies and results of this study, it is stated that there is a relationship between mobility, body image, and prosthesis satisfaction.

CONCLUSIONS

It is concluded that body image perception, mobility, and prosthesis satisfaction are correlated to one another in people with lower limb amputation who use a prosthesis.

REFERENCES

[1] Kumar GK, Souza CD, Diaz EA. Incidence and causes of lower-limb amputations in a tertiary care center: evaluation of the medical records in a period of 2 years. Int J Surg Sci. 2018;2(3):16-9.

[2] Fujioka M. A Retrospective Analysis of Amputation Risk Due to Diabetic Foot and Angioplasty and Free Flap Transfer to Reduce Major Amputation. InLimb Amputation. 2019. doi: 10.5772/intechopen.88351.

[3] Davies M, Burdett L, Bowling F, Ahmed N, McClennon J. The epidemiology of major lower-limb amputation in England: a systematic review highlighting methodological differences of reported trials. Diabet Foot J. 2019;22:53-61.

[4] Silva ADM, Furtado G, Dos Santos IP, da Silva CB, Caldas LR, Bernardes KO et al. Functional capacity of elderly with lower-limb amputation after prosthesis rehabilitation: a longitudinal study. Disabil Rehabil Assist Technol. 2021;16(5):556-560. doi: 10.1080/17483107.2019.1684581.

[5] Van Schaik L, Geertzen JHB, Dijkstra PU, Dekker R. Metabolic costs of activities of daily living in persons with a lower limb amputation: A systematic review and meta-analysis. PLoS One. 2019;14(3):e0213256. doi: 10.1371/journal.pone.0213256.

[6] Miller MJ, Cook PF, Magnusson DM, Morris MA, Blatchford PJ, Schenkman ML et al. Self-Efficacy and Social Support are Associated with Disability for Ambulatory Prosthesis Users After Lower-Limb Amputation. PM R. 2021;13(5):453-460. doi: 10.1002/pmrj.12464.

[7] Burger H, Marincek C, Isakov E. Mobility of persons after traumatic lower limb amputation. Disabil Rehabil. 1997;19(7):272-7. doi: 10.3109/09638289709166538.

[8] Côté-Martin MÉ, Tremblay A, Couture M, Roy JS. Translation, Reliability, and Validity of the French Version of the Amputee Mobility Predictor. JPO: Journal of Prosthetics and Orthotics. 2020;32(2):101-6. doi: 10.1097/JPO.0000000000000305.

[9] Luthi F, Praz C, Léger B, Vouilloz A, Favre C, Loiret I et al. Cross-cultural adaptation and measurement properties of the French version of the Trinity Amputation and Prosthesis Experience Scales-Revised (TAPES-R). PLoS One. 2020;15(2):e0229084. doi: 10.1371/journal.pone.0229084.

[10] Gallagher P, Horgan O, Franchignoni F, Giordano A, MacLachlan M. Body image in people with lower-limb amputation: a Rasch analysis of the Amputee Body Image Scale. Am J Phys Med Rehabil. 2007;86(3):205-15. doi: 10.1097/PHM.0b013e3180321439.

[11] Ostlie K, Franklin RJ, Skjeldal OH, Skrondal A, Magnus P. Assessing physical function in adult acquired major upper-limb amputees by combining the Disabilities of the Arm, Shoulder and Hand (DASH) Outcome Questionnaire and clinical examination. Arch Phys Med Rehabil. 2011;92(10):1636-45. doi: 10.1016/j.apmr.2011.04.019.

[12] Pedras S, Vilhena E, Carvalho R, Pereira MG. Quality of Life Following a Lower Limb Amputation in Diabetic Patients: A Longitudinal and Multicenter Study. Psychiatry. 2020;83(1):47-57. doi: 10.1080/00332747.2019.1672438.

[13] Batch JW, Spittler AW, Mcfaddin JG. Advantages of the knee disarticulation over amputations through the thigh. J Bone Joint Surg Am. 1954;36-A(5):921-30.

[14] Fanciullacci C, McKinney Z, Monaco V, Milandri G,

DOI: https://doi.org/10.54393/pbmj.v5i5.363

Davalli A, Sacchetti R et al. Survey of transfemoral amputee experience and priorities for the user-centered design of powered robotic transfemoral prostheses. J Neuroeng Rehabil. 2021;18(1):168. doi: 10.1186/s12984-021-00944-x.

[15] Gholizadeh H, Abu Osman NA, Eshraghi A, Ali S, Yahyavi ES. Satisfaction and problems experienced with transfemoral suspension systems: a comparison between common suction socket and seal-in liner. Arch Phys Med Rehabil. 2013;94(8):1584-9. doi: 10.1016/j.apmr.2012.12.007.

[16] Webster JB, Hakimi KN, Williams RM, Turner AP, Norvell DC, Czerniecki JM. Prosthetic fitting, use, and satisfaction following lower-limb amputation: a prospective study. J Rehabil Res Dev. 2012;49(10): 1493-504. doi: 10.1682/jrrd.2012.01.0001.

[17] Gallagher P, Maclachlan M. The Trinity Amputation and Prosthesis Experience Scales and quality of life in people with lower-limb amputation. Arch Phys Med Rehabil. 2004;85(5):730-6. doi: 10.1016/j.apmr.2003.07.009.

[18] Roșca AC, Baciu CC, Burtăverde V, Mateizer A. Psychological Consequences in Patients With Amputation of a Limb. An Interpretative-Phenomenological Analysis. Front Psychol. 2021;12: 537493. doi: 10.3389/fpsyg.2021.537493.

[19] Burden N, Simpson J, Murray C, Overton PG, Powell PA. Prosthesis use is associated with reduced physical self-disgust in limb amputees. Body Image. 2018;27:109-117. doi: 10.1016/j.bodyim.2018.08.001.

[20] Brier MJ, Williams RM, Turner AP, Henderson AW, Roepke AM, Norvell DC et al. Quality of Relationships With Caregivers, Depression, and Life Satisfaction After Dysvascular Lower Extremity Amputation. Arch Phys Med Rehabil. 2018;99(3):452-458. doi: 10.1016/j.apmr.2017.09.110.

[21] MacKenzie EJ, Bosse MJ, Castillo RC, Smith DG, Webb LX, Kellam JF et al. Functional outcomes following trauma-related lower-extremity amputation. J Bone Joint Surg Am. 2004;86(8):1636-45. doi: 10.2106/00004623-200408000-00006.

[22] Smith HG. Amputation above or below the knee for primary peripheral vascular disease. The Journal of Bone and Joint Surgery. British volume. 1950;32(3): 392-5. doi.org/10.1302/0301-620X.32B3.392.

[23] Hagberg E, Berlin OK, Renström P. Function after through-knee compared with below-knee and above-knee amputation. Prosthet Orthot Int. 1992;16(3):168-73. doi: 10.3109/03093649209164336.

[24] O'Keeffe B, Rout S. Prosthetic rehabilitation in the lower limb. Indian Journal of Plastic Surgery. 2019;52(01):134-43. DOI: 10.1055/s-0039-1687919.

[25] Wongwan S. The effect of self-compassion on depression, anxiety, stress mediated by perceived body image in poeple with mobility impairment and disability in phrae province.2021.

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Original Article

Effects of Physiotherapy on Strength, Range and Function in Children with Erb's Palsy; An Experimental Study

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ABSTRACT

Children who sustain brachial plexus injuries after birth face significant functional limitations due to a variety of sequelae affecting the shoulder, elbow, or forearm. These effects could be permanent or temporary. It is critical for proper joint development to maintain complete passive mobility while neurological function is being restored. Children with Erb's palsy are more likely to have weak muscles, which can be found by ultrasonography **Objective:** To determine the effects of physiotherapy on strength, range and function in children with Erb's palsy. **Methods:** It was a clinical trial conducted at physiotherapy department outpatient at General hospital Lahore. A sample of 46 children aged between 0-10 years, with the C5 and C6 lesion and with limited range of motion were included while children with any history of previous or recent trauma or surgery to upper limb and to the other roots of brachial plexuses was excluded. Modified Mallet scale and active movement scale was used as outcome measures. The coin toss technique of randomization was adopted, with 'Heads' assigned to strengthening exercises and 'Tails' assigned to general treatment. Independent sample test was employed to assess pre and post differences. Physiotherapy treatments included neurodevelopmental approaches to improve proprioception input, orthosis, and electrical current stimulation. Free weights, resistance bands and manual resistance were used in the strength training. The active range of motion was evaluated using goniometry, and a baseline measurement was generated using a modified mallet scale. The treatment was given every day for six months. Post-intervention measures were implemented two, four, and six months following the intervention. SPSS 25.0 was used for data analysis. **Results:** The finding showed that pre-interventional oxford scale muscle strength for experimental group showed the mean and standard deviation (1.434± 0.5068), control group (1.65± 0.48) while Oxford scale muscle strength post intervention showed the results with the mean and standard deviation for the experimental group 3.13± 0.54 and control group 2.65± 0.48 and showed significant *p value* less than 0.005. **Conclusions:** The study concluded that physiotherapy integrated approach improved upper limb strength, ranges and functional abilities in patients with Erb's Palsy.

INTRODUCTION

Erb's Palsy is one of the most common neurological birth injuries. It is also known as Erb's-Duchenne paralysis and defined as the paralysis of the arm which occurred due to the injury of the upper group of main nerves supplying it, specified as upper trunk of C5-C6 of the brachial plexus. Though, in some cases C7 is also get involved. Brachial plexus injuries can cause movement disability and cutaneous sensation disturbances in upper arm. The most known cause of Erb's palsy is traction happened on the neck during difficult labour and delivery [1]. The severity of

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the injury can resolve by itself with time or needs physiotherapy or surgery. The most common cause is known as obstetrical technique during delivery but two other major risk factors are also associated with Erb's palsy which is shoulder dystonia and foetus large size thus initiating difficult labour and instrumental assistive delivery. Most of the cases are resolved by time and there is no such permanent disability associated with Erb's palsy [2]. The child with this brachial plexus injury presents the sign and symptoms such as extreme extension and internal rotation of the limb, pronation of the forearm and flexion of the wrist which appears and named as waiter's tip deformity [3]. Moro reflex is absent in the arm with intact of grasping of hand of the same side diagnosed as Erb's Palsy [4]. An incidence of 0.9-1 per 1000 births has been reported for the brachial plexus birth injury in the United States. Erb's palsy accounts for about 47% of Brachial plexuses birth injuries. C7 injuries account for only 19% of the brachial plexuses birth injuries. Recovery rate in first few weeks is considered to be a good indicator for the final results and recovery [5]. The etiology of Erb's palsy can be mishandling during child birth such as excessive lateral rotation or stretching of the infant's head and neck to the opposite direction linked with shoulder dystonia and the head may be deviated away from the axial plane. Due to this brachial plexus tear and stretch can be occurred leading to Erb's palsy [6]. Erb's palsy can also be caused by having excessive pressure over pulling on the infant's arm during breech delivery [5,7]. Many children who are have obstetrician brachial palsy can be improved and recovered by 4-5 months of their age; however it may take 2-3 years for the fully functional limb and recovery. Some of the cases has been recovered without any treatment [8]. Fortunately, between 85-90% of the cases be seen who have recovered fully, treatment for this palsy is either rehabilitative therapy or surgery in severe cases [9]. Manual therapy is the first priority to be taken as rehabilitative therapy to for the prevention of fixed deformities and contractures thus one session per day is essential to maintain Range of motion of the limb and wrist and for the quick and full functional recovery. The most effective exercises are by manual therapy or bilateral motor planning activities [10]. One of the previous researches assessed the efficacy of electrical stimulation versus traditional physiotherapy in the early recovery of function in babies after a brachial plexus injury. The results of this research imply that functional electrical stimulation may be preferable to traditional approaches in the rehabilitation of individuals with Erb's paralysis in terms of achieving early functional recovery [11,12]. Justice et al., conducted a research on the effectiveness of neuromuscular electrical stimulation in the treatment of obstetrician palsy. Their narrative evaluation included four articles and eleven patients with obstetrician palsy ranging in age from two to four and a half weeks [13]. Active range of motion, muscular strength, and a variety of somatometric measures were all assessed before and after the intervention. According to the findings, every patient's active range of motion improved, the circumference of the arm extended in some patients, and the length of the arm rose in one; nonetheless, there are mixed signals of an improvement in muscle strength. On the other hand, their investigation was made much harder by the fact that the measurements of physiotherapy equipment, such as the type of current, pulse length, treatment time, and so on, were very different [14]. Frade et al., did a narrative evaluation of the different rehabilitation treatments for OP patients and located 13 papers relevant to their inquiry [15]. They suggest the use of electrical stimulation and CIMT as additional noninvasive therapeutic options in addition to electrical stimulation and CIMT. According to the experts, the first is a commonly used strategy that speeds nerve tissue regeneration, reduces muscular atrophy, and improves functional muscle recovery following peripheral nerve loss. Both electro-stimulation and continuous active motion therapy (CIMT) are efficient methods for restoring muscle tone, range of motion, and strength in damaged muscles [14]. Kasnakova et al., included 17 children who had been diagnosed with obstetrician palsy in their study. The students were allocated into two groups at random [15]. Electromyography, the Active Movement Scale, the Mallet Scale, and the Manual Muscle Test were used to examine individuals before and after the intervention. Individuals in the intervention group received a comprehensive physiotherapy program [15]. A study investigating kinematic and electro-myographic activity of the shoulder during rehabilitation, found that a series of active range of motion, isometric, and isotonic exercises resulted in general strengthening of the injured muscle. This step was taken in order to get the best results. The benefits of PNF (progressive neuromuscular facilitation), scapular stability, and progressive resistive shoulder exercises are also supported by data. After revisional triangle tilt surgery, doctors should think about using these therapies, which have been linked to big changes in a patient's physical limitations, pain, and ability to function [16].

METHODS

It was a clinical trial that took place at physiotherapy department outpatient at General hospital Lahore. A sample of 46 children age between 0-10 years, with the C5 and C6 lesion and with limited range of motion was included while children with any history of previous or recent trauma or surgery to upper limb and to the other roots of brachial plexuses was excluded. Modified Mallet scale and active

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movement scale was used as outcome measures. Patients had assigned two groups named Group 1 as experimental group and Group 2 control group. The coin toss technique of randomization was adopted, with 'Heads' assigned to strengthening exercises and 'Tails' assigned to No treatment. A written consent was taken from the parents telling them about the key beneficial effects of the therapy. Group 1 experimental group was given physiotherapy integrated approach which included neurodevelopment techniques to improve proprioception, electrical current stimulation, orthosis and resistance strengthening exercises protocol such as use of free weights, thera bands and manual resistance exercises were included whereas Group 2 control group was given routine medical care. The active range of motion was evaluated using goniometry, and a baseline measurement was generated using a modified mallet scale. The treatment was given every day for six months. Post-intervention measures were implemented 2,4 and 6 months following the intervention. The researchers started by obtaining the children's names, ages, and residences from their parents. Among the other items of personal information acquired were names. The parents were then educated about the procedure and the potential advantages of the research for their children. SPSS 25.0 was utilized for data analysis. Independent sample test was employed to assess pre and post differences.

RESULTS

The results regarding demographics such as gender of the patients showed the percentage of male 28.3% and female 71.3%, BMI normal 84.8%, overweight 15.2%, socioeconomic status higher 13.3% , middle 32.6% , lower 54.3% , birth procedures NVD 69.6%, C-section 30.4%, surgical procedure during active labor forceps delivery 47.8%, vacuum delivery 15.2%, spontaneous delivery 6.5% and NA 30.4% were found (Table 1).

		Experimental	Control
		Frequency (%)	Frequency (%)
Gender	Male	8 (34.8)	5 (21.7)
	Female	15 (65.2)	18 (78.3)
Body Mass Index	Normal	18 (78.2)	21 (91.3)
	Overweight	5 (21.7)	2 (8.7)
Socioeconomic Status	Higher	2 (8.7)	4 (17.4)
	Middle	11 (47.7)	4 (17.4)
	Lower	10 (43.7)	15 (65.2)
Birth Procedure	NVD	16 (69.6)	16 (69.6)
	C-Section	7 (30.0)	7 (30.4)
	Forceps delivery	12 (52.2)	10 (43.5)
Surgical procedure during active Labor	Vacuum delivery	3 (13.0)	4 (17.4)
	Spontaneous delivery	1 (4.3)	2 (8.7)
	NA	7 (30.4)	7 (30.4)

Table 1: Demographics Characteristics
Note: NVD-normal vaginal delivery

Pre-interventional oxford scale muscle strength for experimental group showed the mean and standard deviation (1.434+ 0.5068), control group (1.6522 0.4869) while Oxford scale muscle strength post intervention showed the results with the mean and standard deviation for the experimental group (3.1304+ 0.54808) and control group (2.6522+ 0.4869) and showed significant p value less than 0.005. Pre-interventional results regarding ranges such as abduction, external rotation, hand to spine movement, hand to mouth movement, hand to neck movement and supination showed non-significant value $p > 0.005$ whereas post interventional results regarding ranges such as abduction, external rotation, hand to spine movement, hand to mouth movement, hand to neck movement and supination showed significant value $p < 0.005$ (Table 2).

Variables	Group	Mean	SD	Sig. (2-tailed)
Range of motion of abduction	Experimental	3.7391	0.44898	0.750
	Control	3.6957	0.47047	
Mallet Score: Range of motion of abduction post-Intervention	Experimental	4.8261	0.38755	0.001
	Control	4.2174	0.73587	
Mallet Score: Range of motion of external rotation, Pre-Intervention	Experimental	2.5652	0.50687	0.145
	Control	2.3478	0.48698	
Mallet Score: Range of motion of external rotation: post-Intervention	Experimental	3.7391	0.44898	0.000
	Control	2.9565	0.63806	
Hand to spine movement	Experimental	2.3478	0.48698	0.337
	Control	2.2174	0.42174	
Mallet Score: Hand to spine movement post-Intervention	Experimental	3.6522	0.48698	0.000
	Control	2.9565	0.70571	
Hand to mouth	Experimental	2.3913	0.49901	0.247
	Control	2.5652	0.50687	
Mallet Score: Hand to mouth post-Intervention	Experimental	3.8696	0.34435	0.000
	Control	3.1739	0.57621	
Supination	Experimental	2.3043	0.47047	0.065
	Control	2.0870	0.2881	
Mallet Score: Mallet: Supination Post-Intervention	Experimental	3.4348	0.50687	0.000
	Control	2.7391	0.61919	
Hand to neck movement	Experimental	2.6087	0.49901	0.546
	Control	2.6957	0.47047	
Mallet Score: Hand to neck movement post-Intervention	Experimental	4.4130	0.80696	0.016
	Control	3.8043	0.83583	
Oxford Scale Muscle Strength	Experimental	1.4348	0.50687	0.145
	Control	1.6522	0.48698	
Oxford Scale Muscle Strength Post-Intervention	Experimental	3.1304	0.54808	0.003
	Control	2.6522	0.48698	

Table 2: Pre & Post Interventional Variables

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DISCUSSION

In this study the gender of the children were mostly females than male children. In comparison to other study it was found that there were 59.6% female children with brachial plexus injuries, (36.2%) were male children, and the gender for two (4.2%) of the cases were not documented [17]. BMI was seen another important as children with normal BMI was reported more than obese. As it was found in another research that children with Erb's palsy has normal BMI and this palsy has no such string association with BMI of the child [18]. In this study, the findings about the birth procedures included normal vaginal delivery was 69.6%, and C-section 30.4% and surgical procedure during active labor Erb's palsy was directly related to forceps delivery which is more frequent cause of Erb's palsy with shoulder dystonia in comparison to the resent study it was reported that birth procedures are important factors for inducing Erb's palsy in mishandling during childbirth or excessive pressure or pulling upper limb during C-section delivery causing lesion to nerve roots of C5 and C6 [19]. During the evaluation of physiotherapy effects on range and function of upper limb in children with Erb's palsy it was seen in this study that pre interventional results regarding ranges such as abduction, external rotation, hand to spine movement, hand to mouth movement, hand to neck movement and supination showed non-significant value $p > 0.005$ whereas post interventional results regarding ranges such as abduction, external rotation, hand to spine movement, hand to mouth movement, hand to neck movement and supination showed significant value $p < 0.005$. However; in one of the recent studies conducted to identify the holistic approach to manage Erb's palsy with physiotherapy and manual exercises and found significant results showing that ranges of shoulder and arm was increased after giving consecutive physiotherapy sessions for 6 weeks [20]. It was reported that about 0.4% of new born had injuries to their brachial plexus that were caused by birth, with Erb's palsy with neurapraxia being the most common type in about 48% of cases. Throughout the analysis, it was found no statistically significant gender differences between the two groups. Similarly, no statistically significant differences in side engagement were identified between the two groups. Both groups were influenced by the important factor of delayed obstructed labour [21]. Shoulder external rotation is critical in performing a wide range of actions that constitute everyday life activities. The capacity of the patient to externally rotate the affected limb should be restored as soon as possible. However, restoring external rotation is a difficult task for both the therapist and the patient, since only little improvements were seen on the modified mallet scale, active movement scale, and scapular elevation [22]. Physical therapy for patients with Erb's palsy has a positive impact on their impairments and challenges. There are no specialised physiotherapy techniques for Erb's palsy that seek to restore the patient's external rotation. On the other hand, surgical procedures that may restore the patient's external rotation are always disputed in terms of effectiveness and expense [23]. When treating Erb's palsy patients, therapists must continually concentrate on recovering the patient's ability to externally rotate their arms and shoulders. Based on the findings of this study, it was recommended that further research be conducted with the goal of overcoming the restricted gains in external rotation by using bigger sample numbers and more focused treatments [24].

CONCLUSIONS

The study concluded that physiotherapy integrated approach improved upper limb strength, ranges and functional abilities in patients with Erb's Palsy.

REFERENCES

[1] Alekaki E, Lytras D, Iakovidis P, Kottaras A, Chatziprodromidou IP, Kopsidas C. The role of kinesiotherapy in treating the symptoms of obstetric palsy. 2021. doi.org/10.33545/orthor.2021.v5.i3b.301.

[2] Basit H, Ali CDM, Madhani NB. Erb Palsy. 2022 Feb 27. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–.

[3] Price A, Tidwell M, Grossman JA. Improving shoulder and elbow function in children with Erb's palsy. Semin Pediatr Neurol. 2000 Mar;7(1):44-51. doi: 10.1016/s1071-9091(00)80009-1.

[4] Awad AS, Ali MS, Elassal MI. Correlation between age, muscle architecture, and muscle strength in children with Erb's palsy. Bulletin of Faculty of Physical Therapy. 2021 Dec;26(1):1-9. doi.org/10.1186/s43161-021-00029-9.

[5] Rahlin M, Cech D, Rheault W, Stoecker J. Use of music during physical therapy intervention for an infant with Erb's palsy: a single-subject design. Physiother Theory Pract. 2007 Mar-Apr;23(2):105-17. doi: 10.1080/09593980701211804.

[6] Sedky Faheim S, El-Sayed Ali Hegazy A, Medany Helaly Mohamed N. Effect of Health Educational Guidelines on knowledge and practices of Mothers having Children with Bell's Palsy. Egyptian Journal of Health Care. 2021 Sep 1;12(3):1437-50. DOI: 10.21608/EJHC.2021.196350.

[7] Ogwumike OO, Adeniyi AF, Badaru U, Onimisi JO. Profile of children with new-born brachial plexus palsy managed in a tertiary hospital in Ibadan, Nigeria. Niger J Physiol Sci. 2014 Jun 19;29(1):1-5.

[8] Raducha JE, Cohen B, Blood T, Katarincic J. A Review

DOI: https://doi.org/10.54393/pbmj.v5i5.462

of Brachial Plexus Birth Palsy: Injury and Rehabilitation. R I Med J (2013). 2017 Nov 1;100(11):17-21.

[9] Samuel A, Rajput M, Gupta C, Kalra S. Indian Journal of Physiotherapy and Occupational Therapy.2013.

[10] Massimino L, Mulrain E, Scheponik K, Wiley R, Ziai H. Rehabilitative Interventions to Improve Biomechanical or Functional Outcomes for Children with Obstetric Brachial Plexus Palsy.2013.

[11] Loren Massimino OT, Erin Mulrain OT, Katherine Scheponik OT, Rachel Wiley OT, Houman Ziai OT, Benevides T. Rehabilitative Interventions to Improve Biomechanical or Functional Outcomes for Children with Obstetric Brachial Plexus Palsy: A Systematic Review.2013.

[12] Okafor UA, Akinbo SR, Sokunbi OG, Okanlawon AO, Noronha CC. Comparison of electrical stimulation and conventional physiotherapy in functional rehabilitation in Erb's palsy. Nig Q J Hosp Med. 2008 Oct-Dec;18(4):202-5.doi:10.4314/nqjhm.v18i4.45029.

[13] Justice D, Awori J, Carlson S, Chang KW, Yang LJ. Use of neuromuscular electrical stimulation in the treatment of neonatal brachial plexus palsy: A literature review. The Open Journal of Occupational Therapy. 2018;6(3):10.

[14] Frade F, Gómez-Salgado J, Jacobsohn L, Florindo-Silva F. Rehabilitation of Neonatal Brachial Plexus Palsy: Integrative Literature Review. J Clin Med. 2019 Jul 5;8(7):980. doi: 10.3390/jcm8070980.

[15] Kasnakova P, Tornyova B, Ivanova S, Atanasov P, Dragusheva S, Petkova V. Analysis Of Applied Medical Rehabilitation In Cases Of Obstetric Brachial Plexus Lesion–Erb's-Duchenne Palsy. 2018.

[16] Dekkers KJ, Rameckers EA, Smeets RJ, Janssen-Potten YJ. Upper extremity strength measurement for children with cerebral palsy: a systematic review of available instruments. Phys Ther. 2014 May;94(5):609-22. doi: 10.2522/ptj.20130166.

[17] Yarfi C, Elekusi C, Banson AN, Angmorterh SK, Kortei NK, Ofori EK. Prevalence and predisposing factors of brachial plexus birth palsy in a regional hospital in Ghana: a five year retrospective study. Pan Afr Med J. 2019Apr29;32:211.doi:10.11604/pamj.2019.32.211.17914.

[18] Mehta SH, Blackwell SC, Bujold E, Sokol RJ. What factors are associated with neonatal injury following shoulder dystocia? J Perinatol. 2006 Feb;26(2):85-8. doi: 10.1038/sj.jp.7211441.

[19] Gherman RB, Ouzounian JG, Miller DA, Kwok L, Goodwin TM. Spontaneous vaginal delivery: a risk factor for Erb's palsy? Am J Obstet Gynecol. 1998 Mar;178(3):423-7. doi: 10.1016/s0002-9378(98)70413-2.

[20] Srilakshmi D, Chaganti S. A holistic approach to the management of Erb's palsy. J Ayurveda Integr Med. 2013 Oct;4(4):237-40. doi: 10.4103/0975-9476.123713.

[21] Ouzounian JG, Korst LM, Phelan JP. Permanent Erb palsy: a traction-related injury? Obstet Gynecol. 1997 Jan;89(1):139-41. doi: 10.1016/s0029-7844(96)00312-2.

[22] Price A, Tidwell M, Grossman JA. Improving shoulder and elbow function in children with Erb's palsy. Semin Pediatr Neurol. 2000 Mar;7(1):44-51. doi: 10.1016/s1071-9091(00)80009-1.

[23] Phipps GJ, Hoffer MM. Latissimus dorsi and teres major transfer to rotator cuff for Erb's palsy. J Shoulder Elbow Surg. 1995 Mar-Apr;4(2):124-9. doi: 10.1016/s1058-2746(05)80066-7.

[24] Al-Qattan MM. Rotation osteotomy of the humerus for Erb's palsy in children with humeral head deformity. J Hand Surg Am. 2002 May;27(3):479-83. doi: 10.1053/jhsu.2002.33198.

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Original Article

Evaluation of Attitude and Emotions towards Sudden Closure of Educational Institution during COVID-19 among Medical Students: A Cross-Sectional Survey

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ABSTRACT

In reaction to an alarming increase in the number of infected cases and fatalities due to new coronavirus infections in 2019, all academic institutions, including primary and secondary schools, were closed. **Objective:** To assess medical students' attitudes and emotions concerning a sudden shutdown of an educational institution during COVID-19. **Methods:** After meeting the requirements for 139 patients, data was collected from medical students at The University of Lahore and medical students at Allama Iqbal Medical College in Lahore, and a Performa was affixed for this purpose. Convenient sampling was employed by employing a different questionnaire to collect data from public and private patients in order to obtain consent to proceed with this data **Results:** The mean and standard deviation for the achievement feelings questionnaire total score were found to be 80.76±4.128 on the histogram with a normal curve. The mean and standard deviation for achievement emotions questionnaire categorization were determined to be 67.30±3.44 on the histogram with a normal curve. The mean and standard deviation for the achievement emotions questionnaire good emotions were determined to be 79.47±6.039 on the histogram with a normal curve. The mean and standard deviation for achievement feelings questionnaire negative emotions were determined to be 55.88±3.801 on the histogram with a normal curve. **Conclusions:** In conclusion, children scored higher on positive emotions (31/40 versus 25/55, respectively). Students are typically delighted with the return of school activities, according to the study. This could be viewed as an indication of the student's future curiosity and drive to study. According to the findings of this study, aging has both an inverse and direct association with good and negative emotions

INTRODUCTION

COVID-19 pandemic resulted in the closures of educational institutions to avoid the spread of the infection among the general public [1]. In addition, to ensure their safety, all youngsters were urged to remain at home throughout the school year. School closures during the COVID-19 outbreak had a direct impact on today's pupils. Despite the fact that more than two-thirds of countries have built a distant learning platform, the program has not been as successful in developing countries as it has been in wealthy ones, with only around a third of destitute countries being able to run one. Even before the COVID-19 outbreak, more than 30% of the world's youthful population lacked access to digital educational programs, an issue that has only gotten worse as the pandemic proceeded [2,3]. However, this is not the first time when schools have been closed. During the H1N1 flu pandemic in the United States, public health professionals urged for temporary school closures. Pupils' activities, as shown by their grades, did not diminish during this time period, according to the findings of a study done during this time period to assess the impact of school closures on students. On the other hand, their interactions with their peers declined dramatically throughout this time period [4,5]. Leaving the academic and educational environment may have an impact on kids' behavior and attitudes toward education, as well as their ability to attend and prosper in school. As a consequence, it is plausible to suggest that public health crises have an emotional impact on pupils and that authorities must pay attention to and

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assist in these instances. To effectively address these crises, it is advised that schools work together to provide crisis-related psychological help and resources to their students and instructors [6,7]. "Progress feelings" are defined as emotions strongly related to either an emotion experienced during the activities or emotion experienced as a result of the activities, which might apply to a variety of scenarios. Students' excitement, academic success, self-regulation, and learning methods were found to be linked to their academic emotions, as well as their class experiences and personal traits [8,9]. Anger, worry, despair, shame, and boredom are examples of negative emotions. Positive emotions are supposed to have positive outcomes, whilst negative emotions are thought to have negative outcomes; yet, each of these two types of emotions has specific advantages [10,11]. Positive emotions promote creativity, curiosity, and connection with others, as well as identifying new social viewpoints, developing new social relationships, and improving physical and social capabilities, all of which contribute to extend the human mind. Negative emotions, alternatively, act as motivators for self-defense, collaboration (because of guilt), justice (due to wrath), information (due to sadness over a fault, for example), and the development of learning and education. A bad mood signals the presence of a problem and hence encourages us to find a solution [12,13]. Even after controlling for students' family socioeconomic status, intelligence, and gender, negative and positive emotions predicted achievement. Furthermore, the combined effect of perceived teacher emotional support and perceived student academic self-efficacy beliefs on behavioral engagement was equal to the effect of perceived student academic self-efficacy beliefs on behavioral engagement in the scientific sector [14-16]. Given the variety of repercussions connected with school closure, this study looked at students' positive and negative attitudes and feelings about school closure as a result of the COVID-19 outbreak, as well as the relationship between these attitudes and emotions and pertinent academic characteristics. The findings of this research will help to develop a well-thought-out approach for maximizing learning in the vulnerable population [17-19]. During the COVID-19 pandemic, the globe was alerted to an epidemic of a new viral illness in Wuhan, China, which was rapidly contained. The pandemic moved from China to Europe, then to other countries, including the United States, and finally to the entire world. Washing hands, wearing a mask, and avoiding congregating in groups were among the suggestions for preventing the spread of COVID-19, because congregating in groups at universities has the potential to speed up the virus's transmission [20,21]. As a result, large institutions (up to several hundred people) were forced to work with health management organizations in order to relocate professors' and students' courses online, as China did. Because to the growing threat of COVID-19, elementary and secondary schools were closed in March 2020, as were the majority of significant universities and colleges [22]. Students were frequently given only a few days' warning to leave campus, and within two weeks, they were notified that the remainder of their spring 2020 semester will be completed entirely online, with no in-person sessions. As a result, students had to not only change their lifestyles while at university, but also deal with the challenges of viral illness outbreaks associated to a lingering pandemic, as well as the myriad unknowns and pressures that came with it [23,24].

METHODS

Following the completion of the criteria for 139 patients, data was collected from medical students at The University of Lahore. A formalized variety of questionnaires were used to gather data from medical students, and permission was obtained before any further action was taken with the information obtained.

RESULTS

The results regarding gender showed that 18.0% were males and 82.0% were females. The results regarding institutes showed that 20 (14.4%) were public and 119(85.6%) were private. The results regarding residences showed that 43.9% were urban and 56.1% were rural. The results regarding CGPA showed that 19.4% had CGPA 2.6-3.0, 47.5% had 3.1-3.5 and 33.1% had 3.6-4.0. 33.8% were neutral, 29.5% agreed, and 36.7% strongly agreed when it came to Enjoyment (I love being in class). The results showed that 33.8% were neutral, 35.3% agreed, and 30.9% strongly agreed when it came to Hope (I am confident when I go to class). The results regarding Pride (I am proud of myself) showed that 31.7% were neutral, 33.1% agreed and 35.3% strongly agreed (Table 1). The results regarding anger (I am angry) showed that 28.1% agreed, 35.3% were neutral and 36.7% strongly disagreed. Regarding anxiety (thinking about class makes me feel uneasy), results showed that 28.1% agreed, 29.5% were neutral and 42.4% were strongly disagreed.

Variables	Frequency	Percent
Pride: I am proud of myself		
Neutral	44	31.7
Agree	46	33.1
Strongly Agree	49	35.3
Total	139	100.0

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Variables	Frequency	Percent
Learning: I Hope, I have an optimistic view of studying		
Neutral	47	33.58
Agree	50	36.0
Strongly Agree	42	30.2
Total	139	100.0
Learning: I feel ashamed that I can't absorb the basics of details		
Neutral	46	33.1
Agree	49	35.3
Strongly Agree	44	31.7
Total	139	100.0
Anger: I am fairly annoyed		
Neutral	51	36.7
Agree	47	33.8
Strongly Agree	47	29.5
Total	139	100.0

Table 1: Questions asked from respondents

The results regarding Shame (I get embarrassed) showed that 39.6% agreed, 28.1% were neutral and 32.4% strongly disagreed. The results regarding Hopelessness (I feel hopeless) showed that 28.1% agreed, 43.9% were neutral and 28.1% strongly disagreed. The results regarding boredom (I get bored) shoed less than 37.4% agreed, 30.2% were neutral and 32.4% strongly disagreed. The results regarding Enjoyment (I enjoy acquiring new knowledge) showed that 35.3% were neutral 29.5% agreed and 35.3% were strongly agreed. The results regarding Learning: Hopelessness (I feel hopeless when I think about studying) showed that 29.5% agreed, 32.4% were neutral and 38.4% disagreed. The results regarding boredom (the material bores me) showed that 30.2% agreed, 36.0% were neutral and 33.8% disagreed. The results regarding the enjoyment for me the test is a challenge that is enjoyable 33.8% were neutral 33.1% agreed and 33.1% strongly agreed. The results regarding the test: hope I have great hope that my abilities will be sufficient that is 35.3% were neutral 30.9% were agreed and 33.8% were strongly agreed. The results regarding the test: pride I'm proud of how well I mastered the exam 34.5% were neutral 40.3% were agreed and 25.2% were strongly agreed. The results regarding the relief: I feel very relieved that 31.7% agreed 37.4% were neutral and 30.9% disagreed. The results regarding Test: Anger I am fairly annoyed that 36.7% agreed 33.8% were neutral and 29.5% disagreed. The results regarding Test: Anxiety I feel panicky when writing an exam 34.5% agreed 36.7% were neutral and 28.8% disagreed. The results regarding the test: shame I feel ashamed that 30.9% agreed 33.1% were neutral and 36.0% disagreed. The results regarding the test: hopelessness I have lost all hope that I have the ability to do well on the exam 33.8% agreed 33.8% were neutral and 32.4% disagreed. The mean and standard deviation for the achievement feelings questionnaire total score were determined to be 80.76±4.128 on a histogram with a normal curve (Figure 1).

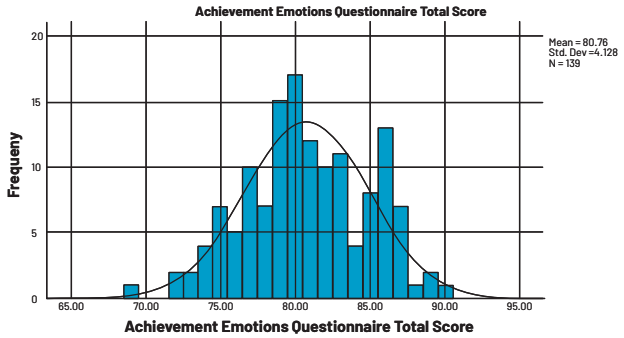

Figure 1: Mean and standard deviation for the achievement feelings

The mean and standard deviation for achievement emotions questionnaire categorization were determined to be 67.30±3.44 on the histogram with a normal curve (Figure 2).

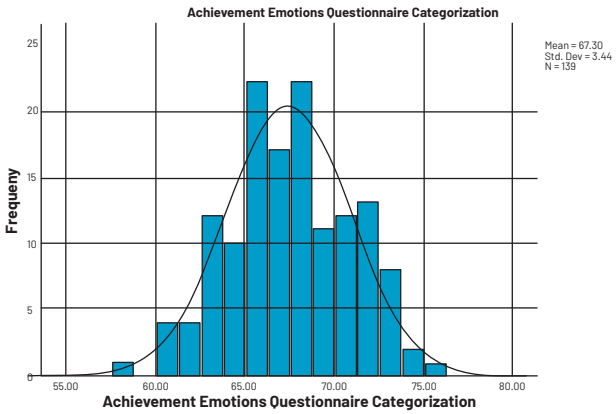

Figure 2: Mean and standard curve for the achievement emotions

The mean and standard deviation for the achievement emotions questionnaire: good emotions were determined to be 79.47±6.039 on the histogram with a normal curve. The mean and standard deviation for achievement feelings questionnaire negative emotions were determined to be 55.88±3.801 on the histogram with a normal curve (Table 2).

	Mean	Std. Deviation	Std. Error Mean	P-value
AEQ: Positive Emotions	79.4726	6.03898	.51222	0.752
ADQ: Negative Emotions	55.8753	3.80115	.32241	
Paired Samples Correlations				
	N	Correlation	Sig.	
AEQ: Positive Emotions & ADQ: Negative Emotions	139	.027		

Table 2: Correlation of Positive and negative emotions

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DISCUSSION

Concerns about public health, such as the COVID-19 outbreak, may worsen students' mental discomfort. These difficulties manifest as a wide range of emotions, including rage, anxiety, worry, despair, and boredom. The goal of this research was to look into students' positive and negative views about school and education during the COVID-19 outbreak, as well as the factors that influenced such sentiments. When we compared positive and negative attitudes towards school, we discovered that kids scored higher on positive emotions (31/40 versus 25/55, respectively). Students are usually delighted with the restoration of school activities, according to these findings. This could be due to the fact that schools were forced to close in February and March, when students were studying for exams and teachers were looking forward to returning to work. This might be seen as an indication of the student's future enthusiasm, curiosity, and drive to study. This study's results show both an inverse association between aging and good emotions and a direct relationship between aging and unpleasant emotions. During the teenage and high school years, a study reported a reduction in both rule compliance and passion for education, as well as devotion to study. These findings support those of prior studies. Despite the lack of a significant link between good or negative emotions and the types of schools studied in our study, two studies were undertaken in the Philippines to investigate the variations in motivation and attitude between public and private schools. Pupils in private schools showed a more positive attitude about learning and were more motivated to study than students in public schools, according to the researchers. This could be because private school students receive greater parental and teacher support, resulting in better learning settings[25].

Prior research on undergraduate university students has revealed several recurring causes of anxiety and stress, including "accommodation worries," "fear about the future," and "worry about test results." Female college students reported higher levels of stress than male undergraduate students, indicating that the average level of stress differs between the sexes. One unexpected, yet predictable, finding of this study was that undergraduate students who participated in the survey reported increased levels of anxiety. Other recent studies have shown that heightened anxiety was more common in those under the age of 35 during the COVID-19 outbreak. These features were most likely present throughout a regular semester, but they might have been accentuated by the abrupt transition to online learning, which added to the high proportion of student replies suggesting anxiety. Furthermore, while undergraduate students' computer skills vary by field of study or major, they have high computer self-efficacy and utilize computers for research, obtaining electronic resources, and connecting with others. Many undergraduate students who benefit from university-based internet-based learning, on the other hand, are likely to have enhanced intellectual understanding, which should serve as an extra source of incentive for students interested in furthering their study of online education. Undergraduate students may need greater motivation when comparing online distance education to regular in-class teaching. However, creating and using films for online learning to augment traditional teaching methods may aid in this endeavor. Student engagement indicators such as online lectures, discussion questions, and email communication with professors have been recognized as effective online teaching techniques that lower students' anxiety while boosting their learning[26].

CONCLUSION

Finally, children scored better on positive emotions. Students are typically delighted with the return of school activities, according to the study. This could be interpreted as a sign of the student's future interest, curiosity, and desire to learn. The findings of this study reveal that aging has both an inverse link with positive emotions and a direct relationship with negative emotions.

REFERENCES

[1] Shah K, Mann S, Singh R, Bangar R, Kulkarni R. Impact of COVID-19 on the Mental Health of Children and Adolescents. Cureus. 2020 Aug 26;12(8):e10051. doi: 10.7759/cureus.10051.

[2] Chandra Y. Online education during COVID-19: perception of academic stress and emotional intelligence coping strategies among college students. Asian Education and Development Studies. 2020 Oct 6.

[3] Daumiller M, Rinas R, Hein J, Janke S, Dickhäuser O, Dresel M. Shifting from face-to-face to online teaching during COVID-19: The role of university faculty achievement goals for attitudes towards this sudden change, and their relevance for burnout/engagement and student evaluations of teaching quality. Computers in Human Behavior. 2021;118:106677. doi.org/10.1016/j.chb.2020.106677.

[4] Flores MA, Barros A, Simão AMV, Pereira D, Flores P, Fernandes E et al. Portuguese higher education students' adaptation to online teaching and learning in times of the COVID-19 pandemic: personal and

DOI:https://doi.org/10.54393/pbmj.v5i5.434

contextual factors. High Educ (Dordr). 2021 Sep 3:1-20. doi: 10.1007/s10734-021-00748-x.

[5] Aristovnik A, Keržič D, Ravšelj D, Tomaževič N, Umek L. Impacts of the Covid-19 Pandemic on Life of Higher Education Students: Global Survey Dataset from the First Wave. Data Brief. 2021 Dec;39:107659. doi: 10.1016/j.dib.2021.107659.

[6] Gonzales G, Loret de Mola E, Gavulic KA, McKay T, Purcell C. Mental Health Needs Among Lesbian, Gay, Bisexual, and Transgender College Students During the COVID-19 Pandemic. J Adolesc Health. 2020 Nov;67(5):645-648. doi: 10.1016/j.jadohealth.2020.08.006.

[7] Kearney CA, Childs J. A multi-tiered systems of support blueprint for re-opening schools following COVID-19 shutdown. Children and Youth Services Review. 2021;122:105919. doi.org/10.1016/j.childyouth.2020.105919.

[8] Restubog SLD, Ocampo ACG, Wang L. Taking control amidst the chaos: Emotion regulation during the COVID-19 pandemic. J Vocat Behav. 2020 Jun;119:103440. doi: 10.1016/j.jvb.2020.103440.

[9] Cicha K, Rizun M, Rutecka P, Strzelecki A. COVID-19 and higher education: First-year students' expectations toward distance learning. Sustainability. 2021;13(4):1889. doi.org/10.3390/su13041889.

[10] Händel M, Stephan M, Gläser-Zikuda M, Kopp B, Bedenlier S, Ziegler A. Digital readiness and its effects on higher education students' socio-emotional perceptions in the context of the COVID-19 pandemic. Journal of Research on Technology in Education. 2020:1-13. doi.org/10.1080/ 15391523.2020.1846147.

[11] Ares G, Bove I, Vidal L, Brunet G, Fuletti D, Arroyo Á et al. The experience of social distancing for families with children and adolescents during the coronavirus (COVID-19) pandemic in Uruguay: Difficulties and opportunities. Child Youth Serv Rev. 2021 Feb;121:105906. doi: 10.1016/j.childyouth.2020.105906.

[12] Hussein E, Daoud S, Alrabaiah H, Badawi R. Exploring undergraduate students' attitudes towards emergency online learning during COVID-19: A case from the UAE. Children and youth services review. 2020;119:105699. DOI: 10.1016/j.childyouth.2020.105699.

[13] Maqsood A, Abbas J, Rehman G, Mubeen R. The paradigm shift for educational system continuance in the advent of COVID-19 pandemic: Mental health challenges and reflections. Current Research in Behavioral Sciences. 2021 Nov;2:100011. doi: 10.1016/j.crbeha.2020.100011.

[14] Minkos ML, Gelbar NW. Considerations for educators in supporting student learning in the midst of COVID-19. Psychol Sch. 2020 Nov 20:10.1002/pits.22454. doi: 10.1002/pits.22454.

[15] Tran T, Hoang A-D, Nguyen Y-C, Nguyen L-C, Ta N-T, Pham Q-H et al. Toward sustainable learning during school suspension: Socioeconomic, occupational aspirations, and learning behavior of vietnamese students during COVID-19. Sustainability. 2020;12(10):4195. doi.org/10.3390/su12104195.

[16] Carolan C, Davies CL, Crookes P, McGhee S, Roxburgh M. COVID 19: Disruptive impacts and transformative opportunities in undergraduate nurse education. Nurse Educ Pract. 2020 Jul;46:102807. doi: 10.1016/j.nepr.2020.102807.

[17] Zheng M, Bender D, Lyon C. Online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic: empirical evidence from a school-wide comparative study. BMC medical education. 2021;21(1):1-11. doi.org/10.1186/s12909-021-02909-z.

[18] Aziz A, Aamer S, Khan AM, Sabqat M, Sohail M, Majeed F. A bumpy road to online teaching: Impact of COVID-19 on medical education. Annals of King Edward Medical University. 2020 Jul 11;26(Special Issue):181-6 . doi.org/10.21649/akemu.v26iSpecial%20Issue.3635.

[19] Shawaqfeh MS, Al Bekairy AM, Al-Azayzih A, Alkatheri AA, Qandil AM, Obaidat AA et al. Pharmacy Students Perceptions of Their Distance Online Learning Experience During the COVID-19 Pandemic: A Cross-Sectional Survey Study. J Med Educ Curric Dev. 2020 Oct 6;7:2382120520963039. doi: 10.1177/2382120520963039.

[20] Balteiro I. University Students' Perceptions and Emotions towards Online Teaching and Assessment during the Covid-19 lockdown and isolation. 2021:25-35.

[21] Gupta MM, Jankie S, Pancholi SS, Talukdar D, Sahu PK, Sa B. Asynchronous Environment Assessment: A Pertinent Option for Medical and Allied Health Profession Education During the COVID-19 Pandemic. Education Sciences. 2020;10(12):352. doi.org/10.3390/educsci10120352.

[22] Islam MA, Barna SD, Raihan H, Khan MNA, Hossain MT. Depression and anxiety among university students during the COVID-19 pandemic in Bangladesh: A web-based cross-sectional survey. PloS one. 2020;15(8):e0238162.

DOI:https://doi.org/10.54393/pbmj.v5i5.434

[23] Leal Filho W, Wall T, Rayman-Bacchus L, Mifsud M, Pritchard DJ, Lovren VO et al. Impacts of COVID-19 and social isolation on academic staff and students at universities: a cross-sectional study. BMC Public Health. 2021 Jun 24;21(1):1213. doi: 10.1186/s12889-021-11040-z.

[24] Tremmel P, Myers R, Brunow DA, Hott BL. Educating students with disabilities during the COVID-19 pandemic: Lessons learned from Commerce Independent School District. Rural Special Education Quarterly. 2020;39(4):201-10. doi.org/10.1177/8756870520958114.

[25] Mirahmadizadeh A, Ranjbar K, Shahriarirad R, Erfani A, Ghaem H, Jafari K et al. Evaluation of students' attitude and emotions towards the sudden closure of schools during the COVID-19 pandemic: a cross-sectional study. BMC psychology. 2020 Dec;8(1):1-7. doi.org/10.1186/s40359-020-00500-7.

[26] Unger S, Meiran WR. Student attitudes towards online education during the COVID-19 viral outbreak of 2020: Distance learning in a time of social distance. International Journal of Technology in Education and Science. 2020;4(4):256-66

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Original Article

Evaluation of the Causal Factors of Complications Following Ileostomy Closure

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ABSTRACT

Objective: To estimate the causative factors of complications in ileostomy reversal. This study was conducted at the Department of Surgery Khairpur Medical College Khairpur Mirs from January 2021 to December 2021. **Methods:** This analysis comprised 52 patients selected consecutively who underwent ileostomy reversal within one year. The study excluded patients under 12 years of age. All patients were followed weekly for three months. The main measure of outcome was the occurrence of surgical complications within 30 days of resolution. **Results:** 52 total patients of ileostomy closures were analyzed to evaluate features contributory to mortality and morbidity. There was no death in this study, but the complication ratio was 15.4% (8 patients), the most common complications were leakage of anastomosis 4 (7.7%), infection of wound 2 (3.8%) and intestinal obstruction 2 (3.8%). The anastomotic site closure technique, primary stoma closure, surgeon's experience and stoma type were important contributing factors. **Conclusions:** We determined that ileostomy closure is related with several problems but not cause any death. The techniques of closure of the anastomotic site, the surgeon's experience, the type of stoma and the technique of closure of skin were forecasters of complications.

INTRODUCTION

From Creating a stoma is a common procedure in both emergency and elective surgery in general surgery. Colostomy was introduced in the 1800s for treatment of intestinal obstruction [1,2]. Intestinal stomas were considered demanding procedures due to the high complication rate [3,4]. With the advancement of surgical techniques, the need for a stoma has increased [5]. An Ileostomy is a life-saving technique that allows people to adore a wide variety of daily goings-on [6,7]. Ileostomies are compulsory when the stoma or the ileum distal from the large intestine is damaged or diseased. An ileostomy can be permanent or temporary, contingent on the indications for surgical procedure [8]. A temporary ileostomy is generally removed after sometime [9,10]. Although the first indication reduces the risk of surgery, it is associated with some morbidity and mortality after confinement. Regarding complications, the testified studies display contradictory outcomes [11]. Thus, incidence ratio after temporary stoma closure ranges from 2.4% to 48.2%. After stoma closure, the most common surgical complications are wound infection, anastomotic leakage, paralytic ileus, bleeding, and small bowel obstruction [12]. Various patient and procedure related risk factors persuading stoma closure complications. These complications affect the patient's health and increase the postoperative hospital stay and hospitalization costs.

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METHODS

52 subsequent patients whose ileostomy was closed after eight weeks of ileostomy were enrolled in the analysis. The study excluded patients under 12 years of age, patients who were closed within 6 weeks, and patients who had undergone additional unrelated surgery. The temporary ileostomy indications, demographics of patients and surgery particulars were recorded. A distal barium loopogram was accomplished in all subjects before closure. Oral feeding was discontinued the day before surgery, and routine bowel preparation of the distal and proximal parts of the intestine, lavage with an orally administered mannitol solution prior to surgery, and lavage of the distal parts with saline were performed. For 5 days, all patients were given parenteral antibiotics (ceftriaxone and metronidazole). All patients were required to provide their informed permission to a laparotomy. The stoma was mobilized from the adjacent peritoneal and fascial adhesions using an elliptical circumstomal incision. After freshening the enterotomy margins and splitting the mesenteric side integral and the transversely closed enterotomy, a delayed absorption suture was employed with a hand stitched extra-mucosal in interrupted single layer method. Interrupted prolene 0 stitches were used to close the muscle gap. All skin wounds were closed with 2/0 interrupted prolene, and a sterile dressing was used as needed. Complications were evaluated during the hospital stay and in weekly surveillance for three months after release. Surgical complications included anastomotic leaking, paralytic ileus, and wound infections. Several risks associated with the surgery have been identified. As a consequence, after 30 days, there were no difficulties associated to the procedure. SPSS version 20 was used to analyze the data. Statistical significance was defined as a p value of less than 0.05.

RESULTS

52 total patients of ileostomy closures were analyzed to evaluate features contributory to mortality and morbidity. All patients experienced emergency surgery. 17-83 years was the patients age range with the 43.2 years mean age, and 1.7 S.D. 33 (63.5%) subjects were males and 19 (36.5%) were females. The most communal indication for an ileostomy was exteriorization of the ileal perforation of typhoid fever 16 (30.8%). Subsequently penetrating abdominal trauma 9 (17.3%), abdominal tuberculosis 13 (25%), blunt abdominal trauma 3 (5.8%), intestinal gangrene 4 (7.7%), post-laparotomy 2 (3.8%), large bowel obstruction 4 (7.7%), ileal perforation post-abortion 1 (1.9%). In the majority of patients, the ileum was introduced as loop, followed by an illeo-colostomy, double-barrel ileostomy and an end ileostomy with a distant mucous fistula. (Table 1)

Type of stoma	
Double barrel ileostomyy	15(28.8%)
Loop ileostomy	31(59.6%)
Ileocolostomy	3(5.8%)
End ileostomy with distant mucus fistula	2(3.8%)

Table 1: Types of Ileostomies

The median period from stoma insertion to closure was 15 weeks (range 8-37, mean 14± 7.1). An elliptical peri-ileostomy incision was used for 46 closures, with six necessitating laparotomies. All anastomoses were made in a hand sewn extra-mucosal in interrupted single layer technique was used with a delayed absorption suture. The loops were reversed by transverse closing after reshaping the edges, while in other cases a short segment of the intestine was excised and an end-to-end anastomosis was performed. The mean operative duration was 55 minutes (range 47-125 mints).

Risk elements	(n=8) with complic-ations	Without complications (n=44)	p-value
Years of age (median)	50(17-83)	39 (15-68)	0.10
Gender			
Male	05(62.5%)	33(75%)	0.13
Female	03(37.5%)	11(25%)	
Stoma classification			
Ileostomy loop	02(25%)	30(68.2%)	0.080
Ileostomy with two barrels	03(37.5%)	11(25%)	
Ileo-colostomy	02(25%)	01(2.3%)	
colostomy removal	01(12.5%)	02(4.5%)	
Reason for ileostomy			
Perforation after Typhoid fever	02(25%)	14(31.8%)	0.430
Abdominal TB	02(25%)	11(25%)	
Penetrating trauma to abdomen	01(12.5%)	06(13.6%)	
Gastrointestinal gangrene	01(12.5%)	07(15.9%)	
Abdominal blunt trauma	02(25%)	02(4.5%)	
Obstruction of the large intestine	00(0%)	01(2.3%)	
Post-laparotomy Perforation of ileum	00(0%)	02(4.5%)	
Ileal perforation after abortion	00(0%)	01(2.3%)	

Table 2: Complications following ileostomy closure are linked to patient risk factors

The intraperitoneal drainage was maintained according to the operating surgeon's decision. Corrugated drainage was used in 20 (38.5%) patients. Stoma closure 21 procedures (40.4%) were performed under direct supervision, while 31 (59.6%) closures were accomplished by surgeons. Seven days was the mean stay postoperatively (median 4, range 4-16, SD ± 2.30 days). There was no death in this study, but the complication ratio was 15.4% (8 patients), the most common complications were leakage of anastomosis

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4(7.7%), infection of wound 2 (3.8%) and intestinal obstruction 2 (3.8%). The anastomotic site closure technique, primary stoma closure, surgeon expertise, and stoma type all played a role. Intestinal obstruction developed in 1 patient (2.3%) treated conservatively.

Risk elements	n=8) with complications	n=44 Without complications
Median Interval(weeks) from construction to closure	10 (9-20)	15 (8-37)
Anastomosis Types		
Complete closure	04	06
Close the enterotomy	03	39
Surgical method	01	05
Closure of the ileostomy site relaparotomy	02	44
Surgeon's experience		
Supervised trainee	05	16
Consultant	04	29
Drains		
Used	05	15
Not used	03	29
Duration of surgery in min		
Median (range)	55(47-125)	52(43-85)

Table 3: Complications after ileostomy closure are linked to the operation method

DISCUSSION

Temporary small bowel stoma creation is a common operating technique in both emergency and elective situations to preserve distal anastomosis or to evade intraperitoneal anastomosis in a hospital environment [10,11]. It is usually suggested to close temporary stoma within 10 to 12 weeks. However, some patients do not tolerate a transient stoma due to poor pouch location, result in dehydration, surrounding skin erosion, nutritional deficiencies and electrolyte imbalance, so prompt closure might be an option [12,13]. Closing an ileostomy may be related with morbidity and mortality. The conveyed studies showed contradictory outcomes in terms of morbidity and mortality. However, the overall complication rate for ileostomy closure ranges from 2.4% to 48.2%. A variety of factors have been thought to be responsible for complications following an ileostomy closure. Such as skin closure techniques and anastomotic sites, surgeon's experience, time amid initial surgery and closure and type of stoma [14]. In current study, the medical condition was considered to be a surgical complication that required repeated intervention and could be treated conservatively. The infection in the wound is a communal impediment after closure of stoma. Depending on the technique of skin closing, it ranges from 1.3-14.2%. Various procedures have been cast-off to close the skin wound. Secondary wound closure has a low infection rate but leaves a very unsightly scar and extends stay in hospital [15,16]. Prompt closure is frequently related with a high ratio of infection. However, when broad-spectrum antibiotics are given in conjunction with primary debridement, they give virtuous outcomes in terms of hospital stay and cosmesis. When the purse string approach was employed instead of linear closure, Lee JR et al, found a low risk of infection. An anastomotic leak leading to peritonitis, which is related with increased mortality and morbidity, is a severe barrier to gut anastomosis [17,18]. The frequency of complications has been documented with 5-8% leakage at the anastomotic site. The time from onset to closure was found to have important impact on the rate of complications ($p < 0.0001$) [19,20]. The leakage of the anastomosis was smaller in those closed after 3months than in those closed at intervals shorter than one-month. The experience of surgeon is additional factor that modifies the rate of complication in stoma reversal. Low leakage at anastomosis site was observed in the hands of skilled specialists [21,22]. From the same location, the stoma can be closed retroperitoneally or intraperitoneally. After anastomotic leakage, retroperitoneal closure was performed to reduce intraperitoneal contamination. However, it has been associated with high-form enterocutaneous fistulas and incision hernias and was reserved for special cases [23]. Other complications observed after stoma reversal are paralytic ileus and small bowel obstruction. The reported incidence varies between 4-16.6% across series. Paralytic ileus is probably caused by electrolyte imbalance and small intestine obstruction due to postoperative adhesions. Both respond well to cautious management in general, and operation is rarely defined.

CONCLUSION

It is not feasible to reverse an ileostomy without problems. However, it has been discovered that anastomotic site closure techniques, stoma type, surgeon expertise, and skin closure technique are all predictive of problems. Retrograde enterotomy, resection, and end-to-end anastomosis all have worse results than loop closures. When compared to primary skin closures, the risk of infection and wound dehiscence is reduced with delayed primary skin closures.

REFERENCES

[1] Baik H, Bae KB. Low albumin level and longer interval to closure increase the early complications after ileostomy closure. Asian journal of surgery. 2021 Jan 1;44(1):352-7. doi.org/10.1016/j.asjsur.2020.09.007

[2] Garfinkle R, Savage P, Boutros M, Landry T, Reynier P,

DOI:https://doi.org/10.54393/pbmj.v5i5.444

Morin N, et al. Incidence and predictors of postoperative ileus after loop ileostomy closure: a systematic review and meta-analysis. Surgical Endoscopy. 2019 Aug;33(8): 2430-43.doi.org/10.1007/s00464-019-06794-y

[3] Vergara-Fernández O, Trejo-Avila M, Salgado-Nesme N. Multivariate analysis of risk factors for complications after loop ileostomy closure. Cirugia y cirujanos. 2019 Jun 14;87(3):337-46. doi.org/10.24875/CIRU.18000611

[4] Rombey T, Panagiotopoulou IG, Hind D, Fearnhead NS. Preoperative bowel stimulation prior to ileostomy closure to restore bowel function more quickly and improve postoperative outcomes: a systematic review. Colorectal Disease. 2019 Sep;21(9):994-1003. doi.org/10.1111/codi.14636

[5] Yellinek S, Krizzuk D, Gilshtein H, Djadou TM, de Sousa CA, Qureshi S, et al. Early postoperative outcomes of diverting loop ileostomy closure surgery following laparoscopic versus open colorectal surgery. Surgical Endoscopy. 2021 Jun;35(6):2509-14. doi.org/10.1007/s00464-020-07662-w

[6] Lee KH, Kim HO, Kim JS, Kim JY. Prospective study on the safety and feasibility of early ileostomy closure 2 weeks after lower anterior resection for rectal cancer. Annals of Surgical Treatment and Research. 2019 Jan 1;96(1):41-6. doi.org/10.4174/astr.2019.96.1.41

[7] Slieker J, Hübner M, Addor V, Duvoisin C, Demartines N, Hahnloser D. Application of an enhanced recovery pathway for ileostomy closure: a case–control trial with surprising results. Techniques in coloproctology. 2018 Apr;22(4):295-300. doi.org/10.1007/s10151-018-1778-1

[8] Bhama AR, Batool F, Collins SD, Ferraro J, Cleary RK. Risk factors for postoperative complications following diverting loop ileostomy takedown. Journal of Gastrointestinal Surgery. 2017 Dec;21(12):2048-55. doi.org/10.1007/s11605-017-3567-y

[9] Li W, Ozuner G. Does the timing of loop ileostomy closure affect outcome: A case-matched study. International Journal of Surgery. 2017 Jul 1; 43:52-5. doi.org/10.1016/j.ijsu.2017.05.039

[10] Choi YJ, Kwak JM, Ha N, Lee TH, Baek SJ, Kim J, et al. Clinical outcomes of ileostomy closure according to timing during adjuvant chemotherapy after rectal cancer surgery. Annals of Coloproctology. 2019 Aug;35(4):187. doi.org/10.3393/ac.2018.10.18.1

[11] Lee JH, Ahn BK, Lee KH. Complications Following the Use of Biologic Mesh in Ileostomy Closure: A Retrospective, Comparative Study. Wound management & prevention. 2020 Jun 1;66(6):16-22.

[12] Farag S, Rehman S, Sains P, Baig MK, Sajid MS. Early vs delayed closure of loop defunctioning ileostomy in patients undergoing distal colorectal resections: an integrated systematic review and meta-analysis of published randomized controlled trials. Colorectal Disease. 2017 Dec;19(12):1050-7. doi.org/10.1111/codi.13922

[13] Bausys A, Kuliavas J, Dulskas A, Kryzauskas M, Pauza K, Kilius A, et al. Early versus standard closure of temporary ileostomy in patients with rectal cancer: a randomized controlled trial. Journal of surgical oncology. 2019 Aug;120(2):294-9. doi.org/10.1002/jso.25488

[14] Nguyen JM, Bouchard-Fortier G, Covens A. Same-day discharge of Gynecologic Oncology patients following ileostomy closure is feasible and safe. Gynecologic Oncology. 2020 Feb 1;156(2):446-50. doi.org/10.1016/j.ygyno.2019.11.014

[15] Abdalla S, Scarpinata R. Early and late closure of loop ileostomies: a retrospective comparative outcomes analysis. Ostomy Wound Manage. 2018 Dec 1;64(12):30-5. doi.org/10.25270/owm.2018.12.3035

[16] Whitney S, LaChapelle C, Plietz M, George J, Khaitov S, Greenstein A. Unexplained systemic inflammatory response following ileostomy closure after ileal pouch-anal anastomosis: a deeper dive into a rare entity. International Journal of Colorectal Disease. 2020 Dec;35(12): 2267-71.doi.org/10.1007/s00384-020-03710-y

[17] Sun Z, Zhao Y, Liu L, Qin J. Clinical Outcomes of Ileostomy Closure before Adjuvant Chemotherapy after Rectal Cancer Surgery: An Observational Study from a Chinese Center. Gastroenterology Research and Practice. 2021 Jul 14;2021. doi.org/10.1155/2021/5592721

[18] Richards SJ, Udayasiri DK, Jones IT, Hastie IA, Chandra R, McCormick JJ, et al. Delayed ileostomy closure increases the odds of Clostridium difficile infection. Colorectal Disease. 2021 Dec;23(12): 3213-9.doi.org/10.1111/codi.15858

[19] Zhen L, Wang Y, Zhang Z, Wu T, Liu R, Li T, et al. Effectiveness between early and late temporary ileostomy closure in patients with rectal cancer: A prospective study. Current Problems in Cancer. 2017 May 1;41(3):231-40. doi.org/10.1016/j.currproblcancer.2017.02.007

[20] Brown SR, Khan B, Green HJ, Beck DE. Overall survival associated with ileostomy closure in patients with rectal cancer before and after adjuvant therapy. Ochsner Journal. 2017 Dec 21;17(4):328-30.

[21] Dukes' Club Research Collaborative, Chambers A,

DOI:https://doi.org/10.54393/pbmj.v5i5.444

Stearns A, Walsh A, Rankin A, Khan A, Morton A, Engledow A, Newman A, Shaw A, Wilkins A. Factors impacting time to ileostomy closure after anterior resection: the UK closure of ileostomy timing cohort study (CLOSE-IT). Colorectal Disease. 2021 May;23(5):1109-19.

[22] Vaughan-Shaw PG, Gash K, Adams K, Vallance AE, Pilkington SA, Torkington J, et al. Protocol for a multicentre, dual prospective and retrospective cohort study investigating timing of ileostomy closure after anterior resection for rectal cancer: The CLOSurE of Ileostomy Timing (CLOSE-IT) study. BMJ open. 2018 Oct 1;8(10): e023305. doi.org/10.1136/bmjopen-2018-023305

[23] Pedrazzani C, Secci F, Fernandes E, Jelovskijs I, Turri G, Conti C, et al. Early ileostomy reversal after minimally invasive surgery and ERAS program for mid and low rectal cancer. Updates in Surgery. 2019 Sep;71(3):485-92.doi.org/10.1007/s13304-018-0597-2

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Original Article

Evaluation of Tumor Markers Among Patients with Hepatitis C Infection

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ABSTRACT

Tumor markers are biomolecules found in blood, urine and tissue of individuals and, with particularly high concentration in most cancers, therefore, their concentration has diagnostic value. These markers may be used for screening, identification (type and stage), monitoring, and predicting prognosis. Increases in tumor markers are sometimes seen in patients with chronic liver disease without hepatocellular carcinoma (HCC). **Objective:** To determine the tumor markers, present among patients with Hepatitis C infection. **Methods:** From April 2021 to March 2022, serum samples from 700 HCV patients who presented to the Department of Pathology at the Pir Syed Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat Khairpur Mirs, were used in this descriptive, cross-sectional study. Using the ACCESS-2 system, serum samples were analyzed for the presence of the specified tumor markers. **Results:** There was a significant increase in CA125 ($P = 0.03$) and AFP levels ($P = 0.03$). CA19-9, CEA, and CA15-3 levels in the blood were unremarkable ($P > 0.05$). It is too early to say if the increase in CA125 or AFP will lead to eventual carcinoma based on this study, but it deserves further exploration using a longitudinal research methodology. **Conclusion:** CA125 and AF (P were the most common tumor markers found in HCV patients. Given the association of the aforementioned indicators with hepatic cancer, HCV patients with CA125 and AFP levels over normal should be considered high-risk.

INTRODUCTION

Hepatitis C is an ailment of the liver, brought about by a viral infection (hepatitis C virus - HCV). The infection is transmitted via bodily fluids and blood in particular. Though unprotected sexual contact poses a risk, little evidence of sexual transmission is available. The condition is asymptomatic for a brief initial period, followed by vague symptoms such as low fever, yellow skin, dark urine etc. Thus, the condition is hard to notice in the initial stage, with people become aware of their ailment and attaining a diagnosis late in the infection – all the while acting as carriers and transmitting the infection forward. HCV infection has a mortality rate of 1%, with the morbidity (liver cancer and cirrhosis) rate being much higher [1,2]. More than 10 million people in Pakistan are afflicted with the condition, entailing a high morbidity and mortality. According to a comprehensive systematic review (based on literature published from 1994 to 2009), "prevalence of HCV was (4.95%± 0.53%) in the general adult population, (1.72%± 0.24%) in the pediatric population and (3.64%± 0.31%) in a young population, whereas a very high (57%± 17.7%) prevalence was observed in injecting drug users and (48.67%± 1.75%) in a multi-transfused population [3-5].Tumor markers are biomolecules found in blood, urine and tissue of individuals and, with particularly high

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concentration in most cancers, therefore, their concentration has diagnostic value [6,7]. These markers may be used for screening, identification (type and stage), monitoring, and predicting prognosis of cancer [8,9]. Patients with chronic liver illness but no hepatocellular carcinoma may see an increase in tumor markers (HCC). This could be a sign of imminent cancer and thus an opportunity to intervene quickly, avoiding a poor outcome and gaining a favorable prognosis. The goal of this study was to evaluate the levels of tumor markers in patients with Hepatitis C infection in order to identify HCV carriers who are at high risk for cancer development.

Alpha Fetoprotein (AFP): This fetal specific glycoprotein is primarily developed in the fetal liver. In normal circumstances the serum concentration of AFP falls immediately following the birth and hereafter, all production is repressed. It has been noted 7 out of every 10 HCC patients have elevated levels of AFP in the serum (attributed to secretion by the tumor). To date, serum AFP is regarded as the tumor marker that is most useful in screening HCC among suspected patients. Commonly, a serum concentration of 30 ng/mL is deemed a differentiation point or a cut-off value between normal individual and HCC patients (Sensitivity:65% and Specificity: 89%)[10].

CA 15-3: Secreted by normal cells in the breast, this murine monoclonal antibody (molecular weight: 300–450 kDa) is particularly elevated among patients with cancerous tumors (in the breast and/or elsewhere). The point of differentiation between healthy and diseased (cancerous) individuals is a concentration is 25 U/ml for CA 15-3. The marker is also known to be elevated among conditions other than hepatocellular carcinoma, such as cancer of the lungs, colon, rectum, and breast [11].

CA 19-9: The carbohydrate antigen 19-9 (CA19-9) is a known marker for illness states such as colon cancer and gastrointestinal adenocarcinoma. The point of differentiation between healthy and diseased (cancerous) is a concentration of more than 37 U/ml. In addition to hepatocellular carcinoma, the serum concentrations of this marker are also hiked among patients with cancer of the stomach, lungs, colon, and pancreas [12].

CA 125: This carbohydrate-related high molecular mass glycoprotein (molecular weight: >200 kDa) marker is a carbohydrate antigen that can be found in up to 80% of non-mucinous ovarian cancer cases. The marker is primarily a monoclonal antibody. The point of differentiation between healthy and disease (cancerous) cases is a serum concentration of an upwards of 35 U/ml. In addition to hepatocellular carcinoma, the serum concentration of CA125 is elevated among patients with cancer of the lungs, endometrium, pancreas, breast, and colon [13,14]. CEA: This antigen is an oncofetal antigen that is linked to a wide group of cell surface glycoproteins (molecular weight: 150–300 kDa) that are found on numerous cell types but have much higher concentrations in tumour patients and fetuses (normal). Smokers and nonsmokers have various points of differentiation (between normal and ill persons), namely 2.5g/l and 5.0g/l, respectively.

METHODS

This descriptive, cross-sectional study was conducted from April 2021 to March 2022 using serum samples of 700 HCV patients, presenting to the Dept. of Pathology at Pir Syed Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat, Khairpur Mirs. The serum samples were checked for the existence of the listed tumor markers by ELISA using ACCESS-2 machine. ACCESS-2 can identify the following prominent biomarkers, among others. Since the levels (obtained via biochemical tests) of biomarkers can vary with time and between patients, the principles of best practice state that an arithmetic mean be used. Inclusion criteria was confirmed cases of HCV. Exclusion criteria was patients receiving hepatitis medication / Antiviral Therapy. Interferon-alpha (Subcutaneous Inj.) in combination oral Ribavirin & Lamivudine. Proven cases of hepatocellular carcinoma(HCC).

RESULTS

The mean age of the sample stood at 43 (SD± 3) years, with most of the sample comprising of males (59.29%), and the remaining being females (40.71%). Patients (73.14%) hailed from an urban setting while the remaining had a rural (26.86%) residence. A summary of the sociodemographic characteristics of the sample population are tabulated below. An increase in CA125 and AFP levels, was noted. Levels (in serum) of tumor marker CA15-3, CA19-9, and CEA were unremarkable.

Variables		Statistic – n (%)
Age (Years)	Up to 20	92 (13.14%)
	21 to 30	103 (14.71%)
	31 to 40	175 (25%)
	41 to 50	161 (23%)
	51 and above	94 (13.43%)
	41 to 45	75 (10.72%)
Gender	Male	415 (59.29%)
	Female	285 (40.71%)
Residence	Urban	512 (73.14%)
	Rural	188 (26.86%)
Educational Status	Educated	404 (57.71%)
	Un-Educated	296 (42.29%)

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Variables		Statistic – n (%)
CA15-3	Normal	322 (46%)
	Abnormal	378 (54%)
CA125	Normal	139 (19.9%)
	Abnormal	561 (80.1%)
CA19-9	Normal	404 (57.7%)
	Abnormal	296 (42.3%)
AFP	Normal	105 (15%)
	Abnormal	595 (85%)
CEA	Normal	301 (43%)
	Abnormal	399 (57%)

Variables		Statistic – n (%)	
CA15-3	Normal	12.93 U/mL	> 0.05
	Abnormal	44.39 U/mL	
CA125	Normal	1.35 U/mL	0.03
	Abnormal	88.51 U/mL	
CA19-9	Normal	3.82 U/mL	> 0.05
	Abnormal	67.21 U/mL	
AFP	Normal	6.99 ng/mL	0.03
	Abnormal	31.22 ng/mL	
CEA	Normal	5.6 ng/mL	> 0.05
	Abnormal	17.94 ng/mL	

DISCUSSION

A variety of markers are used for HCC and among the said markers is serum alpha-fetoprotein (AFP), which is used widely and with great effect. However, it is noted that serum AFP levels are oftentimes increased among patients with ailments of the liver other than HCC. The same conditions may also infect patients concurrently with HCV in up to 42% of the cases, putting the specificity of AFP (with regards to HCV) into doubt [15]. In this research, an 85% of the sample population had a raised AFP level. Research suggests that the hiked levels of AFP result from hepatocyte destruction (due to viral hepatitis) and consequent attempts of regeneration [16]. Recently, more alternatives have surfaced that outperform AFP in terms of specificity for HCC, [17] such as the "Lens culinaris agglutinin-reactive fraction of AFP (AFP-L3%)" [12] and "des-c-carboxy prothrombin (DCP)" [18]. The Access-2 machine used in this research does not measure the said markers were not made a part of this research. It is noteworthy that AFP is more suited (as a diagnostic marker) to HBV, than HCV. Literature suggests that diagnostic accuracy deteriorates in cumulative samples when the proportion of HCV patients is higher than the proportion of HBV patients in the sample set [19]. Another marker that this research focused upon was CA125. Research suggests a significant correlation between CA125 and infection with hepatitis (P=0.01). CA125 is sensitive to benign and neoplastic pathologies of the liver despite not being a tissue or tumor specific antigen. However, CA125 levels are less specific to malignancy owing to the fact that the levels may increase in patients without malignant transformation. Additionally, CA125 level elevation is independent of etiology [20-22]. No significant relationship was noted between CEA levels and hepatitis which is synonymous with the existing literature [23,24]. It may thus be safe to state that patients with hepatitis may have elevated levels of CEA in the absence of a tumor / cancer. However, CEA levels may rather be more efficacious for purposes pertaining to management of the disease condition [25]. This study did have a few limitations. Firstly, it was a single center study and although the setting played host to a diverse demographic cohort, it is still a possibility that the results may not be truly generalizable to the general population. Nonetheless, care was exercised in extrapolating the study findings to other populations.

CONCLUSIONS

After careful consideration and a thorough evaluation CA125 and AFP were the prominent tumor markers detected among patients with hepatitis C. Keeping in view the co-occurrence of the said markers with hepatic carcinoma, it is advised that hepatitis C patients with CA125 and AFP levels above normal may be treated as high-risk patients.

REFERENCES

[1] Dennis LK, Eugene Stephen H, Dan L, J Larry J, Anthony SF. Harrison's principles of internal medicine. 16 th ed Mc Graw-Hill,New York ,2004;1855 –60.

[2] Cohan N, Zandieh T, Samiei SH, Ataie Z, Kavari M. The prevalence and clinical significance Hepatitis B and C co-infection. Iran J Sci,2006; 31(3):156–159.

[3] Lok As, McMahon BJ. Chronic hepatitis B. Hepatology, 2001;34(6): 1225–1241. doi.org/10.1053/jhep.2001.29401

[4] Massarat MS, Tahaghoghi mehrizi S.Iranian national health survey: a brief report. Arch Iran Med, 2002;5(2): 73–79.

[5] Alavian SM, Fallahian F, Bagheri lankarani K. The changing epidemiology of viral Hepatitis Bin Iran 2007;16(4): 403–6.

[6] Pour shams A, Nasiri J, Mohammad khani A, Nasrollahzadeh D.Hepatitis B in Gonbad-kavvos: prevalence, risk factors and interfamilial spreading. Govaresh, Iran Hepatol,2004; 4(9): 222–5.

[7] Hosseini ASI, Avijgan M, Mohammad nejhad M. High prevalence of HBV, HCV, HIV infection gypsy

DOI: https://doi.org/10.54393/pbmj.v5i5.475

population residing in Shahr-e-kord. Aerch Iran Med, 2004;7(1): 20–22.

[8] Zali MR, Mohammad K, farhadi Ad, Masjedi MR, zargar A, Nawroozi A. Epidemiology of hepatitis B in the Islamic Republic of Iran. East Mediterr Health J,1996; 2(2): 290–

[9] Johnson RJ, Couser WG. Hepatitis B infection and renal diseases: clinical, immunopathogenetic and therapeutic considerations. Kidney Int, 1990;37: 663. doi.org/10.1038/ki.1990.32

[10] Daniel WC, Stewart S. Tumour markers. In: Burtis CA, Ashwood ER, editors. Teitz textbook of clinical chemistry 3rd edn. Philadelphia: Saunders Elsevier; 1999;733–737.

[11] Shitrit D, Zingerman B, Shitrit AB, Shlomi D, Kramer MR. Diagnostic value of CYFRA 21-1, CEA, CA 19-9, CA 15-3, and CA 125 assays in pleural effusions: analysis of 116 cases and review of the literature. Oncologist. 2005; 10:501–507. doi.org/10.1634/theoncologist.10-7-501

[12] Pasaoglu G, Zamani A, Can G, Imecik O. Diagnostic value of CEA, CA-19-9, CA 125 and CA 15-3 levels in malignant pleural fluids. Eur J Gen Med. 2007;4(4):165–171. doi.org/10.29333/ejgm/82523

[13] Ghosh I, Bhattacharjee D, Das AK, Chakrabarti G, Dasgupta A, Dey SK. Diagnostic role of tumour markers CEA, CA15-3, CA19-9 and CA125 in lung cancer. Indian J Clin Biochem. 2013 Jan;28(1):24-9.doi.org/10.1007/s12291-012-0257-0

[14] Yang X, Wang D, Yang Z, Qing Y, Zhang Z, Wang G, et al. CEA is an independent prognostic indicator that is associated with reduced survival and liver metastases in SCLC. Cell Biochem Biophys. 2011;59(2):113–119.doi.org/10.1007/s12013-010-9121-0

[15] Jihadi AA, Avijgan M, Hafizi M. Prevalence of HBV and HCV infections and associated risk factors in addict prisoners. Iran J Public Health, 2006;35: 33–6.

[16] Shi J, Su Q, Zhang G, Huang G, Zhu Y. An intelligent decision support algoritm for diagnosis of colorectal cancer through serum tumor markers. Comput Methods Prog Biomed,2010;100: 97–107.doi.org/10.1016/j.cmpb.2010.03.001

[17] Gadducci A, tana R, Cosio S, Genazzani AR. The serum assay of tumor markers in the prognostic evaluation, treatment monitoring and follow-up of patients with cervical cancer. Crit Rev Oncol Hematol,2008;66: 10–20. doi.org/10.1016/j.critrevonc.2007.09.002

[18] Motoo Y, Satomura Y, Mouri I. Serum levels of pancreatitis-associated protein in digestive diseases with special reference to gastrointestinal cancers. Dig Dis Sci,1999; 44: 1142–47.doi.org/10.1023/A:1026620006078

[19] Maestranzi S, Przemioslo R, Mitchel H. The effect of benign and malignant liver disease on the tumor markers CA19-9 and CEA. Ann Clin Biochem,1998; 35: 99–103. doi.org/10.1177/000456329803500113

[20] Derarbhavi H, Kaese D, William AW. Cancer antigen 125 in patients with chronic liver diseases. Mayo Clin Proc, 2002;77: 538–41.doi.org/10.4065/77.6.538

[21] Canney PA, Moore M, Wilkinson PM.Ovarian cancer antigen CA125: A prospective clinical assessment of its role as a tumor marker. Br J Cancer, 1984;50: 765–9. doi.org/10.1023/A:1026620006078

[22] Molina R, Filella X, Bruix J. Cancer antigen 125 in serum and ascetic fluid of patients with liver diseases. Clin Chem, 1991;37: 1379–83.doi.org/10.1093/clinchem/37.8.1379

[23] George PK, Lowenstein MS, Brien MJ.Circulating CEA levels in patients with fulminant hepatitis. Dig Dis Sci, 27 1982; 139 –142.doi.org/10.1007/BF01311707

[24] Maestranzi S, Przemioslo R, Mitchel H.The effect of benign and malignant liver disease on the tumor markers CA19-9 and CEA. Ann Clin Biochem,1998; 35: 99–103. doi.org/10.1177/000456329803500113

[25] Assmar M, Yeganeh S, Mansourghanaei F, Amirmozafari N. Combined evaluation of AFP, CA15-3, CA125, CA19-9, and CEA tumor markers in patients with hepatitis B and C. Iranian journal of public health. 2016 Dec;45(12):1645.

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Original Article

Assessment of Microbiological Quality of Raw Milk and Identification of Pathogenic Bacteria

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ABSTRACT

Milk contains important nutrients such as minerals, vitamins, proteins and lipids and are consumed by all age group of humans around the world. It is impossible to avoid contamination of milk with micro-organisms because presence of nutrients therefore quality of milk can be determined by the microbial content in milk. **Objective:** To investigate the microbiological quality of raw milk. **Methods:** In the present study, there were 30 cow milk samples collected from different dairy farms of Lahore. Firstly, a surf field mastitis test was performed for detection of clinical and sub-clinical mastitis. The microbial isolation was performed by microbial culturing and biochemical tests and antibiotic sensitivity test was performed for isolated bacteria. These isolated bacterial DNA was extracted and amplified by *16S rRNA* PCR. The precipitated amplicon was sequenced by *16S rRNA* sequencing. The results were evaluated statistically to check the level of significance among them. **Results:** The *Chi-square* values of catalase test, oxidase test, indole test, methyl red test, Voges Proskauer test and triple sugar iron were 12.42, 13.77, 8.77, 9.02, 10.67 and 4.29 respectively and the *p-values* were 0.034, 0.031, 0.042, 0.039, 0.044 and 0.056 respectively on MacConkey Agar. The *Chi-square* values of catalase test, oxidase test, indole test, methyl red test, Voges Proskauer test and triple sugar iron were 12.44, 11.98, 9.38, 7.02, 14.22 and 10.43 respectively and p-values were 0.034, 0.045, 0.039, 0.012, 0.022 and 0.053 receptively on Mannitol salt Agar. The *Chi-square* and *p-values* of gram staining bacteria were 13.99 and 0.034 respectively and showed the significant relationship among them. Mastitis test were presented the value of *Chi-square* 17.86 and *p-value* 0.029. The *ANOVA* table on DNA isolation method were exposed the highly significant relationship among the variables. **Conclusions:** There was a significant association between different treatments. Different pathogens can grow in milk and milk products and produce toxic metabolites. Products that are contaminated by these toxic metabolites when consumed may results in food poisoning.

INTRODUCTION

Milk contains important nutrients such as minerals, vitamins, proteins and lipids and are consumed by all age group of humans around the globe [1, 2]. It is impossible to avoid contamination of milk with micro-organisms because presence of nutrients therefore quality of milk can be determined by the microbial content in milk [3]. Raw milk when leaving the udder has very low microbial contamination but due to possible exposure to various environmental contaminants microbial load immediately increases after milking [4]. The microbial contamination can be occurred from ill cow's udder and teat, unhygienic milking utensils, poor milking practice, and low maintained transportation [5,6]. The regular request of bacteriological analysis of the quarter milk samples is hindered by financial considerations. Alternative parameters are also used to define patterns in the health of udder production in a dairy herd, as these limits suggest inflammation [7]. The manufacturer of such products, usually follow traditional procedures and shows lack of concern about quality of milk used. These practices cause harmful microorganisms to gain access in milk-based products [8,9]. Effective and good hygienic practice at farm can minimize the microbial contamination in milk before transporting to the markets, screening of milk is important for protection against milk

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borne infections [10]. The temperature at which milk is kept after milking disturbs the quality of milk and likewise influence the production of microbial growth [11]. To prevent milk contaminations, it is necessary to boil or pasteurize the milk after milking or cool immediately and keep in a clean environment. The pathogens in milk gain entry mainly to low animal hygiene and poor milking [12, 13]. Therefore, the main purpose of this research was to determine bacterial load in raw milk samples from different farms and to isolate different type of bacteria and its strains and to find out antibiotic resistance bacteria in mastitis positive and negative samples.

METHODS

A total of 30 cow milk samples from dairy farms of Lahore were collected. Firstly, cow teats were sterilized and milk was collected from each teat of a cow in a sterilized container. All the containers were stored at 4°C for further processing. The milk sample collection procedure was performed according to Quinn *et al.* [14].

Mastitis screening test: The surf field mastitis test was performed for finding of subclinical and clinical mastitis. Milk sample was mixed with surf detergent in the Petri plate and stirred with a sterilized glass rod in a gentle circular rotation. The appearance of clots and gel-like structures was observed [15].

Microbial Culturing: Microbial culturing was performed directly on nutrient agar and after the growth of samples on nutrient agar, morphological characters of the colonies were observed by direct examination of colonies. MacConkey agar and mannitol salt agar were used for differentiation in growth according to gram-positive and gram-negative bacteria, Gram staining was done on sterile glass slide for all isolated colonies [16].

Biochemical tests: For the biochemical identification of bacteria catalase, oxidase, indole test, methyl red test, Voges Proskauer test and triple sugar iron tests were performed for characterization of bacteria [17].

Antibiotic Sensitivity test: The antibiotic sensitivity tests of the bacterial isolates were performed according to the NCCLS (National Committee for Clinical Laboratory Standards) method by using Kirby Bauer disk diffusion test on Muller Hinton agar. Mueller Hinton Agar was autoclaved, allowed to cool down and poured into the sterile petri dishes and the plates were inoculated by using a sterile swab, a total of 48 plates were swabbed for 48 isolated colonies and antibiotics discs (Tazobactam, Amikacin, Gentamicin, Tobramycin, Imipenem, Clavulanic acid, Ceftriaxone, Levofloxacin, Doxycycline Linezolid, Ampicillin, Vancomycin, Nitrofurantoin, Fosfomycin, Meropenem, Trimethoprim, Polymyxin B, Nalidixic acid) were placed on the plates at a distant position. All plates were incubated at 37°C for 24hr. The zone of inhibition was measured and results for each isolate was concluded as susceptible, intermediate, and resistant based on the standards of inhibition zone given by CLSI (Clinical and Laboratory Standard Institute).

Molecular Identification: Extraction of Bacterial DNA was performed by using two methods, the QIAGEN Kit method for gram-positive bacteria and PEG (polyethylene glycol) buffer method for gram negative bacteria. QIAGEN kit method is column-based DNA extraction followed by manufacturer's protocol. For gram-negative bacterial DNA isolation boiling method was used, in this method, PEG polyethylene buffer was used. PCR was performed by using 16SrRNA primers, Forward primer: 27F 5'-AGA GTT TGA TTC TGG CTC AG-3' and Reverse primer: 515R 5'-TTA CCG CGG CTG CTG GCA C-3'. The PCR amplicons were placed at 4°C and then characterized by agarose gel electrophoresis.

Sequencing and Sequence Analysis: The amplified 16S rRNA fragment was precipitated and sequenced using DNA sequencing services of First Base Company Lahore. 16S rRNA sequences were analyzed by using BLAST (Basic Local Alignment Search Tool) available from the website of NCBI (National Center for Biotechnology Information) to identify the similar matches with existing reference sequences.

Statistical Analysis: *Chi- Square* value and *P value* were calculated by applying *Chi-Square test* on results. *ANOVA test* was applied on antibiotics sensitivity test results. All statistical values were interpreted and significant and non-significant associations were recorded.

RESULTS

Mastitis test: When mastitis test was performed in total 30 raw milk samples 14 samples were mastitis positive and 16 samples were mastitis negative, in 16 negative samples, 8 samples showed growth on nutrient agar and 8 sample did not show any growth on nutrient agar.

Microbial Culturing: Out of 30 samples 22 showed growth on nutrient agar and 8 did not showed any growth. Total 48 colonies were selected on nutrient agar.

Biochemical Characterization of the Bacterial Isolates: In gram staining results in total 48 isolated bacteria 25 were gram negative and 23 were gram-positive.

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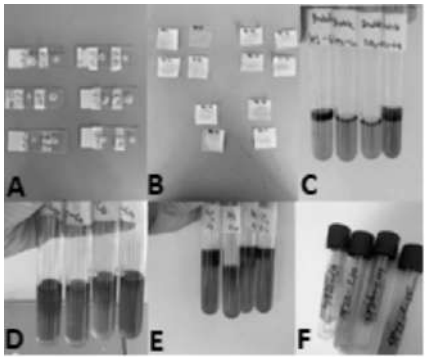

Table 1: Numeral of splenic artery with its primary segmental branches

Antibiotics Sensitivity test: Antibiotics sensitivity test was performed. In results, 23 isolates were sensitive to tazobactam, 14 isolates were intermediate to Fosfomycin and 19 were resistant to gentamicin.

16s rRNA sequencing results: The sequencing results were analyzed by BLAST on NCBI. On BLAST 16 bacteria were matched with *E. coli* with identities of 99%, 8 were matched with *Klebsiella spp.* with identities of 99 %, 1 was matched with *Pseudomonas spp.* with identities of 99%, 17 were matched with *S. aureus* with identities of 99%, 6 were *Streptococcus spp.* With identities of 89% (Table 1).

Microbial Culturing base results	Number of isolated bacteria	16s rRNA Sequencing Results	Query cover	Percentage identical	Accession No by NCBI
Escherichia coli	16	Escherichia coli strain	100.00%	99.60%	MT230530.1
Klebsiella	8	Klebsiella pneumoniae strain sctcc18	100.00%	99.84%	HQ622339.1
Pseudomonas	1	Pseudomonas sp. KLEPS3	100.00%	99.81%	JQ910871.1
Staphylococcus aureus	17	Staphylococcus aureus subsp. Aureus	100.00%	99.45%	CP054876.1
Streptococcus	6	Streptococcus sp	100.00%	88%	EU826665.1

Table 1: Sequencing results matched on BLAST

In the mastitis test result chi-square test was applied to check significant association (table 2). The chi-square value was recorded as 17.86 and the p-value as 0.029 which shows there is significant association between them as the p value was less than 0.05.

Mastitis Test	Growth of samples on Nutrient Agar		Total
	Showed no growth	Showed growth	
Mastitis Negative	8	8	16
Mastitis Positive	0	14	14
Total	8	22	30

Table 2: Mastitis Test
Chi-square value = 17.86, P-value = 0.029

Biochemical tests Association with Isolated colonies on Differential Media: The p-value was calculated between the association of biochemical tests and colony characteristics on MacConkey agar and mannitol salt agar (Table 3). In case of biochemical test (catalase, oxidase, indole, MR, VP) association with isolated colonies on MacConkey agar and mannitol salt agar p-value was lesser than 0.05 which showed the important association it means the result of all biochemical test of isolated bacteria had a significant difference, each colony showed a different result, and it showed the different types of gram-negative and gram-positive bacteria. In the case of the triple sugar iron test association with isolated bacteria is non-significant because the p-value was more than 0.05 it shows that all bacteria isolated on MacConkey agar had the same result. Only gram-negative bacteria can grow on MacConkey agar and all these gram-negative bacteria were triple sugar iron test positive and bacteria that can grow on mannitol salt agar are gram-positive and these are always negative results for triple sugar iron test.

Biochemical tests	Colony characteristics on MacConkey agar		Colony characteristics on mannitol salt agar	
	Chi-square value	P-value	Chi-square value	P-value
Catalase Test	12.42	0.034	12.44	0.034
Oxidase Test	13.77	0.031	11.98	0.045
Indole Test	8.77	0.042	9.38	0.039
Methyl-Red Test	9.02	0.039	7.02	0.012
Voges-Proskauer Test	10.67	0.044	14.22	0.022
Triple Sugar Iron	4.29	0.056	10.43	0.053

Table 3: Biochemical Tests Result

ANOVA test was applied on results of antibiotic sensitivity test. We compared our result with the p-value if the p-value >0.05 it showed significant result. If the p-value is less than 0.01 then it means the results are highly significant from the table 6 the p-value for the replication is 0.004 and for the treatment is 0.030 that are less than 0.05 it means results are significant (Table 4).

Source of Variation	SS	DF	MS	F	P-value
Antibiotic Discs	51.59	7.00	7.37	15.00**	0.00
Samples	32.27	24.00	1.34	2.74**	0.00
Error	82.53	168.00	0.49		
Total	166.39	199.00			

Table 4: ANOVA Table
(SS: sums of square, df: degree of freedom, MS: mean square value, F: variation between sample means), *= Significant **= Highly significant

DISCUSSION

The aim of this study was assessment of microbial quality of raw milk and detection of different strains of bacteria. At the time of milking, milk has a low bacterial count but after milking the bacterial load increases, due to various external and internal contaminants [6]. Maintaining good quality of milk is a main challenge in dairy sectors worldwide, where production of milk and its products take place in unhygienic conditions [18,19]. In the present study 30 cow milk samples were collected from dairy farms in Lahore and raw

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milk quality was checked by culturing milk samples and different types of bacteria were isolated. Out of 30 cow milk samples 8 samples did not show any growth and 22 showed growth, 48 bacterial colonies were selected from 22 samples including 25 gram-negative bacteria and 23 gram-positive bacteria. However, in the study of bacteriological quality of raw milk, there were 25 different areas in Guwahati city selected and total 200 raw milk samples collected to check microbiological quality of raw milk. The total coliform count (TCC) and total viable count (TVC) was estimated and results showed highly significant differences in total coliforms count and viable count in different areas around the city [20]. In current study, 14 samples were mastitis positive and 16 samples were mastitis negative. To check the association among the growth on nutrient agar chi-square test was applied in mastitis positive and negative samples 48 bacteria were isolated including E. coli, Klebsiella spp., S. aureus, Pseudomonas spp., and Streptococcus spp. In another study species composition of microbiota of cow's udder and raw milk quality was detected. The milk from animals with clinical and subclinical mastitis had higher number of somatic cell count and in mastitis positive samples 16 species of bacteria were isolated. In microbial culture, the microflora included S. aureus, S. hyicus spp., (Staphylococcus hyicus), S. agalactiae (Streptococcus agalactiae), S. lentus (Staphylococcus lentus), and S. intermedius (Streptococcus intermedius) [21]. In the results most of isolated bacteria showed resistance to gentamicin. Comparative studies on resistance profiles of E. coli isolated from goats' milk are very rare and found approximately 18.2% of the isolates to be resistant against ampicillin [22]. According to procedure involving Triton X-100-based pretreatment and an inhibitor removal resin was superior to all other methods tested in terms of DNA yield, sensitivity, ease of sample handling, time efficiency, and cost per sample. But in present study two methods were used, Qiagen kit method and PEG buffer method was used for bacterial extraction. Gram positive bacteria cell wall have a thicker layer of peptidoglycan and their DNA cannot extracted by Boiling method by using PEG buffer, therefore special kits such as Qiagen kit used for gram positive bacteria extraction. A research of "Microbiological safety concerns of raw milk" showed that microbial contamination of milk was raised from unhygienic conditions coupled with improper processing and handling result it unsafe products causing several diseases outbreaks [23]. Microbiological analysis of raw milk indicated presence of pathogenic organisms like coliforms [18] S. aureus [21], E. coli [24], E. aerogenes spp., (Enterobacter aerogenes)., Salmonella typhi [25] Salmonella spp. from India, Klebsiella spp., Proteus spp., Enterobacter spp., Mycobacterium spp. from Ghana [25] E. coli, Aeromonas, Salmonella from Bangladesh. E. coli, Bacillus spp., Clostridium spp., coliforms from Pakistan, also different species of different kinds of bacterial are also seen in the milk in different countries. The most common microorganisms associated with the environment are E. coli and S. uberis (Streptococcus uberis). The vast majority of mastitis of bacterial origin (80% of cases) is caused by five species of bacteria, namely E. coli, S. uberis, S. aureus, S. (Streptococcus dysgalactiaes) and S. agalactiae [24]. The study indicated that the dominant microbial flora associated with raw milk samples in and around were in the order of Lactobacillus spp. > S. aureus > E. coli > Bacillus spp. > Pseudomonas fluorescens > Salmonella spp. > among the isolated pathogens. The presence of those bacteria in milk suggested contamination from various sources, such as animal, human, environment, utensils and others [24]. In current study total 48 bacteria were isolated from mastitis positive and negatives samples, all these bacteria were identified by microbial culturing and biochemical tests and confirmed by 16S rRNA sequencing, including 16 E. coli, 8 Klebsiella spp., 1 Pseudomonas aeruginosa, 17 S. aureus, and 6 Streptococcus spp.,

CONCLUSION

Different pathogens can grow in milk and milk products and produce toxic metabolites. Products that are contaminated by these toxic metabolites when consumed may results in food poisoning. It is main challenge to monitor the microbiological quality of milk to ensure its safety for consumers. In present study on the basis of culturing and biochemical identification, 16 E. coli, 8 Klebsiella spp., 1 Pseudomonas spp., 17 S. aureus, and 6 Streptococcus spp., were detected in mastitis positive and negative milk samples and it was further confirmed by 16S rRNA sequencing. Different bacteria isolates found in both mastitis positive and mastitis negative samples. Bacterial isolates antibiotic resistance profile was checked by antibiotic sensitivity test. In mastitis negative samples bacteria also isolated it means contamination can occur by environment e.g., milk handler, water that used for washing milk contact surfaces. Hands of the milk handler are the main reason affecting microbial quality of raw cow milk. Hence, measures should be taken to improve the attitude and educational status of milk handlers and the quality of water to enhance.

REFERENCES

[1] Dehkordi FS, Borujeni MR, Rahimi E, Abdizadeh R. Detection of Toxoplasma gondii in raw caprine, ovine,

DOI:https://doi.org/10.54393/pbmj.v5i5.469

buffalo, bovine, and camel milk using cell cultivation, cat bioassay, capture ELISA, and PCR methods in Iran. Foodborne Pathog Dis. 2013 Feb;10(2):120-5. doi: 10.1089/fpd.2012.1311.

[2] Rozenberg S, Body JJ, Bruyère O, Bergmann P, Brandi ML, Cooper C et al. Effects of Dairy Products Consumption on Health: Benefits and Beliefs—A Commentary from the Belgian Bone Club and the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases. Calcif Tissue Int. 2016 Jan;98(1):1-17. doi: 10.1007/s00223-015-0062-x.

[3] Torkar KG, Teger SG. The microbiological quality of raw milk after introducing the two day's milk collecting system. Acta Agriculturae Slovenica. 2008 Nov;92(1):61-74.

[4] Teshome T, Ketema B. Microbiological quality and safety of raw milk collected from Kersa District, Jimma Zone, South west Ethiopia. Journal of Biological and Chemical Research. 2014;31:546-61.

[5] Abera Y, Angaw M. Handling practice and microbial quality of raw cow's milk produced and marketed in Adigrat Town, North Eastern Tigray. Journal of Biology, Agriculture and Healthcare. 2015;5:15.

[6] Mabrook MF, Petty MC. Effect of composition on the electrical conductance of milk. Journal of food engineering. 2003 Dec 1;60(3):321-5. doi.org/10.1016/S0260-8774(03)00054-2.

[7] Leslie KE, Dingwell RT. Mastitis control: where are we and where are we going. InKeynote lectures of world buiatrics congres 2002 Aug 18.

[8] Wielgosz-Groth Z, Groth I. Effect of the udder health on the composition and quality of quarter milk from black-and white cows. Electron. J. Pol. Agr. U. Anim. husbandry. 2003;6.

[9] Nirwal S, Pant R, Rai N. Analysis of milk quality, adulteration and mastitis in milk samples collected from different regions of Dehradun. International Journal of PharmTech Research. 2013;5(2):359-64.

[10] Mosalagae D, Pfukenyi DM, Matope G. Milk producers' awareness of milk-borne zoonoses in selected smallholder and commercial dairy farms of Zimbabwe. Tropical animal health and production. 2011 Mar;43(3):733-9. doi.org/10.1007/s11250-010-9761-5.

[11] Omore AO, Lore TA, Staal SJ, Kutwa J, Ouma R, Arimi SM et al. Addressing the public health and quality concerns towards marketed milk in Kenya.

[12] Karimuribo ED, Kusiluka LJ, Mdegela RH, Kapaga AM, Sindato C, Kambarage DM. Studies on mastitis, milk quality and health risks associated with consumption of milk from pastoral herds in Dodoma and Morogoro regions, Tanzania. J Vet Sci. 2005 Sep;6(3):213-21.

[13] Sharma D, Sharma PK, Malik A. Prevalence and antimicrobial susceptibility of drug resistant Staphylococcus aureus in raw milk of dairy cattle. Int. Res. J. Microbiol. 2011;2(11):466-70.

[14] Quinn PJ, Markey BK, Leonard FC, Hartigan P, Fanning S, Fitzpatrick E. Veterinary microbiology and microbial disease. John Wiley & Sons; 2011 Oct 7.

[15] Muhammad G, Naureen A, Asi MN, Saqib M. Evaluation of a 3% surf solution (surf field mastitis test) for the diagnosis of subclinical bovine and bubaline mastitis. Tropical animal health and production. 2010 Mar;42(3):457-64. doi.org/1 0.1007/s11250-009-9443-3.

[16] Harrigan WF, McCance ME. Laboratory methods in microbiology. Academic press; 2014 Jun 28.

[17] Mohamed FS, Farah AA. Bacteriological quality assessment of milk in College of Veterinary Medicine (Cvm) dairy farm and Kalamino dairy farm in Mekelle, Tigray, Ethiopia. Dairy and Vet. Sci. J.. 2018;8(2):1-8.

[18] Tola A, Ofodile LN, Beyene F. Microbial quality and chemical composition of raw whole milk from Horro cattle in East Wollega, Ethiopia. Ethiopian Journal of Education and Sciences. 2007;3(1):1-0. DOI: 10.4314/ejesc.v3i1.41995.

[19] Palii AP, Ulko YS, Bogomolov OO, Kis-Korkishchenko LV, Kambur MD, Zamaziy AA et al. Species composition of microbiota of cows udder and raw milk quality at mastitis. Ukrainian Journal of Ecology. 2020;10(4):78-85.

[20] Kakati S, Talukdar A, Hazarika RA, Raquib M, Laskar SK, Saikia GK et al. Bacteriological quality of raw milk marketed in and around Guwahati city, Assam, India. Veterinary World. 2021 Mar;14(3):656. doi: 10.14202/vetworld.2021.656-660.

[21] Malissiova E, Papadopoulos T, Kyriazi A, Mparda M, Sakorafa C, Katsioulis A et al. Differences in sheep and goats milk microbiological profile between conventional and organic farming systems in Greece. J Dairy Res. 2017 May;84(2):206-213. doi: 10.1017/S0022029917000103.

[22] Sarkar S. Microbiological safety concerns of raw milk. Safety. 2016;24:1-7. DOI: 10.19104/jfnd.2016.105.

[23] Devi NP, Sowmya D. Microbial count of raw cow's milk in Chennai. International Journal of Research in Pharmaceutical and Biomedical Sciences. 2012;3(2):856-60.

[24] Aglawe PP, Wadatkar CM. Microbial examination of milk sample from Nagpur region with reference to coliform. Food Science and Technology Letters. 2012

DOI:https://doi.org/10.54393/pbmj.v5i5.469

Jan 1;3(1):24.
[25] Mubarack HM, Doss A, Dhanabalan R, Balachander S. Microbial quality of raw milk samples collected from different villages of Coimbatore District, Tamilnadu, South India. Indian Journal of Science and Technology. 2010 Jan 1;3(1):61-3

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Original Article

Effect of Stress on Quality of Life in Patients with Chronic Rheumatoid Arthritis

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ABSTRACT

Stress symptoms affect one's body, thoughts and feelings. Stress may decrease an individual's self-esteem, increasing anxiety and sadness, and adversely affecting the general quality of life (QoL) in rheumatoid arthritis (RA) patients. **Objective:** To determine the effect of stress on quality of life in patients with chronic rheumatoid arthritis. **Methods:** This cross-sectional study was conducted on 196 participants at The University of Lahore Teaching Hospital. Stress in RA patients was measured using a perceived stress score (PSS). PSS scores were calculated by inverting replies to the four positively stated items (items 4, 5, 7, and 8) and then accumulating all scale items (*e.g.*, 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0). The SF-36 questionnaire was used to measure QoL. The lower the score, the greater the degree of impairment; for example, a score of zero equals maximum disability and a score of 100 equals no disability. A non-probability convenient sampling strategy was used to compute sample size. **Results:** The results showed that the average value of age was 44.14± 6.842 years with a lowest value of 32.00 and a highest value of 58.00 years. Male had a frequency of 13 (6.6%) and patients with a frequency of 183 (93.4%). According to the results, the average value of physical health component scoring was 37.12± 9.96 and the average value of mental health component scoring was 44.00± 5.738. The results showed that the average value of perceived stress score was 25.32± 7.47. The significant value of 0.000 was smaller than the *p-value* in the study, indicating that there is a link between stress and quality of life. **Conclusions:** These findings led to the conclusion that stress had an impact on RA Patient's quality of life.

INTRODUCTION

Immune system normally works to protect the body against any infections and diseases [1]. Problem in the immune system leads to autoimmune disorders in body [2]. One of the most common autoimmune disorder include RA [3]. It is inflammatory systemic autoimmune [4]. In RA immune system attacks the healthy cell of the body causing inflammation in that body area [5,6]. It commonly affects hand joint, wrist and knees. It includes eyes, joints, heart, kidney, salivary gland, bone marrow, blood vessels, skin and nerve tissue [7]. RA occurs when a lining of the joint gets inflamed and damages the tissue of the joint which further cause long lasting pain, inflammation and unsteadiness [8]. Its symptoms include warm area, inflammation, joint pain, joint stiffness (normally in morning), fever, fatigue and loss of appetite. Symptoms which occur before six months is known as early and when the symptoms are present for more than six month it is called established [9]. Prevalence of the RA is 3 cases out of every 10000 populations annually [10]. With every 1% increase of age prevalence of the RA increase by 1% [11]. It is more prevalent in people with 35 to 50 years of age [12]. RA shows symmetrical presentation which effects multiple joints. Its clinical presentation includes pain, swelling as well as nausea in the affected area. Pain involvement is early in this disease which involves metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints [13]. It also has extra articular involvement. In RA, MCP and PIP are commonly involved in hand which occurs early and as the disease progresses deformities such as Boutonniere and swan neck occurs [14]. In normal joints there are synovial membranes which contain synovial fluid. This fluid acts as a lubricant between the joints [15]. In RA, there is an inflammation of synovial membrane which results in cartilage erosion. This causes symptoms such as pain and swelling. Another feature seen

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in RA patient is angiogenesis [16]. Synovial membrane is made up of fibroblast synoviocytes cells. In this synovial membrane there are macrophages like TNFα, IL-1 and IL-6. These cytokines result in inflammation. These cytokines cells stimulate fibroblast synoviocytes [17]. When synoviocytes are stimulated they proliferate after their activation. Along with proliferation process they also assist in stimulate RANKL expression [18]. This RANKL expression together with cytokines stimulates osteoclast activation which lead towards joint erosion. Cytokines also contribute in stimulating proteases which breaks the bone cartilage causing degradation [19]. As a result of this cartilage causes further secretion of proteases leading to more degeneration of the cartilage [20]. These synoviocytes then travels from one joint to another causing symmetry leading towards progression of the rheumatoid arthritis [21]. Its risk factor includes age, gender, smoking status, obesity and family history [22]. The complications include dry eyes, rheumatoid nodules, osteoporosis, infection, lung problem, heart problem, carpal tunnel syndrome and lymphoma along with abnormal body composition [23-25]. The treatment involves pharmacological and non-pharmacological agents. Recently anti rheumatic drug is the most advance form of disease modifying treatment [26]. Stress being one of the common factor effects rheumatoid patients as a trigger which flares up this disease. It is stated that mind and body interact with one another in unique manner which impacts person health [27]. Stress causes more damage and inflammation in RA patient. This destruction results in impairment with respect to all aspect of QoL [28-31]. By improving the QoL, health promoting activities strengthens a person's over all well-being and also helps a person in preventing such disease like rheumatoid arthritis [32]. This study was conducted to investigate the impact of stress on the quality of life of rheumatoid arthritis patients.

METHODS

A total of 196 participants from The University of Lahore Teaching Hospital were enrolled in this cross-sectional survey. Stress in RA patients was measured using a perceived stress score. PSS scores were calculated by inverting replies to the four positively stated items (items 4, 5, 7, and 8) and then totaling across all scale items (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0). The PSS 10 item scale was broken down into four questions: 2, 4, 5, and 10 [33]. The SF-36 questionnaire was used to measure QoL. The SF-36 is made up of eight scaled scores, which are the weighted sums of each section's questions. On the assumption that each question bears equal weight, each scale was immediately translated into a 0-100 scale. The lower the score, the greater the degree of impairment. The lower the number, the less impairment; for example, a score of zero equals maximum disability, while a score of 100 equals no disability [34]. The symptoms' history was recorded. A non-probability convenient sampling strategy was used to compute sample size. Before completing out the surveys, all patients were given written consent and the significance of the study was explained.

RESULTS

Several participants who fulfilled the inclusion criteria were registered i.e., N= 196. Data was collected by using PSS and SF 36 questionnaire. PSS was used to assess stress in RA patients. The results showed that the average value of age was 44.14± 6.842 years with a lowest value of 32.00 and a highest value of 58.00 years (Table 1).

Age	
Mean	44.14
Std. Deviation	6.842
Minimum	32.00
Maximum	58.00

Table 1: Descriptive statistics of age

Males had a frequency of 13(6.6%) and female with a frequency of 183 (93.4%). The average value of height was 5.52± 197 ft with a lowest value of 5.1 ft and a highest value of 5.7 ft. The average value of weight was 57.54± 11.059 Kg with a lowest value of 42.00 Kg and a highest value of 75.00 Kg. According to the results the frequency of upper class out of 196 were 77 (39.3%), patients who were middle class out of 196 were 51(26.0%), and patients who belong to lower class were 68 (34.7%).

socio-economic status	frequency (%)
upper class	77(39.3)
middle class	51(26.0)
lower class	68(34.7)
Total	196(100.0)

Table 2: Descriptive statistics of socioeconomic status

The results showed that the average value of physical health component scoring was 37.12± 9.96 with a lowest value of 20.96 and highest value of 50.05. The results showed that the average value of mental health component scoring was 44.00± 5.738 with a lowest value of 36.12 and highest value of 55.57. The results showed that the average value of perceived stress score was 25.32± 7.47 with a lowest value of 11.00 and highest value of 38.00 (Table 3).

perceived stress score	rheumatoid patients
Mean	25.32
SD	7.47
Minimum	11.00
Maximum	38.00

Table 3: Descriptive statistics of perceived stress score

The results show the comparative relationship between

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gender and the domains of QoL. According to results female had less QoL with respect to body pain, physical function, health transition and role in comparison to males. The results show a significant value of 0.000 which were less than the p-value which means there was a relationship between Stress and the QoL (Figure 1).

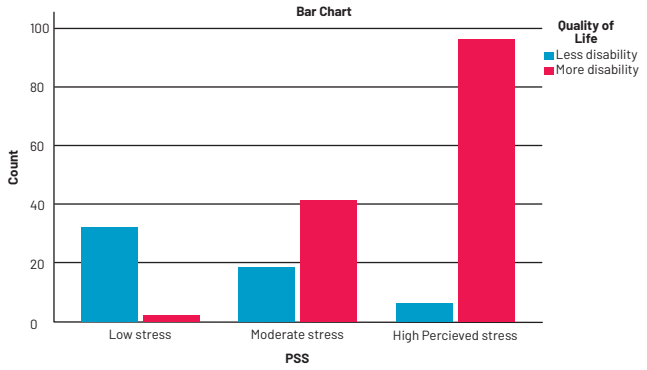

Figure 1: Descriptive statistics of Chi-square

DISCUSSION

Rheumatoid arthritis is known to be affected by many factors such as age, gender, gene, smoking history, obesity, stress etc. Stress being one of the common factor effects rheumatoid patients. It is stated that mind and body interact with one another in unique manner which impacts individual's health [27]. Stress causes more damage and inflammation in RA patient. Finally, stress has an influence on RA patients' QoL [28]. Stress management has been shown to improve QoL in persons with RA, along with many other risk factors. Stress symptoms affects our body, thoughts and feelings [33,34]. Previous study had shown less evidence related stress [35-39]. According to some studies there were no difference in level of stress between the two genders [40]. S Mehta et al., conducted a research in 2016 in order to see assess mood, QoL and disability among RA. It was concluded that level of stress impact level of disease and its QoL [41]. This result supported the result of our study. In another study by Gholamhossein Alishiri et al., it was stated that stress management technique enhances quality of life in RA patients [42]. Similarly, Samar H. Goma et al., conducted a study in 2019 in order to see the RA and QoL with respect to disease activity. A total of 89% people showed that people with high disease activity were depressed. It was concluded that rheumatoid impair health with all aspect of QoL which is commonly due to the level of anxiety and stress [43]. In another study Alireza Vahedi Hemat et al., conducted in 2020 see the effect of reducing stress on QoL in students with RA. In this study it was stated that stress do effect quality of life in people with RA [44]. Another study reason explained that as stress tends to make RA symptoms worse its leads towards further disability and impacts patient's QoL [45]. According to one study stress is a factor which impacts rheumatoid patients specially with chronic rheumatoid than acute [46-48]. In another study it is stated that in chronic rheumatoid disability is more in comparison to acute rheumatoid. Due to this chance of stress in higher in chronic cases than acute one's [49]. Seyedeh Parisa Moosavian et al., conducted a study in 2020 in order to determine the effect of oxidative stress and QoL on rheumatoid arthritis patient. Result showed that garlic supplement does impact the stress level which improves the QoL in RA patients [50]. So, based on all previous studies and result of this research it is proved that stress does affect QoL in RA patients.

CONCLUSIONS

It is stated that stress does impact quality of life of chronic rheumatoid patients which impacts individual's mental health resulting in poor quality of life and more disability. As a result, it was established that stress had an impact on rheumatoid arthritis patients' quality of life.

REFERENCES

[1] Gombart AF, Pierre A, Maggini S. A review of micronutrients and the immune system–working in harmony to reduce the risk of infection. Nutrients. 2020;12(1):236. doi.org/10.3390/nu12010236

[2] Vojdani A, Vojdani E, Vojdani C. The Immune System: Our Body's Homeland Security Against Disease. Integrative and Functional Medical Nutrition Therapy: Springer; 2020;285-302. doi.org/10.1007/978-3-030-30730-1_19

[3] Wang D, Zhang J, Lau J, Wang S, Taneja V, Matteson EL, et al. Mechanisms of lung disease development in rheumatoid arthritis. Nature Reviews Rheumatology. 2019;15(10):581-96. doi.org/10.1038/s41584-019-0275-x

[4] Marcucci E, Bartoloni E, Alunno A, Leone M, Cafaro G, Luccioli F, et al. Extra-articular rheumatoid arthritis. Reumatismo. 2018;70(4):212-24. doi.org/10.4081/reumatismo.2018.1106

[5] Conforti A, Di Cola I, Pavlych V, Ruscitti P, Berardicurti O, Ursini F, et al. Beyond the joints, the extra-articular manifestations in rheumatoid arthritis. Autoimmunity Reviews. 2021;20(2):102735.doi.org/10.1016/j.autrev.2020.102735

[6] Chirila RM, Berianu F, Abril A, Butendieck Jr RR. Extra-articular involvement of rheumatoid arthritis in three seropositive patients in the absence of initial joint involvement. Immunity, Inflammation and Disease. 2021;9(4):1613-7. doi.org/10.1002/iid3.514

[7] Gulati M, Farah Z, Mouyis M. Clinical features of rheumatoid arthritis. Medicine. 2018;46(4):211-5. doi.org/10.1016/j.mpmed.2018.01.008

[8] Colquhoun M, Gulati M, Farah Z, Mouyis M. Clinical

DOI: https://doi.org/10.54393/pbmj.v5i5.452

features of rheumatoid arthritis. Medicine. 2022. doi.org/10.1016/j.mpmed.2021.12.002

[9] Cush JJ. Rheumatoid arthritis: early diagnosis and treatment. Medical Clinics. 2021;105(2):355-65. doi.org/10.1016/j.mcna.2020.10.006

[10] Lo J, Chan L, Flynn S. A systematic review of the incidence, prevalence, costs, and activity and work limitations of amputation, osteoarthritis, rheumatoid arthritis, back pain, multiple sclerosis, spinal cord injury, stroke, and traumatic brain injury in the United States: a 2019 update. Archives of physical medicine and rehabilitation. 2021;102(1):115-31. doi.org/10.1016/j.apmr.2020.04.001

[11] Almutairi K, Nossent J, Preen D, Keen H, Inderjeeth C. The global prevalence of rheumatoid arthritis: a meta-analysis based on a systematic review. Rheumatology International. 2021;41(5):863-77. doi.org/10.1007/s00296-020-04731-0

[12] Otón T, Carmona L. The epidemiology of established rheumatoid arthritis. Best Practice & Research Clinical Rheumatology. 2019;33(5):101477. doi.org/10.1016/j.berh.2019.101477

[13] edunjobi as. rheumatoid arthritis among patients presenting at the rheumatology out-patient clinic of the olabisi onabanjo university teaching hospital, sagamu, western nigeria. faculty of internal medicine. 2016.

[14] Kuang S, Yap ES, Wang DA, Lahiri M, Pattapola S, Gendi N, et al. 001. Pure Red Cell Aplasia: A Rare and Challenging Extra-Articular Manifestation of Rheumatoid Arthritis. Rheumatology. 2017;56(suppl_2):ii49-ii95. doi.org/10.1093/rheumatology/kex062

[15] Moradi B, Schnatzer P, Hagmann S, Rosshirt N, Gotterbarm T, Kretzer JP, et al. CD4+ CD25+/high CD127 low/-regulatory T cells are enriched in rheumatoid arthritis and osteoarthritis joints—analysis of frequency and phenotype in synovial membrane, synovial fluid and peripheral blood. Arthritis research & therapy. 2014;16(2):1-13. doi.org/10.1186/ar4545

[16] Smith MD, Weedon H, Papangelis V, Walker J, Roberts-Thomson PJ, Ahern MJ. Apoptosis in the rheumatoid arthritis synovial membrane: modulation by disease-modifying anti-rheumatic drug treatment. Rheumatology. 2010;49(5):862-75. doi.org/10.1093/rheumatology/kep467

[17] Choy E. Understanding the dynamics: pathways involved in the pathogenesis of rheumatoid arthritis. Rheumatology. 2012;51(suppl_5):v3-v11. doi.org/10.1093/rheumatology/kes113

[18] Noss EH, Brenner MB. The role and therapeutic implications of fibroblast-like synoviocytes in inflammation and cartilage erosion in rheumatoid arthritis. Immunological reviews. 2008;223(1):252-70. doi.org/10.1111/j.1600-065X.2008.00648.x

[19] Grabiec AM, Korchynskyi O, Tak PP, Reedquist KA. Histone deacetylase inhibitors suppress rheumatoid arthritis fibroblast-like synoviocyte and macrophage IL-6 production by accelerating mRNA decay. Annals of the rheumatic diseases. 2012;71(3):424-31.doi.org/10.1136/ard.2011.154211

[20] Wong CK, Chen DP, Tam LS, Li EK, Yin YB, Lam CW. Effects of inflammatory cytokine IL-27 on the activation of fibroblast-like synoviocytes in rheumatoid arthritis. Arthritis research & therapy. 2010;12(4):1-15.doi.org/10.1186/ar3067

[21] Najm A, Masson FM, Preuss P, Georges S, Ory B, Quillard T, et al. MicroRNA-17-5p reduces inflammation and bone erosions in mice with collagen-induced arthritis and directly targets the JAK/STAT pathway in rheumatoid arthritis fibroblast-like synoviocytes. Arthritis & Rheumatology. 2020;72(12):2030-9. doi.org/10.1002/art.41441

[22] van der Woude D, van der Helm-van AH. Update on the epidemiology, risk factors, and disease outcomes of rheumatoid arthritis. Best Practice & Research Clinical Rheumatology. 2018;32(2):174-87. doi.org/10.1016/j.berh.2018.10.005

[23] Sowmya T. Tumbe Group of International Journals 2019.

[24] Mandal U, Mahalik G. Ethnomedicinal plants used in rheumatoid arthritis. Medico-Bio wealth of India. 2021;2:140-7.

[25] Rawla P. Cardiac and vascular complications in rheumatoid arthritis. Reumatologia. 2019;57(1):27-36. doi: 10.5114/reum.2019.83236.

[26] Roongta R, Ghosh A. Managing rheumatoid arthritis during COVID-19. Clinical rheumatology. 2020;39(11):3237-44. doi.org/10.1007/s10067-020-05358-z

[27] Sturgeon JA, Finan PH, Zautra AJ. Affective disturbance in rheumatoid arthritis: psychological and disease-related pathways. Nature Reviews Rheumatology. 2016;12(9):532-42. doi.org/10.1038/nrrheum.2016.112

[28] Finan PH, Zautra AJ. Stress affects rheumatoid arthritis, but via what mechanisms? Nature Reviews Rheumatology. 2013;9(10):569-70. doi.org/10.1038/nrrheum.2013.139

[29] Conceição CTM, Meinão IM, Bombana JA, Sato EI. Psychoanalytic psychotherapy improves quality of life, depression, anxiety and coping in patients with systemic lupus erythematosus: a controlled

DOI: https://doi.org/10.54393/pbmj.v5i5.452

randomized clinical trial. Advances in Rheumatology. 2019;59. doi.org/10.1186/s42358-019-0047-y

[30] Bucourt E, Martaillé V, Goupille P, Joncker-Vannier I, Huttenberger B, Réveillère C, et al. A comparative study of fibromyalgia, rheumatoid arthritis, spondyloarthritis, and Sjögren's syndrome; impact of the disease on quality of life, psychological adjustment, and use of coping strategies. Pain Medicine.2021;22(2):37281.doi.org/10.1093/pm/pnz255

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Original Article

Impact of Maternal Nutrition Education on Dietary Practices of School Going Children

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ABSTRACT

Nutrition (Nutritional) education is a kind of education that is important to improve the health status of people. School children are undergoing rapid mental and physical development. Therefore, an appropriate diet is critical throughout this stage of life to ensure normal and healthy growth. As a result, nutrition education should begin at a young age for children **Objective:** To evaluate the impact of nutrition education of mothers on the dietary habits of school-going children aged 3-6 years **Methods:** A Quasi-Experimental study was executed on 77 children of class playgroup to class 1 studying in the Government girl's school of Garhi Shahu, Lahore. Firstly, anthropometric data were collected through the children and secondly socio-demographic and dietary knowledge of mothers of selected children were noted through pre-designed questionnaires and interview method. The mothers were then given 45 minutes of nutrition education and a dietary change course, and some informative dietary guidelines leaflets and a weekly healthy kid's school lunch planner were given to the mothers which they were requested to implement in the daily routine of children. After three months again the anthropometrics and questionnaires were assessed and compared with the initial findings **Results:** After nutrition education, the percentage of children who followed the servings of healthy food groups and avoided consumption of harmful meals (fast, fried, processed foods), unhealthy beverages (carbonated drinks), and intake of fruits and vegetables increased dramatically. After the intervention, the percentage of children who followed recommended nutritional, lifestyle, and physical activity guidelines, as well as healthy school lunch practices, improved statistically significantly ($P<0.005$). The percentage of children who skipped meals on daily basis was 20% decreased to 8%. Before the intervention, 63% of mothers say that their children consumed breakfast regularly and after the intervention, it increases to 75%. The children's anthropometric status improved significantly, with a $P<0.005$ significance level **Conclusions:** In this study, nutrition education had a significant impact on the school-going children in their anthropometry measurements, healthy school lunch boxes, and awareness of their mothers about healthy eating practices. Seminars and camps should be arranged in schools to educate the mothers and the students at a young age regarding their health and healthy eating to reduce the nutritional deficiencies and diseases.

INTRODUCTION

Nutrition education is a kind of education that is important to improve the health status of people. Underdeveloped countries like Pakistan have many health-related issues, which can be solved by bringing about a change in dietary practices. Nutrition education combines many areas and develops strategies that seek help from environmental support [1]. It is designed to improve and change people's dietary practices so that their health status can be improved [2]. Nutrition education is more likely to be effective when it focuses on behavior/action (rather than just information) and systematically links pertinent theory, research, and practice, according to a review of over 300 studies [3]. Schoolchildren are undergoing rapid mental and physical development, so an adequate diet is critical during this stage of life to guarantee normal and healthy growth [4]. In general, children's eating patterns endure into adolescence and often into adulthood. As a result, children should be taught about nutrition from an early age [5]. The elementary school would be the best strategic site for developing a healthy lifestyle and a second front in the

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struggle against sickness and malnutrition. The School Health Committee appreciates this as well [6]. A poor diet is one of the key risk factors for many chronic diseases, and society's propensity, particularly among children and adolescents, suggests a warning condition [7]. Many adult disorders are caused by nutritional behaviors that began in childhood [8]. Over the last decade, little has changed in terms of anthropometry. In 2011, 43.7% of children under the age of five were stunted, compared to 41.6% in the National Nutrition Survey (2001). 15.1% were overweight, up from 14.3% in 2001, while 31.5% were underweight, a figure that has been constant since 2001. According to the National Nutrition Survey (2011), stunting, wasting, and micronutrient deficiencies are widespread in Pakistan. Dietary deficits, poor mother and child health, and nutrition are also contributing factors [9]. Mothers' awareness can be improved, which is linked to the prevalence of childhood malnutrition. Child caregivers' lack of nutritional understanding about child feeding relates greatly to children's bad eating habits [10]. The development of nutrition education tools is the main aim of the study, which may help in minimizing nutritional problems of Children due to improper feeding practices in Pakistan. Mothers and their Children of school age are one of the vulnerable groups who suffer from malnutrition. A nutrition education tool will be developed in this study which will focus on mothers' nutritional education for their school-going Children about their dietary habits, dietary requirements, and healthy school lunch options, as their awareness is very important to raise healthy children in this country like Pakistan.

METHODS

An intervention study Quasi-Experimental design was conducted for 9 months. Convenient sampling was used to assess the nutrition education of mothers through questionnaires. The data were collected from the mothers of children studying in the government school of Garhi Shahu, Lahore. The study was completed in three stages: the first stage involved collecting anthropometric data from children and assessing mothers' knowledge of the diet and lifestyle of their children, the second stage involved implementing a NE program, and the third stage was completed three months after the last educational session to assess the intervention's impact on mothers' knowledge, their children's lifestyle, and their children's anthropometric data. The sample size was estimated using the Open Epi info application, and it was 77. 18 to 20 students were randomly chosen from each class playgroup to 1, and then their anthropometric data was collected. Mothers of the selected students were interviewed before giving Nutrition education and after 3 months' the same students and mothers were again analyzed to check the differences.

Tools of data collection: the data was collected by using the weighing machine, height scale, and measuring tape [11]. After taking anthropometric data from the students, the mothers of these students were gathered by arranging a nutrition education session in school, firstly after creating a friendly environment with mother's pre-intervention education was assessed by giving them pre-designed questionnaires, then after the first demographic data was taken from the participants to determine socioeconomic status of mothers. Then there's the pre-prepared food. With the use of appropriate teaching materials such as charts, posters, and pamphlets, messages and lessons were conveyed to a group of 77 mothers from the school. The mothers were taught about diet, the necessity of a balanced diet, nutrient sources, cooking techniques, healthy school lunch options, the value of green leafy vegetables and fruits in the diet, nutrient deficiency disorders, and nutrient conservation, among other things. After three months again the anthropometric data were collected from the students to check the differences, and the responses from the mothers of these students were also obtained to assess the nutritional knowledge and implementation of their children's dietary practices and lifestyle habits.

RESULTS

According to the study results, a significant association was found between pre-intervention weight mean (17.4 ± 3.02) to post-intervention weight (18.05 ± 2.99) which means that there was an increase of 3.7% in weight after the intervention, the mean of height increases from (108 ± 9.2) to (109.6 ± 9.3) with the increase of 1.48% which shows that there was a significant association as p-value is less than 0.005. There was a significant association between pre-intervention BMI (14.66 ± 1.4) to post-intervention (14.99 ± 1.3) which means there was an increase of 1.36% in BMI of children [12]. There was a significant association between pre-intervention MUAC (16.2 ± 0.9) to post-intervention (16.5 ± 0.8) which shows there was an increase of 1.85% (Table 1).

Anthropometrics	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	% Change	Significance level (P-value)
Weight	17.4 ± 3.02	18.05 ± 2.99	+3.7	0.001
Height	108 ± 9.2	109.6 ± 9.3	+1.48	0.004
BMI	14.76 ± 1.4	14.99 ± 1.3	+1.36	0.003
MUAC	16.2 ± 0.9	16.5 ± 0.8	+1.85	0.002

Table 1: Distribution of children according to anthropometric measurements

Table 2 explains the pre and post-intervention frequency and percentages of daily servings of different food groups

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consumed by children. The correct answer scored 1 and the others scored 0, the change in the correct answer before and after education will analyze whether there was a significant association or not. The servings of grains increase from 23.4-41.6% which means that there was a significant association as the p-value is >0.005. The servings of vegetables increase from 28.6-40.3% which shows that there was a significant association as the p-value is >0.005. There was a significant association between pre and post-intervention servings of fruit as there was an increase of 15.5-22.1%. Servings of meat/ legumes/ eggs increased from 20-29%, meaning there was a significant association as P-value is >0.005. Servings of dairy also increases from 20.8-37.7% which means there was a significant association between pre and post-intervention as P-value is >0.005.

Food groups	Servings	Scores	Pre-int. frequency	Post-int. frequency	Pre-int. %		Significance level (P-value)
Servings of grains	2-3 servings	0	23	5	29.9	6.5	0.002
	3-4 servings	0	35	40	45.5	51.9	
	5-6 servings	1	18	32	23.4	41.6	
	Never	0	1	0	1.3	0	
Servings of vegetables	1-2 Serving	1	22	31	28.6	40.3	0.003
	per day2-3 serving In a week	0	5	4	6.5	5.2	
	3-4 serving in a week	0	36	20	46.8	26.0	
	4-5 serving in a week	0	6	17	7.8	22.1	
	Never	0	8	5	10.4	6.5	
Servings of fruits	1 serving per day	0	25	35	32.5	45.5	0.002
	2-3 servings per day	1	12	17	15.6	22.1	
	3-4 servings in a week	0	16	9	20.8	11.7	
	4-5 servings in a week	0	15	12	19.5	15.6	
	Never	0	9	4	11.7	5.2	
Servings of meat, eggs, legumes, nuts	1 serving per day	0	28	37	36	48	0.003
	2-3 servings per day	1	16	22	20	29	
	3-4 servings in a week	0	18	8	23	10	
	4-5 serving in a week	0	11	9	14	12	
	Never	0	4	1	5	14	
Servings of Dairy	1 Serving per day	0	32	36	41.6%	6.8%	0.004
	2-3 Servings per day	1	16	29	20.8%	37.7%	
	3-4 Servings In a week	0	5	6	6.5%	7.8%	
	Never	0	24	6	31.2%	7.8%	

Table 2: Recommendation about consumption pattern of different food groups of Children before and after nutrition education

Table 3 shows the percentage comparison of healthy and unhealthy eating practices of school-going children before and after giving nutrition education to their mothers. The percentage of children who skipped meals on daily basis was 20% decreased to 8% and 38% skip their meals very often decreased to 27%. 42% never skipped their meals which increased to 65%. Before the intervention, 63% of mothers say that their children consumed breakfast regularly and after the intervention, it increases to 75%. 20% skipped sometimes and after the intervention, it was 15%. 17% never consumed breakfast daily which was decreased to 10%.

education

Healthy and unhealthy eating practices	Daily		Often		Never		P-value
	Before interv-ention %	After interv-ention %	Before interv-ention %	After interv-ention %	Before interv-ention %	After interv-ention %	
Percentage of skipped meals	20%	8%	38%	27%	42%	65%	0.003
Consumption of breakfast	63%	75%	20%	15%	17%	10%	0.002

Table 3: Comparison of healthy and unhealthy eating practices of school-going children before and after giving nutrition education to their mothers

DISCUSSION

By evaluating pre and post-questionnaire data, data was obtained from 77 mothers of school-aged children aged 3-6 years from a middle-class school to determine the impact of nutrition instruction. Results show a significant increase in their knowledge and practices regarding eating habits and healthy lunch boxes [13]. Similarly, Kigaru et al., collected the sample from four schools among 202 school children. Data were collected through questionnaires, interviews, and discussions. The low, moderate, and high knowledge ratio was 41-69%. Dietary practices were noticed by food consumption and the attitude about what they ate [14,15]. The purpose of this study was to increase the healthy eating habits and nutritional value of lunch boxes among the primary school-going children by providing nutrition education and also ensuring their likes and dislikes about their meal patterns. 77 children were chosen from the primary school in which there was 57% of children fall in 3-5.9 years of age group whereas, 43% of children fall in 6-8 years of age group. 24% of students fall in playgroup, 25% students in Kg and from prep class, there were 25% students and 26% from 1 class. Table 1 shows there was a significant association between pre-intervention weight mean (17.4 ± 3.02 Kg) to post-intervention weight (18.05 ± 2.99 Kg) which means that there was an increase of 3.7% in weight after the intervention, the mean of height increases from (108 ± 9.2cm) to (109.6 ± 9.3cm) with the increase of 1.48% which shows that there was a significant association as p-value is

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less than 0.005. There was a significant association between pre-intervention BMI (14.66 ± 1.4) to post-intervention (14.99 ± 1.3) which means there was an increase of 1.36% in BMI of children, there was a significant association between pre-intervention MUAC (16.2 ± 0.9) to post-intervention (16.5 ± 0.8) which shows there was an increase of 1.85%. There was a considerable increase in fruit servings from pre-intervention to post-intervention, from 15.5-22.1%. Meat, legumes, and egg servings increased from 20% to 29%, indicating a significant correlation with a P= 0.003 [16]. In our study dietary intake of the basic food, groups were also observed before and after intervention and then analyzed. The servings of grains increase from 23.4-41.6% which means that there was a significant association as p=0.002. The servings of vegetables increase from 28.6-40.3% which shows that there was a significant association as the p-value is 0.003. Similarly, a study conducted by F Tilley et al., presents the development of a healthy lunch box challenge. Staff members and parents were targeted on summer days. The total ratio of students who took fruits and vegetables and water in their lunch was 31-42% [17]. LN Gase et al., found similar results, with dairy servings increasing from 20.8-37.7%, indicating a significant connection between before and post-intervention (P=0.004) [18]. Ostachowska-Gasior et al., conducted a study to confirm the proper value of nutrition education among adolescents and also noticed the students who consumed daily their breakfast and know the value of other meals. This fact shows that the consumption of breakfast is very beneficial for the consumption of other meals in a whole day [19]. The impact of nutrition education can be seen in the respondents' eating habits. Meal skipping was discovered to be a regular practice among the participants, with breakfast being the most commonly skipped meal. As it was found that the percentage of children who never skipped meals was 42% which increased to 65%, and the percentage of children who consumed breakfast daily was 63% which increased to 75% which shows that there was a significant change observed as P < 0.005. After receiving nutrition education, meal skipping was reduced and regular breakfast consumption rose. Similarly, Kaur et al. found that meal skipping decreased (from 43-24), and respondents skipping breakfast and lunch decreased (from 29 and 12-16 and 8 respectively) after receiving nutrition education. NE also improved respondents' living habits statistically significantly (p<0.001) [20]. The women who have a greater level of nutritional understanding feed their children more vegetables, fruit, legumes, and less sugared drinks like cola juice and fast eats, according to this study. A mother's nutritional knowledge level affects children's eating habits. Proper intake of a healthy diet is very important for children, deficiency of which causes the serious effect on a healthy life. It is very obvious that being an inhabitant of an underdeveloped country like Pakistan, many people cannot afford to have a balanced diet. Resultantly, the efficiency of the individuals gets affected.

CONCLUSIONS

In this study, nutritional education had a significant impact on the school-going children in their anthropometric measurements, healthy school lunch boxes, and awareness of their mothers about healthy eating practices. The inadequate dietary intake during school hours was substituted with the incorporation of healthy options to be consumed with the help of the nutritional education program. It has been discovered that mothers with a high level of nutritional education have a good impact on their children's eating habits and behaviors. If the mother receives constant nutritional instruction, all family members may develop good eating habits and behaviors. Seminars and camps should be arranged in schools to educate the mothers and the students at a young age regarding their health and healthy eating to reduce the nutritional deficiencies and diseases. Teachers should engage themselves in nutrition education sessions so that they can further educate their students and there should be a regular check and balance on the school canteen and cafeterias for the sake of students' health.

REFERENCES

[1] Franciscato SJ, Janson G, Machado R, Lauris JR, Andrade SM, Fisberg M. Impact of the nutrition education Program Nutriamigos® on levels of awareness on healthy eating habits in school-aged children. Journal of Human Growth and Development. 2019 Dec;29(3):390-402. doi.org/10.7322/jhgd.v29.9538.

[2] Kong K, Liu J, Tao Y. Limitations of studies on school-based nutrition education interventions for obesity in China: a systematic review and meta-analysis. Asia Pacific Journal of clinical nutrition. 2016 Jan;25(3): 589-601.

[3] Contento I. Nutrition education: Linking research, theory, and practice. Asia Pacific Journal of Clinical Nutrition. 2008;17 Suppl 1:176-179.

[4] Ruzita AT, Mab WA, Ismail MN. The effectiveness of nutrition education programme for primary school children. Malaysian Journal of nutrition. 2007;13(1):4554.doi.org/10.26226/morressier.60c25 9aa0bb2c9002fbe9316.

[5] Haldar D, Chatterjee T, Sarkar AP, Bisoi S, Biswas AK, Sardar JC. A study on impact of school-based health and nutrition education in control of nutritional anemia among primary school children in rural West

DOI: https://doi.org/10.54393/pbmj.v5i5.290

Bengal. Indian J Community Med. 2012;37(4):259-262. doi.org/10.4103/0970-0218.103476.

[6] World Health O. Nutrition in adolescence: issues and challenges for the health sector: issues in adolescent health and development. Geneva: World Health Organization; 2005. 187-192. doi.org/10.1515/9783110847659-002.

[7] Kigaru DMD, Loechl C, Moleah T, Macharia-Mutie CW, Ndungu ZW. Nutrition knowledge, attitude, and practices among urban primary school children in Nairobi City, Kenya: a KAP study. BMC Nutrition. 2015;1(1):44. doi.org/10.1186/s40795-015-0040-8.

[8] Norton K, Whittingham N, Carter L, Kerr D, Gore C, Marfell-Jones M. Measurement techniques in anthropometry. Anthropometrica. 1996;1:25-75.

[9] Harris CV, Neal WA. Assessing BMI in West Virginia schools: parent perspectives and the influence of context.Pediatrics.2009Sep1;124(Supplement_1):S63-72. doi.org/10.1542/peds.2008-3586I.

[10] Bhutta ZA, Soofi SB, Zaidi SS, Habib A, Hussain I. Pakistan national nutrition survey, 2011.

[11] 11. Kuchenbecker J, Reinbott A, Mtimuni B, Krawinkel MB, Jordan I. Nutrition education improves dietary diversity of children 6-23 months at community-level: Results from a cluster randomized controlled trial in Malawi. PLoS One. 2017;12(4):e0175216-e. doi.org/10.1371/journal.pone.0175216.

[12] Kigaru DMD, Loechl C, Moleah T, Macharia-Mutie CW, Ndungu ZW. Nutrition knowledge, attitude, and practices among urban primary school children in Nairobi City, Kenya: a KAP study. BMC Nutrition. 2015;1(1):44. doi.org/10.1186/s40795-015-0040-8.

[13] Antwi J, Ohemeng A, Boateng L, Quaidoo E, Bannerman B. Primary school-based nutrition education intervention on nutrition knowledge, attitude, and practices among school-age children in Ghana. Glob Health Promot. 2020 Dec;27(4):114-122. doi: 10.1177/1757975920945241.

[14] Tilley F, Weaver RG, Beets M, Turner-McGrievy G. Healthy Eating in Summer Day Camps: The Healthy Lunchbox Challenge. Journal of the Academy of Nutrition and Dietetics. 2013;9(113):A78. doi.org/10.1016/j.jand.2013.06.272.

[15] Salem GM, Said RM. Effect of health belief model based nutrition education on dietary habits of secondary school adolescent girls in Sharkia governorate. Egypt J Commun Med. 2018 Jul;36(3):35-47. doi.org/10.1016/j.injury.2009.11.020.

[16] Abdel-Hady D, El-Gilany AH, Sarraf B. Dietary habits of adolescent students in Mansoura, Egypt. International Journal of Collaborative Research on Internal Medicine & Public Health. 2014 Jun 1;6(6):132. doi.org/10.1155/2014/258470.

[17] Ostachowska-Gasior A, Piwowar M, Kwiatkowski J, Kasperczyk J, Skop-Lewandowska A. Breakfast and other meal consumption in adolescents from Southern Poland. International journal of environmental research and public health. 2016 May;13(5):453. doi.org/10.3390/ijerph13050453.

[18] Wang M, Zhong JM, Wang H, Zhao M, Gong WW, Pan J et al. Breakfast consumption and its associations with health-related behaviors among school-aged adolescents: a cross-sectional study in Zhejiang Province, China. International Journal of Environmental Research and Public Health. 2016 Aug;13(8):761. doi.org/10.3390/ijerph13080761.

[19] Pendergast FJ, Livingstone KM, Worsley A, McNaughton SA. Correlates of meal skipping in young adults: a systematic review. International Journal of Behavioral Nutrition and Physical Activity. 2016 Dec;13(1):1-5. doi.org/10.1186/s12966-016-0451-1.

[20] Kelishadi R, Mozafarian N, Qorbani M, Motlagh ME, Safiri S, Ardalan G et al. Is snack consumption associated with meal skipping in children and adolescents? The CASPIAN-IV study. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity. 2017 Jun;22(2):321-8. doi.org/10.1007/s40519-017-0370-4.

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Original Article

Impact of Premenstrual Syndrome on Quality of Life of Working Women

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ABSTRACT

The premenstrual disorder is a typical psychosomatic disorder for women of reproductive age. It is an array of emotional, behavioral, and physical signs that happen all through the late luteal phase of the menstrual cycle and vanishes by it's beginning **Objective:** To investigate the effect of premenstrual syndrome on the life of working women and their experience of tiredness and insight about the causes, effect and controlling of symptoms. **Methods:** This cross-sectional study included 170 working females and was completed in 6 months from July 2021-December 2021. Inclusion Criteria included the age of 20 to 40years. Exclusion Criteria included housewives and females having a systematic illness and autoimmune disorders. Premenstrual Syndrome (PMS) Scale and SF-36 were used. All patients were chosen using the purposive sampling technique. **Results:** Working women with PMS have decreased levels of work-related quality of life in their professional lives. The PMS score in working women 7.82% mild symptoms, 22.32% moderate, 16.13% severe symptoms, 3.17% very severe symptoms. **Conclusions:** PMS significantly influenced daily activities related to professional and personal lives. Valid conclusions were drawn that PMS had a great impact on working women with behavioral and psychological symptoms.

INTRODUCTION

Premenstrual Syndrome (PMS) an array of emotional, behavioral, and physical signs that happen all through the late luteal phase of the menstrual cycle and vanishes by the beginning of menstruation [1]. It is a multi-indicative disorder described by the cyclic rehash of side effects for the span of the luteal period of the menstrual cycle and resolves swiftly at or sooner or later of a few days of the commencement of the feminine cycle. The monthly cycle is a distinctive wonder which is a crucial marker of female's wellbeing [2]. PMS is a common complaint and is typically predominant in premenopausal and women of the reproductive phase. It impacts the working class socially, emotionally, functionally, and mentally. Symptoms and impacts of PMS vary across cultures and sampling differences and diagnostic criteria. Signs include stress, anxiety, depression irritability joint, and muscle pain however abdominal pain and mental symptoms are more prevalent. These cyclic symptoms' severity varies before every cycle. Numerous symptoms and uneasiness were reported and more than 90% of women have a complaint of at least two or three symptoms. Sometimes, it is also referred as Premenstrual Tension (PMT). Approximately 1 of every 3 endures discomforting signs and side effects inside the days prior to their length. For one out of ten, the side effects are necessarily undesirable to all the more genuinely upset their lives [3,4]. There are more noticeable than one hundred valuable signs and side effects identified with PMS, yet most females' best experience a cluster of their side effects can be psychological and real. The most extensively recognized are psychological PMS indications

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bad temper, loss of self-reliance, feeling furious, feeling frustrated and enthusiastic, disheartened, tearfulness, pressure, exhaustion, negative fixation, and restlessness [5,6]. Physical PMS side effects are weight gain, gut swelling, smooth and knotty bosoms, swollen lower legs, misperceptions, backaches, pores, and skin changes and pimples, disillusioned stomach, restlessness, tiredness, joint throbs, and dizziness. Conduct PMS indications, dinner longings, and gorging, loss of keenness for intercourse. PMS signs ordinarily start up to a week or so sooner than a length is expected and fade when the length starts, or a couple of days subsequently [7,8]. Dietary and lifestyle factors such as consumption of sweets and lack of physical activity are associated with the presence of PMS [9]. Women's premenstrual syndrome increases tension, anxiety, and conflict proneness reduces productive capacity and leads to social maladjustment. Syndrome medicalization is required based on personal quality of life markers [10]. As compared to women without PMS, women with Premenstrual Dysphoric Disorder (PMDD) have all the earmarks of being 2 to 3 times most presumably to answer to have an extended stretch of time to consider suicides [11-13]. Employers and line managers should be trained to better understand women's experiences with premenstrual symptoms, be able to communicate effectively with women, and give targeted help and resources to those who need it, among other recommendations and ideas [14]. Make self-destructive arrangements and endeavors, major depressive disorder, tension issues, substance utilization confusion, and statistic trademark. Although several studies have examined PMS, the association of PMS with the work-related quality of life of working women has not been studied well [15]. Therefore, we decided to conduct the study in order to examine whether PMS impacts the quality of life of working-class females.

METHODS

A cross-sectional survey was conducted and data was collected from teachers, bankers, health workers, and doctors of Lahore. Working women at age of 18 to 40 years were included. Females having the systematic disorder, Systemic lupus erythematosus (SLE) and autoimmune conditions were excluded. The diagnosis was done by using the PMS Scale consisting of diagnostic questions. It was used to diagnose the indicators and severity of physical, psychological, and behavioral. Analyzed data by (SPSS).

RESULTS

Total 170 participants with a mean ± standard deviation of the age of 28.69 years. Table 1 shows that out of 170 female patients having PMS, 7.82% had mild symptoms, 22.32% had moderate symptoms, 16.13% had severe symptoms and 3.17% had very severe symptoms. Figure 1 shows that the mean score of emotional wellbeing is 16.51, which is less than the total score of emotional wellbeing. Mean shows that females having PMS signs suffer emotionally (Figure 1). Figure 2 shows that the mean score for functional wellbeing is 13.89, which is less than the total score of functional wellbeing. The mean value shows that females having PMS signs have a functional limitation. Figure 3 shows that the mean score of physical wellbeing is 19.20, which is less than the total score of physical wellbeing. The mean value shows that females having PMS signs had lack of energy and suffer physically. Figure 4 shows that the mean score for physical wellbeing is 19.20, which is less than the total score of social wellbeing. The mean value shows that females having PMS signs suffer socially as well.

PMS SCORE	Mild symptoms	Moderate symptoms	Severe symptoms	Very Severe symptoms
Working women having PMS	7.82%	22.32%	16.13%	3.17%

Table 1: Premenstrual Syndrome Scale Scoring

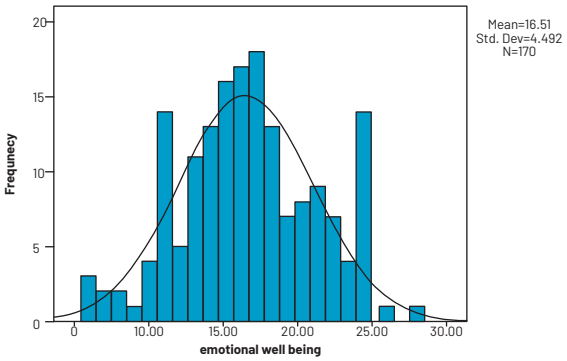

Figure 1: Histogram showing mean score of emotional wellbeing in PMS females

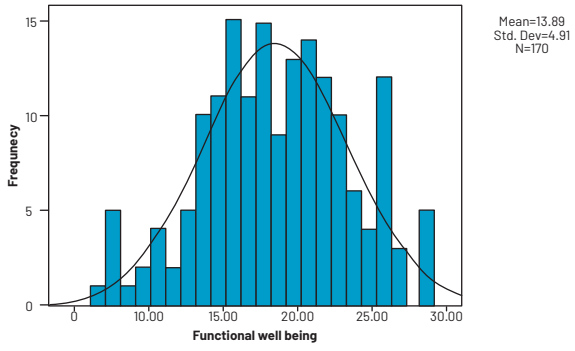

Figure 2: Histogram showing mean score for functional well-being in PMS females

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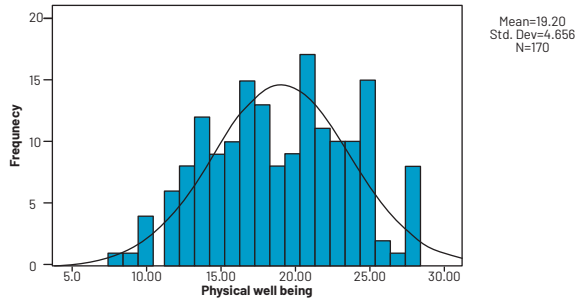

Figure 3: Histogram showing mean score for physical well-being in PMS females

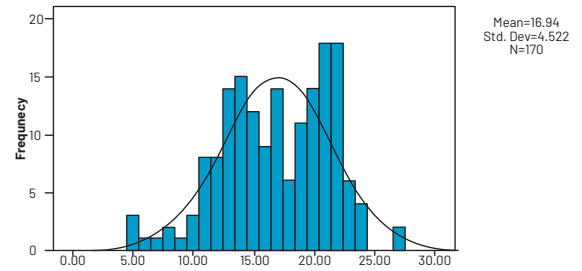

Figure 4: Histogram showing mean score for social well-being in PMS females

DISCUSSION

The purpose of this study was to define the impact of premenstrual syndrome and its special effects on the physical, functional and emotional, and social well-being of working women. To know the effect of PMS on quality of life PMS scale was used. A cross-sectional survey was conducted and 170 working women having PMS symptoms were studied. Erstwhile investigations explored that in the luteal period females can experience different and lot of indications. Females' daily schedules are usually affected because of these warning signs [16,17]. Different women can experience diverse symptoms. A lot of the female population doesn't know about the ailment and despite of management availability doesn't get any treatment which can upset both individuals and their family's life. The current study shows the almost same result and percentage of PMS symptoms in both populations. But the previous study by Arbabi M et al., in 2008 shows that as compared with healthy adolescents, those with PMS had a lower score of SF-36 in all the scales. PMS is associated with a significant burden on QOL in adolescents [18]. These symptoms can be enhanced with some reasonable workout and yoga exercises. The aerobics exercise helps to improve venous blood return which can lessen pain and uneasiness. A study done by SY Tsai in 2016 stated the importance of yoga in females and the positive impact it has on PMS symptoms. Nearly 80% of females had fewer symptoms of PMS [19]. The study found differences in PMS prevalence among groups with diverse physical activity levels and residences. The study also states that other than interventions related to PMS the interventions which are not related to PMS should be reflected to improve [20]. According to this study, different symptoms which are commonly seen in females with PMS are depression, anger, rejection sensitivity, headache, muscle pain, joint pains, hypersomnia or hyposomnia, bloating, breast pain, and swelling were common among the working women.

CONCLUSIONS

PMS significantly influenced daily activities related to professional and personal lives. Valid conclusions were drawn that PMS had a great impact on working women with behavioral and psychological symptoms.

REFERENCES

[1] Türkçapar AF, Türkçapar H. Diagnosis and treatment of premenstrual syndrome and premenstrual dysphoric disorder: A review. Journal of Clinical Psychiatry. 2011;14(4):241-53.

[2] Miyaoka Y, Akimoto Y, Ueda K, Ujiie Y, Kametani M, Uchiide Y et al. Fulfillment of the premenstrual dysphoric disorder criteria confirmed using a self-rating questionnaire among Japanese women with depressive disorders. Biopsychosoc Med. 2011 May 2;5:5. doi: 10.1186/1751-0759-5-5.

[3] Taşçı KD. Evaluation of nursing students' premenstrual symptoms. TAF Preventive Medicine Bulletin. 2006;5(6):434-43.

[4] 4. Consultation WH. Obesity: preventing and managing the global epidemic. World Health Organization technical report series. 2000;894:1-253.

[5] Polat A, Celik H, Gurates B, Kaya D, Nalbant M, Kavak E et al. Prevalence of primary dysmenorrhea in young adult female university students. Arch Gynecol Obstet. 2009 Apr;279(4):527-32. doi: 10.1007/s00404-008-0750-0.

[6] Derman O, Kanbur NO, Tokur TE, Kutluk T. Premenstrual syndrome and associated symptoms in adolescent girls. Eur J Obstet Gynecol Reprod Biol. 2004 Oct 15;116(2):201-6. doi: 10.1016/j.ejogrb.2004.04.021.

[7] Halbreich U, Backstrom T, Eriksson E, O'brien S, Calil H, Ceskova E et al. Clinical diagnostic criteria for premenstrual syndrome and guidelines for their quantification for research studies. Gynecol Endocrinol. 2007 Mar;23(3):123-30. doi: 10.1080/09513590601167969.

[8] Abbasi S, Tufail A, Kalyar J, Ahsan NA. Premenstrual syndrome in undergraduate medical students: hostellers versus dayscholars. Journal of Surgery Pakistan(International). 2015 Jul;20(3):82-6.

[9] Bhuvaneswari K, Rabindran P, Bharadwaj B. Prevalence of premenstrual syndrome and its impact

DOI: https://doi.org/10.54393/pbmj.v5i5.312

on quality of life among selected college students in Puducherry. Natl Med J India. 2019 Jan-Feb;32(1):17-19. doi: 10.4103/0970-258X.272109.

[10] Tkachenko LV, Kurushina OV, Atagadzhieva MS. The quality of life in women suffering from premenstrual syndrome. Probl Sotsialnoi Gig Zdravookhranenniiai Istor Med. 2010 Mar-Apr;(2):13-6.

[11] Morino S, Egawa M, Hirata H, Nishimura H, Aoyama T. Association between premenstrual syndrome and daily physical activity levels. J Womens Health Issues Care. 2016;5:2. DOI: 10.4172/2325-9795.1000241.

[12] Chung SH, Kim TH, Lee HH, Lee A, Jeon DS, Park J et al. Premenstrual syndrome and premenstrual dysphoric disorder in perimenopausal women. Journal of Menopausal Medicine. 2014 Aug 1;20(2):69-74. doi.org/10.6118/jmm.2014.20.2.69.

[13] Masoumi SZ, Ataollahi M, Oshvandi K. Effect of Combined Use of Calcium and Vitamin B6 on Premenstrual Syndrome Symptoms: a Randomized Clinical Trial. J Caring Sci. 2016 Mar 1;5(1):67-73. doi: 10.15171/jcs.2016.007.

[14] Hardy C, Hunter MS. Premenstrual Symptoms and Work: Exploring Female Staff Experiences and Recommendations for Workplaces. Int J Environ Res Public Health. 2021 Mar 31;18(7):3647. doi: 10.3390/ijerph18073647.

[15] Ducasse D, Jaussent I, Olié E, Guillaume S, Lopez-Castroman J, Courtet P. Personality Traits of Suicidality Are Associated with Premenstrual Syndrome and Premenstrual Dysphoric Disorder in a Suicidal Women Sample. PLoS One. 2016 Feb 10;11(2):e0148653. doi: 10.1371/journal.pone.0148653.

[16] Pazoki H, Bolouri G, Farokhi F, Azerbayjani MA. Comparing the effects of aerobic exercise and Foeniculum vulgare on pre-menstrual syndrome. Middle East Fertility Society Journal. 2016 Mar 1;21(1):61-4. doi.org/10.1016/j.mefs.2015.08.002.

[17] Purdue-Smithe AC, Manson JE, Hankinson SE, Bertone-Johnson ER. A prospective study of caffeine and coffee intake and premenstrual syndrome. Am J Clin Nutr. 2016 Aug;104(2):499-507. doi: 10.3945/ajcn.115.127027.

[18] Arbabi M, Shirmohammadi M, Taghizadeh Z, Mehran A. The effect of premenstrual syndrome on quality of life in adolescent girls. Iran J Psychiatry. 2008;3(3):105-109.

[19] Tsai SY. Effect of Yoga Exercise on Premenstrual Symptoms among Female Employees in Taiwan. Int J Environ Res Public Health. 2016 Jul 16;13(7):721. doi: 10.3390/ijerph13070721.

[20] Farrokh-Eslamlou H, Oshnouei S, Heshmatian B, Akbari E. Premenstrual syndrome and quality of life in Iranian medical students. Sex Reprod Healthc. 2015 Mar;6(1):23-7. doi: 10.1016/j.srhc.2014.06.009.

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Original Article

Methicillin-Resistant *Staphylococcus aureus* (MRSA) Epidemiology and Antibiotics Susceptibility Profile Isolated from Different Clinical Samples in Tertiary Care Hospital

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ABSTRACT

Staphylococcus aureus is a versatile bacterium that causes a wide range of diseases in humans and animals. **Objective:** To determine the occurrence and antibiotic sensitivity profiles of Methicillin-Resistant *Staphylococcus aureus* (MRSA) isolates directly from the clinical samples. **Methods:** Individuals from various subgroups of the District Peshawar provided three different clinical specimens that are pus, body fluids and blood. Plasma, Macconkey and Cysteine Lactose Electrolyte Deficient agar (CLED) agar were used to prepare each specimen in the usual method. Gram staining test, catalase, and coagulase were used to identify and confirm *S. aureus*. The conventional "Kirby-Bauer disc" diffusion method was used to confirm MRSA antibiotic resistance patterns to several antibiotics. **Results:** A maximum of 750 diagnostic samples were evaluated and 50 (6.37%) were found to be positive for MRSA, with 33 (72%) coming from pus samples, 9 (19%) from fluid samples, and 6 (12%) from blood samples. Males had a higher prevalence of MRSA strains (69%) than females (31%). Most MRSA strains were completely resistant to different type of antibiotics *e.g.* penicillin, oxacillin, and ampicillin, while remaining completely susceptible to linezolid, teicoplanin, & vancomycin. Other anti-microbials to which MRSA strains were resistant are ceftriaxone (78.88%), cefoxitin (65.55%), erythromycin (83.33%), clindamycin (72.22%), co-amoxiclav (76.66%), fusidic acid (67.77%), and gentamycin (83.33%) (74.4%). **Conclusions:** This study found that the frequency of MRSA in Pakhtunkhwa is lower in comparison to that reported in other regions of Pakistan. Moreover, because MRSA is multi-drug-resistant, culture sensitivity testing should be conducted to determine the best antibiotic to use to treat MRSA infection.

INTRODUCTION

Staphylococcus aureus is a human pathogen causing diseases ranging from minor skin and soft tissue infections to life-threatening sepsis [1]. It leads to increasing hospital and healthcare costs [2]. All these hospital-associated infections [3] and community associated infections [4] are caused by the bacterium. MRSA was initially reported in the United Kingdom in 1961 [5], and it has become more prevalent since then, presenting a significant diagnostic challenges [6]. "Methicillin-resistant" strains of S. aureus currently account for more than half of all S. aureus infections. Many infection sites have been linked to it, including the bones joints, bones, lungs, and the urinary

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bladder [7]. It can also cause bacteremia, which can result in endocarditis and osteomyelitis [7]. Body's skin and soft tissues are greatly affected by MRSA. Due to some genetic adaptations in MRSA, it has the ability to resist the large number of antibiotics such as β-lactams [8]. MRSA has increasingly received a lot of attention in the media. MRSA was termed the "superbug" by the American press in 2005 as it caused more deaths than AIDS [9]. In Trinidad, MRSA has shown complete resistance to erythromycin, gentamycin, penicillin, ceftriaxone and ampicillin [10]. In various Latin American nations, like Mexican (penicillin & oxacillin), Brazil (penicillin), & Chilean (penicillin), similar findings were observed for penicillin and oxacillin among MRSA (oxacillin & penicillin) [11]. MRSA is becoming increasingly common around the world. More than half of all suppurative skin infections in 11 US metropolitan locations were caused by community associated MRSA [12]. In 2002, a published study revealed the prevalence of MRSA in some of Pakistan's big cities, such as Karachi (57%), Lahore (61%), Rawalpindi (46 %), Sukkur (2 %), Quetta (26 %), Azad Kashmir (32 %), and Peshawar (36%) [13]. In several of these cities, such as Karachi (43% in 2007 and 38.6% in 2010) [14] and Lahore (27.77% and 34.7%) [14], following studies, indicated a considerable decline in MRSA prevalence. The frequency of MRSA in District Peshawar was established, and the anti-microbial resistance of MRSA isolated from blood, pus, and fluids was tested. In comparison to previous publications, these findings suggest a decreased prevalence rate of MRSA in Peshawar.

METHODS

Samples such as pus, bodily fluid, & blood were obtained and sent to the microbiological section of the city Laboratory Peshawar, Pakistan, between October 2018 and September 2019. The 750 total samples were processed for MRSA isolation from patients across the Peshawar District. A proforma was filled out when taking blood samples to obtain the heath information from all the candidates and consents were signed. In order to culture the blood samples, different growth media were selected e.g. MacConkey agar, Blood agar as well as Cysteine Lactose Electrolyte Deficient agar (CLED). By using the sterile inoculating loop, each sample was inoculated on different selected Medias. The incubation temperature of 37 °C for 24 hours was given to grow the bacterial colonies. Standard operational procedures were used to further process positive samples for identification. After that Gram-negative bacteria and gram-positive bacteria were differentiated by the use of gram staining. Chemical studies, such as the catalase and coagulase tests, were used to establish the presence of *Staphylococcus aureus.*

For Methicillin Resistance Detection: MRSA was identified using an oxacillin screening plate in accordance with National Committee for Clinical Laboratory Standards (NCCLS). With the use of sterile swabs, a suspension equivalent to 0.5 McFarland standards was inoculated smoothly on the surface of the Mueller-Hinton agar plate (Oxoid-UK) containing 4% of NaCl and 6g/mL of oxacillin. Every one of the plates was incubated overnight for 24 hours at 35°C. The isolates were recognized as oxacillin or methicillin-resistant after showing signs of growth (>1 colonies).

Testing for Antibiotic Susceptibility: The Kirby-Bauer disc diffusion method was used to verify MRSA antibiotic resistance patterns to several antibiotics. Muller-Hinton agar was prepared and sterilized in autoclave for 15 minutes at 121°C. To ensure sterility, 25 mL of media was placed onto 90mm sterile Petri dishes and then incubated at 37°C for overnight. Antimicrobial sensitivity was tested for all clinical isolates of MRSA using standard doses of "ampicillin, co-amixoclav, penicillin, ceftriaxone, erythromycin, oxacillin, clindamycin fusidic acid, linezolid, cefoxitin, gentamycin teicoplanin, and vancomycin". After an 18-hour incubation period at 37°C, the plates were analyzed for zones of inhibition and classified as resistant, moderate, or sensitive, according to the national council for controlling lab guidelines.

RESULTS

The Prevalence of MRSA in District Peshawar Between has been observed from October 2018 to September 2019. For MRSA isolation, the examination of 750 specific clinical samples was carried out. A total of 50 samples (6.37%) were tested positive for MRSA Table 1. As a result, 32 (67%) of the 50 positive MRSA samples belonged to males, whereas 15(32%) belonged to females. 36(72%) of the MRSA positive samples occurred from pus tests, 9 (19%) from fluids, and 6 (12%) from blood samples.

MRSA +ve	Males	Females	pus	fluids	blood
50	32(70%)	15 (32%)	33 (72%)	9 (19%)	6 (12%)

Table 1: MRSA Isolates Distribution

MRSA Antibiotic Susceptibility Profile: "Total resistance to oxacillin, ampicillin, and penicillin was shown in all MRSA isolates, while complete sensitivity to vancomycin, teicoplanin, and linezolid was observed". Other antimicrobials resistant to these MRSA strains were Ceftriaxone (88.88%), Cefoxitin (65.55%), Erythromycin (83.33%), Clindamycin (72.22%), Co-Amoxiclav (76.66%), Fusidic acid (67.77%), and Gentamycin (73.22%) (Table 2).

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Selected antibiotics	Sensitivity (%)	Resistance (%)	Intermediate (%)
Penicillin	0 0	50 100	0 0
Ampicillin	0 0	50 100	0 0
Cefoxitin	05 09	30 65.5	12 27.8
Ceftriaxone	04 07	36 78	8 16.7
Clindamycin	09 19	33 72.22	6 12.12
Erythromycin	06 12	38 83.3	4 7.8
Co amoxiclav	07 14	35 76.6	6 12.12
Oxacillin	0 0	50 100	0 0
Gentamycin	06 12	34 74.4	8 16.7
Fusidic acid	10 03	31 67.8	31 67.8
Telcopanlani	50 10	0 0	0 0
Linezolid	050 100	0 0	0 0
Vancomycin	50 100	0 0	0 0

Table 2: The sensitivity profiles of MRSA to different antibiotics

DISCUSSION

In comparison to earlier findings on MRSA, bacterial prevalence in Pakistan and around the world, the MRSA frequency detected in this study is relatively low. In Pakistan, MRSA prevalence rates vary significantly, from 2-61% [15] and globally [16]. Meanwhile, MRSA in Peshawar exhibits significant resistance to several antibiotics, which is consistent with recent data on the chemotherapy activity of different antimicrobial drugs against MRSA. Methicillin-resistant S. aureus prevalence in Peshawar is lower than in past which reports from "Rawalpindi (60%) [16], Johannesburg, and Cape Town, South Africa's major cities (33–43%) [16], eastern Uttar Pradesh, India (54.85%) [16], California (86.3%) [17], Kuwait (32%), Sudan (33%), Iran (35%), and Russia (36%)" [18]. MRSA prevalence rates in European countries are as follows: "Austria 8.8%, Bulgaria 33.9%, Croatia 36.7%, Belgium 23.6%, Denmark 0.6%, Estonia 0.9%, France 33.1%, Hungary 7.1%, Iceland 0.5%, Ireland 41.2%, Czech Republic 5.9%, Israel 38.4%, Italy 40.9%, Germany 13.8% and Luxembourg 40.9%" [6]. The Linezolid, Teicoplanin, and Vancomycin [19] all had excellent antimicrobial action against MRSA and also no resistant MRSA strains were found in this investigation. While similar findings for Vancomycin, Teicoplanin, and Linezolid [20] have been obtained in various regions of Pakistan. While similar findings for vancomycin [21], Teicoplanin [22], and Linezolid [22] have been obtained in various regions of Pakistan. Ampicillin, Oxacillin, and Penicillin resistance were found in all MRSA strains, and no treatment effectiveness against MRSA infections was found. In some of Pakistan's biggest cities, similar results have been observed. Penicillin and Oxacillin and are completely ineffective against MRSA [22,23]. MRSA has also been found to be resistant to penicillin and oxacillin in Latin American nations such as Mexico (oxacillin and penicillin), and Brazil (penicillin) [15]. Ampicillin resistance has been documented at a high level in Nepal and India [19]. The aminoglycoside, gentamycin had weak effectiveness on MRSA, with 73% resistance. Other parts of Pakistan have shown varying degrees of gentamycin resistance, including Karachi (96%), Pakistan Institute of Medical Sciences hospital Islamabad (100%), Kohat (67%) and 76% in Islamabad [14]. Ceftriaxone, a 3rd generation cephalosporin antibiotic, has a significant degree of resistance (78.88%) in the present study, which is higher than the 45% found in Karachi [20], but lower than that found in Trinidad and Tobago, where MRSA is entirely susceptible to ceftriaxone. The antibiotics of 2nd generation cephalosporin, such as Ceftriaxone has a significant degree of resistance (78.88%) in the present study, which is higher than the 45% found in Karachi, but lower than that found in Trinidad, where MRSA is entirely susceptible to ceftriaxone [11]. The considerable resistance of MRSA to Fusidic acid (66.66%) has been observed more than 20% in Islamabad and 2% in Karachi [18], however, it is less than the previous reports (95.7%) in Riyadh Saudi Arabia". In most countries, therefore, fusidic acid is the medication of choice [11]. Clindamycin resistance is seen in 71% of MRSA strains. A stronger resistance (98.5%) to a lincosamide antibiotic has been documented in Karachi. However, in the United Kingdom (18%) and Russia, there is less resistance (27%) [24]. The overall prevalence of MRSA is greater in males 32 out of 50 (70%) than in females 15 out of 50, according to the current study is 32%. In Peshawar, Rahman et al., found a higher incidence of MRSA in men (59%) than females (42%) in 2009 [13]. Males have an increased rate of MRSA prevalence than females, according to Tiemersma et al. [25], however girls 14/25 (60.86%) had a greater rate of MRSA prevalence than males 9/25 (39.13%) in India, according to S. Sharma and A. Mall. Most MRSA infections were detected in pus samples (72%) while the lowest level of MRSA strains was found in blood samples (12%). India, European countries, and Pakistan have all shown similar findings [26]. For such preventive and control of MRSA infections, preventive measures should be implemented. "Cleanliness comes second only to Godliness." Hands should be cleansed with soap on a regular basis and the environment should be maintained clean. Self-medication should be discouraged, and the mob should be made aware of the situation. For MRSA infections, appropriate antibiotic susceptibility tests should be performed. "Colonized/infected patients should be isolated" and treated accordingly. In this study, linezolid, teicoplanin, and vancomycin had the best chemotherapeutic activity against MRSA infections, with their limited use of antibiotic susceptibility tests

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CONCLUSIONS

The occurrence of MRSA in District Peshawar has been shown to be lower than in earlier studies. The most effective chemotherapeutic agents against MRSA infections were vancomycin, teicoplanin, and linezolid. To minimize MRSA resistance to these medications and the spreading of MRSA in District Peshawar, appropriate preventive

REFERENCES

[1] Thati V, Shivannavar CT, Gaddad SM. Vancomycin resistance among methicillin resistant Staphylococcus aureus isolates from intensive care units of tertiary care hospitals in Hyderabad. Indian J Med Res. 2011 Nov;134(5):704-8. doi: 10.4103/0971-5916.91001.

[2] Waitayangkoon P, Thongkam A, Benjamungkalarak T, Rachayon M, Thongthaisin A, Chatsuwan T et al. Hospital epidemiology and antimicrobial susceptibility of isolated methicillin-resistant Staphylococcus aureus: a one-year retrospective study at a tertiary care center in Thailand. Pathog Glob Health. 2020 May 18;114(4):212-217. doi: 10.1080/20477724.2020.1755550.

[3] Shahkarami F, Rashki A, Rashki Ghalehnoo Z. Microbial Susceptibility and Plasmid Profiles of Methicillin-Resistant Staphylococcus aureus and Methicillin-Susceptible S. aureus. Jundishapur J Microbiol. 2014 Jul;7(7):e16984. doi: 10.5812/jjm.16984.

[4] Indian Network for Surveillance of Antimicrobial Resistance (INSAR) group, India. Methicillin resistant Staphylococcus aureus (MRSA) in India: prevalence & susceptibility pattern. Indian J Med Res. 2013 Feb;137(2):363-9.

[5] Amorim ML, Faria NA, Oliveira DC, Vasconcelos C, Cabeda JC, Mendes AC et al. Changes in the clonal nature and antibiotic resistance profiles of methicillin-resistant Staphylococcus aureus isolates associated with spread of the EMRSA-15 clone in a tertiary care Portuguese hospital. J Clin Microbiol. 2007 Sep;45(9):2881-8. doi: 10.1128/JCM.00603-07.

[6] Tiwari HK, Das AK, Sapkota D, Sivrajan K, Pahwa VK. Methicillin resistant Staphylococcus aureus: prevalence and antibiogram in a tertiary care hospital in western Nepal. J Infect Dev Ctries. 2009 Oct 22;3(9):681-4. doi: 10.3855/jidc.86.

[7] Hussain MS, Naqvi A, Sharaz M. Methicillin Resistant Staphylococcus aureus (MRSA);: Prevalence And Susceptibility Pattern Of Methicillin Resistant Staphylococcus aureus (MRSA) Isolated From Pus In Tertiary Care Of District Hospital Of Rahim Yar Khan. The Professional Medical Journal. 2019 Jan 10;26(01):1227.doi.org/10.29309/TPMJ/2019.26.01.2510.

[8] Rongpharpi SR, Hazarika NK, Kalita H. The prevalence of nasal carriage of Staphylococcus aureus among healthcare workers at a tertiary care hospital in assam with special reference to MRSA. J Clin Diagn Res.2013Feb;7(2):25760.doi:10.7860/JCDR/2013/4320.2741.

[9] Rahimi F. Characterization of Resistance to Aminoglycosides in Methicillin-Resistant Staphylococcus aureus Strains Isolated From a Tertiary Care Hospital in Tehran, Iran. Jundishapur J Microbiol. 2016 Jan 2;9(1):e29237. doi: 10.5812/jjm.29237.

[10] Inomata S, Yano H, Tokuda K, Kanamori H, Endo S, Ishizawa C et al. Microbiological and molecular epidemiological analyses of community-associated methicillin-resistant Staphylococcus aureus at a tertiary care hospital in Japan. J Infect Chemother. 2015 Oct;21(10):729-36. doi: 10.1016/j.jiac.2015.07.005.

[11] Rajaduraipandi K, Mani KR, Panneerselvam K, Mani M, Bhaskar M, Manikandan P. Prevalence and antimicrobial susceptibility pattern of methicillin resistant Staphylococcus aureus: a multicentre study. Indian J Med Microbiol. 2006 Jan;24(1):34-8. doi: 10.4103/0255-0857.19892.

[12] Bhatt MP, Bhalla GS, Kundan T, Jindamwar P, Chaudhari CN, Sahni NG. Antimicrobial susceptibility profile of methicillin-resistant Staphylococcus aureus at a tertiary care centre. Archives Of Clinical Microbiology. 2015;6(3):0-.

[13] Khan RA, Rahman AU, Ahmad A, Jaseem M, Jabbar A, Khan SA et al. Prevalence and antibiotic susceptibility profile of methicillin-resistant Staphylococcus aureus (MRSA) isolated from different clinical samples in district Peshawar. J Appl Environ Biol Sci. 2014;4(8S):40-6.

[14] Khan AA, Ali A, Tharmalingam N, Mylonakis E, Zahra R. First report of mecC gene in clinical methicillin resistant S. aureus (MRSA) from tertiary care hospital Islamabad, Pakistan. J Infect Public Health. 2020 Oct;13(10):1501-1507. doi: 10.1016/j.jiph.2020.05.017.

[15] Bari F, Wazir R, Haroon M, Ali S, Ali I, Rahman H et al. Frequency and antibiotic susceptibility profile of MRSA at lady reading hospital, Peshawar. Gomal Journal of Medical Sciences. 2015 Mar 31;13(1).

[16] Preeja PP, Kumar SH, Shetty V. Prevalence and Characterization of Methicillin-Resistant

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Staphylococcus aureus from Community- and Hospital-Associated Infections: A Tertiary Care Center Study. Antibiotics (Basel). 2021 Feb 18;10(2): 197. doi: 10.3390/antibiotics10020197.

[17] Shittu AO, Lin J. Antimicrobial susceptibility patterns and characterization of clinical isolates of Staphylococcus aureus in KwaZulu-Natal province, South Africa. BMC Infect Dis. 2006 Jul 28;6:125. doi: 10.1186/1471-2334-6-125.

[18] Omuse G, Kabera B, Revathi G. Low prevalence of methicillin resistant Staphylococcus aureus as determined by an automated identification system in two private hospitals in Nairobi, Kenya: a cross sectional study. BMC Infect Dis. 2014 Dec 14;14:669. doi: 10.1186/s12879-014-0669-y.

[19] Fatholahzadeh B, Emaneini M, Gilbert G, Udo E, Aligholi M, Modarressi MH et al. Staphylococcal cassette chromosome mec (SCCmec) analysis and antimicrobial susceptibility patterns of methicillin-resistant Staphylococcus aureus (MRSA) isolates in Tehran, Iran. Microb Drug Resist. 2008 Sep;14(3):217-20. doi: 10.1089/mdr.2008.0822.

[20] Mahmood K, Tahir M, Jameel T, Ziauddin A, Aslam HF. Incidence of Methicillin-resistant Staphylococcus aureus (MRSA) causing nosocomial infection in a Tertiary Care Hospital. Annals of King Edward Medical University. 2010;16(2):91-.doi.org/10.21649/akemu.v16i2.188.

[21] Pai V, Rao VI, Rao SP. Prevalence and Antimicrobial Susceptibility Pattern of Methicillin-resistant Staphylococcus aureus [MRSA] Isolates at a Tertiary Care Hospital in Mangalore, South India. J Lab Physicians. 2010 Jul;2(2):82-4. doi: 10.4103/0974-2727.72155.

[22] Taj Y, Abdullah FE, Kazmi SU. Current pattern of antibiotic resistance in Staphylococcus aureus clinical isolates and the emergence of vancomycin resistance. J Coll Physicians Surg Pak. 2010 Nov;20(11):728-32.

[23] Kim HB, Jang HC, Nam HJ, Lee YS, Kim BS, Park WB et al. In vitro activities of 28 antimicrobial agents against Staphylococcus aureus isolates from tertiary-care hospitals in Korea: a nationwide survey. Antimicrob Agents Chemother. 2004 Apr;48(4):1124-7. doi: 10.1128/AAC.48.4.1124-1127.2004.

[24] Alfouzan W, Udo EE, Modhaffer A, Alosaimi A. Molecular Characterization of Methicillin- Resistant Staphylococcus aureus in a Tertiary Care hospital in Kuwait. Sci Rep. 2019 Dec 6;9(1):18527. doi: 10.1038/s41598-019-54794-8.

[25] Tiemersma EW, Bronzwaer SL, Lyytikäinen O, Degener JE, Schrijnemakers P, Bruinsma N et al. Methicillin-resistant Staphylococcus aureus in Europe, 1999-2002. Emerg Infect Dis. 2004 Sep;10(9):1627-34. doi: 10.3201/eid1009.040069.

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Original Article

Occurrence and Distribution of Diabetes Mellitus in Mardan, Pakistan

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ABSTRACT

Diabetes Mellitus (DM) is a metabolic disorder which is described by chronic hyperglycemia due to faulty insulin secretion. Metabolism of lipids, carbohydrates and proteins are disturbed in DM **Objective:** To assess the occurrence and distribution of diabetes mellitus in Mardan, Pakistan **Methods:** It is a cross-sectional, survery-based study conducted at District Headquarter Hospital Mardan, Khyber Pakhtunkhwa. The detailed information about age and gender of the patients was collected. Blood glucose level was detected by Glucose oxidase test. **Results:** The overall prevalence of DM was found as 50.4%. DM was found dominant in females (52%) as compared to males (48%). Moreover, the age groups of 30-40 years were most affected. Fasting blood sugar (FBS) range was high in the age of 10-20 years and Random blood sugar (RBS) range was high in the age of 40 years and above. **Conclusions:** It is concluded that DM is most commonly found in females and the age group of 30-40 years is more affected. FBS range was high in the age group of 10-20 years and RBS range was high in the age of 40 years and above.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder in which the digestion of lipids, carbohydrates and proteins are affected due to insulin deficiency or dysregulation of its secretion [1,2]. Furthermore, polyuria in which a person urinates frequently, polydipsia in which thirst is increased and polyphagia in which hunger is increased are the conditions associated with DM. It is the main cause of disability and death in main population of the world as declared by the International Diabetes Federation (IDF) and World Health Organization (WHO) [3]. WHO indicated that in 2030, DM will be the 7th leading cause of death [2]. DM was first recognized by the Egyptians and is characterized by weight reduction and polyuria. Later on a Greek physician Aertaeus gave it the term Diabetes mellitus. In Greek, diabetes means "to go through" and mellitus means honey referring to sweet taste [4]. In 1500 BC a Hindu scholar for the first time reported diabetes in his writing. They had defined that it is a dangerous disease that causes thirst, huge amount of urine and the urine of an effected person are more attracted by flies and ants [5]. The movement of glucose in the cells is maintained by Insulin hormone. In Type1 diabetes the body is not capable to make enough insulin which controls the blood sugar level. Earlier it was also called insulin-dependent diabetes or juvenile diabetes [6]. Type1 diabetes mellitus (T1DM), also identified as autoimmune diabetes, in which pancreatic β-cell are loss

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due to insulin deficiency that leads to hyperglycemia in which the insulin level decreases in plasma and the patients do not receive insulin from outside which is known as ketoacidosis. In early stages of DM type 1, there is enough insulin in the body of patients and they have no need to take insulin which lower the danger of ketoacidosis [7]. Type 2 DM also known as non-insulin dependent DM is the most common form of DM considered by insulin resistance, hyperglycemia, and relative insulin deficiency [8]. It is a long lasting condition that affects the process of metabolism of glucose, which acts as main source of fuel in the body. Similarly, in DM type 2 case the body does not produce insulin or either show resistance to the effect of insulin which maintain normal glucose level in individual body. However, the pancreas has some ability to produce insulin but it does not fulfill the basic needs of the body in DM type 2 and also the body cell shows resistant in action to insulin. It mostly affects the elder peoples mainly at the age of 40 years. It should be treated on time if not so later on it may be leads to ketoacidosis [9]. Gestational diabetes mellitus (GDM) is defined as a glucose intolerance resulting in hyperglycemia which causes major problems during pregnancy [10]. About more than 2000,000 cases are reported annually and about 7% of them are the results of GDM. The prevalence of all pregnancies may range from 1 to 14%, that depends on population and diagnostic test studies [11]. It is found all over the world including rural parts of low- and middle-income countries. According to IDF about 1.1 million children and teenagers of 14-19 years are suffering with T1DM. If no proper measures have been taken to stop the increase in DM, there will be more chances about 629 million people living with the disease. About 4 million deaths occur annually due to high blood glucose, and the assessments of IDF predicted that the annual global health care spending was US$ 850 billion in 2017 diabetes among adults (WHO, 2019). In 2015 about 415 million of adults had diabetes and the rate of increase in people is increasing day by day which will be rise to 642 million in 2040 as estimated by IDF. Among these over 60% of people with diabetes live in Asia, ranging from 3% to 47.3% of prevalence across countries. More number of cases of diabetes is reported in Thailand. More than 200,000 deaths annually among the Thai population are due to chronic non-communicable diseases, and about 30,000 deaths are due to diabetes, a leading cause of death in Thailand [12]. In Pakistan the prevalence of number of diabetic peoples has increased. The prevalence of diabetes in Pakistan is more than 6.5 million according to World Health Organization. The number of affected people will grow to 11.5 million in 2025 until measure are taken for the control of disease [13]. The prevalence of diabetes mellitus in Pakistan is 11.77%. Males are affected more about (11.20%) while (9.19%) are females. In urban areas the prevalence is high 14.81% as compared to rural areas i.e., 10.34% [14]. In 2017, Pakistan ranks 10 out of 221 countries having 7.5 million cases of diabetes (20–79 years). Since 1947 three national diabetes surveys have been conducted in Pakistan. The combined data of first national diabetes survey of Pakistan (NDSP-I) was published in 2007 and it was conducted in four phases (1995-98). The total number of subjects (n = 5433) in NDSP-I combined data was higher than the sum of subjects examined in four individual studies. So, the prevalence of DM predicted in NDSP-I was under- reported. In 2016-17 the second national diabetes survey of Pakistan (NDSP-II) was reported and similarly, in 2017 the third diabetes prevalence survey of Pakistan (DPS-PAK) was conducted. Although at the same time both the survey was conducted so the prevalence rate was (26.3 vs.16.98%). Also in Pakistan in the prevalence of DM varied between 0.95% and 32.9% according to the regional diabetes survey in the last two decades [15]. Almost nine million cases of diabetes are estimated in Pakistan with nearly 11.7% in the Khyber Pakhtunkhwa [16]. The number of diabetics in Pakistan is estimated to be almost nine million, National Diabetes Survey of Pakistan was completed from 1994-1998, which indicated the prevalence of diabetes as 8.7% which rose to 26.3% in 2017. KPK has the lowest prevalence with 13.2% [17].

METHODS

This study was conducted in different areas of district Mardan in Khyber Pakhtunkhwa province of Pakistan. The total area of district Mardan lies from 34° 05' to 34° 32' at north latitudes and 71" 48' to 72° 25' east longitudes. It is surrounded by Buner district and Malakand protected area from the north, on the east by Swabi and Buner districts, Nowshera district from the south and on the west by Charsadda district and Malakand protected area. The total area of the district is 1632 square kilometers. A Total of 250 blood samples were collected from Mardan District Head Quarter (DHQ) hospital and different medical centers. Glucose oxidase test was used as a diagnostic test for diabetes in pathology lab of District Headquarter Hospital (DHQ). Materials used in this study were Glucose reagent, Glucose standard, test tube, gloves, adjustable juster, distal water, 1ml sugar reagent, 10µl patient serum, Chemistry analyzer, Centrifuge, Micro pipette.In this procedure blood taken from the patients was first centrifuged at 3000 rpm for 4 minutes, at 25oC. The serum was separated from RBCs. About 10µl of serum was transferred to Eppendorf tube to which 1µl of glucose reagent, 10µl of Glucose standard and 10µl distilled water were added. All the contents were mixed well and kept for 10 minutes at room temperature. The blood glucose level was

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analyzed through UV spectrophotometric technique [18]. The data was analyzed through software (SPSS Version 17), calculation were done for frequencies, percentage and ratio. For testing significances of frequencies between the groups T test was used. P value is < 0.05 was considered as statistically significant.

RESULTS

The total prevalence of DM in district Mardan was 50.4%. Total 250 samples were collected out of these 126 (50.4%) samples were positive and 124 (49.6%) were negative cases (Table 1). The number of males were 61 (48%) and the remaining 65 (52%) were females (Table 2). Table 3 reveals that mean-prevalence of diabetes among male and female; 0.4552 (male) and 0.5603 (female). This means that prevalence of diabetes is higher in female as compared to male. The table reveals that F-statistic of Levene's test is insignificant, so the variance of the two groups (male/female) is equal; hence results of t-test provided in the first row are valid. Respective t-statistic = -1.660 and its p-value = 0.098 suggest that the mean prevalence of diabetes statistically significantly differ among the male and female. The results revealed 7 (5%) were positive cases in the age of 1-10 years, 11 (9%) were positive cases in the age of 10-20 years, 30 (24%) were positive cases in the age of 20-30 years, 45 (36%) were positive cases in the age of 30-40 years, 33 (26%) were positive cases in the age of 40 years and above (Table-4). FBS and RBS level of positive 126 cases were monitored and categorized according to age groups. The FBS range in low age group i.e. 1-10 years was115-120 mg/dl however RBS range was 140-155 mg/dl. Similarly, at the age of 10-20 years, FBS range was 118-128 mg/dl and RBS range was 160-177 mg/dl. At the age of 20-30 years, FBS range was 121-127 mg/dl and RBS range was 159-181 mg/dl, at the age of 30-40 years, FBS range was 114-121 mg/dl and RBS range was 162-182 mg/dl. FBS range was 113-127 mg/dl and RBS range was 163-189 mg/dl in the age of 40 years and above (Table 5).

Total samples	Positive cases (n)	Positive case (%)	Negative cases (n)	Negative case (%)
250	126	50.4	124	49.6

Table 1: Overall prevalence of diabetes in District Mardan

Gender	Total	Positive case (n)	Prevalence of diabetes (%)
Male	126	61	48
Female	126	65	52

Table 2: Gender wise prevalence of diabetes in District Mardan

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Diabetic	Equal variances assumed	.242	.623	-1.660	248	.098	-.10512	.06331	-.22982	.01958
	Equal variances not assumed			-1.661	243.082	.098	-.10512	.06330	-.22981	.01957

Table 3: Result of Independent Samples t-Test

Age wise(Years)	Total	Positive case (n)	Prevalence of diabetes (%)
1-10	126	7	5
10-20	126	11	9
20-30	126	30	24
30-40	126	45	36
40 and above	126	33	26

Table 4: Age Wise Prevalence of diabetes in district Mardan

Age wise(Years)	Total	Positive case (n)	FBS range (mg/Dl)	RBS range (mg/Dl)
1-10	126	7	115-120	115-120
10-20	126	11	118-128	118-128
20-30	126	30	121-127	121-127
30-40	126	45	114-121	114-121
40 and above	126	33	113-127	113-127

Table 5: Age wise FBS and RBS level in District Mardan

DISCUSSION

Diabetes is the major problem all over the world in every population and regions, with rural parts of low- and middle-income countries. National Diabetes Survey of Pakistan from 1994-1998 showed the prevalence of DM to be 8.7% which rose to 26.3% in 2017. This study showed prevalence of DM as 50.4% in district Mardan being more prevalent in female as compared to male. These results are against Basit [19]. whose findings show prevalence of DM to be more in male. The current examination shows DM was more prevalent in age group 30-40 (36%) as compared to younger and old age groups. These findings are in contrast to Jawad's [20]. who found high prevalence in the age of 25 years whereas Parveen and Ahmad [3] found DM to be more prevalent at the age of 31-45 years. Similarly, a study done in China by Yang and Weng [21] showed DM to be more prevalent in age group 60 years and above. FBS range was high in the age of 10-20 years. However, there was exception in case of Rehman [22] whose study showed FBS range to be high in the age of 31-40 years. The RBS range was high in the age of 40 years and above. The present study support another study conducted by Zekewos [23]. According to their study RBS range was high in the age of 40 years and above. This study is also supported by Ruhemebe study [24] that showed the prevalence was high

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in females. Furthermore, the study conducted by Hayat is also in support of this study [25]. According to his study diabetes were more in females as compared to males. This examination is likewise upheld by another investigation Laakso and Pyorala [26], which demonstrated that prevalence of DM at above age 50 as 73%.

CONCLUSIONS

It is concluded from this study that the overall prevalence rate of diabetes was observed as 50.4%. It was observed that generally diabetes was found more commonly in female population as compared to male, it may be due to lack of physical activity or high stress level in females. The prevalence of diabetes at age 30-40 years' age group was high as compared to younger and older age groups. The prevalence of FBS range was high in the age of 10-20 years and RBS range was high in the age of 40 and above years as compared to other age groups.

REFERENCES

[1] Gao Y, Wang Y, Zhai X, He Y, Chen R, Zhou J, et al. Publication trends of research on diabetes mellitus and T cells (1997–2016): A 20-year bibliometric study. PloS one. 2017;12(9):e0184869. doi.org/10.1371/journal.pone.0184869

[2] Karamanou M, Protogerou A, Tsoucalas G, Androutsos G, Poulakou-Rebelakou E. Milestones in the history of diabetes mellitus: The main contributors. World journal of diabetes. 2016;7(1):1.doi.org/10.4239/wjd.v7.i1.1

[3] Parveen K. Studies on The Efficacy and Therapeutic Poential of Some Herbal Drugs In The Treatment of Diabetes Mellitus In The Rat.

[4] Kaul K, Tarr JM, Ahmad SI, Kohner EM, Chibber R. Introduction to diabetes mellitus. Diabetes: Springer.2013;1-11.doi.org/10.1007/978-1-4614-5441-0_1

[5] Das AK, Shah S. History of diabetes: from ants to analogs. J Assoc Physicians India. 2011;59 (Suppl):6-7.

[6] Inzucchi SE, Sherwin RS. Type 2 diabetes mellitus. Cecil Medicine 24th ed Philadelphia, Pa: Saunders Elsevier 2011. doi.org/10.1016/B978-1-4377-1604-7.00562-5

[7] Katsarou A, Gudbjörnsdottir S, Rawshani A, Dabelea D, Bonifacio E, Anderson BJ, et al. Type 1 diabetes mellitus. Nature reviews Disease primers. 2017;3(1):1-17. doi.org/10.1038/nrdp.2017.16

[8] Olokoba AB, Obateru OA, Olokoba LB. Type 2 diabetes mellitus: a review of current trends. Oman medical journal. 2012;27(4):269. doi.org/10.5001/omj.2012.68

[9] Kharroubi AT, Darwish HM. Diabetes mellitus: The epidemic of the century. World J Diabetes. 2015 Jun 25;6(6):850-67. doi: 10.4239/wjd. v6. i6.850.

[10] Baz B, Riveline J-P, Gautier J-F. Gestational diabetes mellitus: definition, aetiological and clinical aspects. Eur J Endocrinol. 2016;174(2):R43-51.doi.org/10.1530/EJE-15-0378

[11] American Diabetes Association. Gestational diabetes mellitus. Diabetes Care. 2004 Jan;27 Suppl 1: S88-90. doi: 10.2337/diacare.27. 2007.s88.

[12] Aekplakorn W, Chariyalertsak S, Kessomboon P, Assanangkornchai S, Taneepanichskul S, Putwatana P. Prevalence of diabetes and relationship with socioeconomic status in the Thai population: National Health Examination Survey, 2004–2014. Journal of diabetes research 2018. doi.org/10.1155/2018/1654530

[13] Zuhaid M, Zahir KK, Diju IU. Knowledge and perceptions of diabetes in urban and semi urban population of Peshawar, Pakistan. Journal of Ayub Medical College Abbottabad. 2012;24(1):105-8.

[14] Uzma Hassan A, Khurshid WAN. Awareness of Diabetes Mellitus and Associated Factors in Diabetic Patients; Visiting Rawal General and Dental Hospital Islamabad. population Research. 2018;4:11.

[15] Adnan M, Aasim M. Prevalence of type 2 diabetes mellitus in adult population of pakistan: a meta-analysis of prospective cross-sectional surveys. Annals of Global Health. 2020;86(1).doi.org/10.5334/aogh.2679

[16] Ullah M, Mehmood S, Ali M, Bussmann RW, Aldosari A, Khan RA, et al. An ethnopharmacological study of plants used for treatment of diabetes in the Southern and Tribal regions of Khyber Pakhtunkhwa province, Pakistan. Ethnobotany Research and Applications. 2019;18:1-20.doi.org/10.32859/era.18.8.1-20

[17] Rafiullah AR, Khan K, Ali A, Khan A, Sajid A, Khan N. Prevalence of Theileria Parva in large ruminants through conventional and molecular techniques in district Lakki Marwat and Peshawar (Pakistan). Sarhad Journal of Agriculture. 2019;35(2):320-9.

[18] Mashal S. prevalence and different comorbidities linked to diabetic patients in dera ismail khan, khyber pakhtunkhwa, pakistan. 2019.

[19] Badruddin N, Basit A, Hydrie MZI, Hakeem R. Knowledge, attitude and practices of patients visiting a diabetes care unit. Pakistan Journal of Nutrition. 2002;1(2):99-102. doi.org/10.3923/pjn.2002.99.102

[20] Jawad F. Diabetes in Pakistan. Diabetes voice. 2003;48(2):12-4.

[21] Yang W, Lu J, Weng J, Jia W, Ji L, Xiao J, et al. Prevalence of diabetes among men and women in

DOI: https://doi.org/10.54393/pbmj.v5i5.313

China. New England journal of medicine. 2010;362(12):1090-101. doi.org/10.1056/NEJMoa0908292

[22] Rahman S, Ismail AA-S, Ismail SB, Naing NN, Rahman ARA. Effect of rosiglitazone/ramipril on preclinical vasculopathy in newly diagnosed, untreated diabetes and IGT patients: 1-year randomised, double-blind, placebo-controlled study. European journal of clinical pharmacology. 2007;63(8):733-41. doi.org/10.1007/s00228-007-0315-3

[23] Zekewos A, Loha E, Egeno T, Wubshet K, Merga Z. Prevalence of diabetes mellitus and associated factors in Southern Ethiopia: a community based study. Ethiopian Journal of Health Sciences. 2018;28(4).doi.org/10.4314/ejhs.v28i4.11

[24] Ruhembe CC, Mosha TC, Nyaruhucha CM. Prevalence and awareness of type 2 diabetes mellitus among adult population in Mwanza city, Tanzania. Tanzania journal of health research. 2014;16(2). doi.org/10.4314/thrb.v16i2.4

[25] Hayat U, Khan M, Kazmi NHS, Ali N, Mufti WA, Khan FI, et al. frequency of newly diagnosed diabetes mellitus in patients with acute myocardial infarction. Journal of Ayub Medical College Abbottabad. 2014;26(3):368-70.

[26] Laakso M, Pyörälä K. Age of onset and type of diabetes. Diabetes care. 1985;8(2):114-7. doi.org/10.2337/diacare.8.2.114

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Original Article

Patient Satisfaction Referred to Physical Therapy after One Week Management of Mechanical Low Back Pain

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ABSTRACT

The degree to which a patient is content with the health treatment he or she receives is characterized by patient satisfaction with health care. Patient satisfaction necessitates a match between expectations and outcomes. **Objective:** To determine the satisfaction level of patients with treatment of physiotherapy for mechanical back pain patients. **Methods:** This study was a cross-sectional survey that was conducted on a sample of 100 patients with chronic low back pain (LBP). Non-probability convenient sampling technique was used using predefined inclusion and exclusion criteria. A patient satisfaction questionnaire was used to assess the level of satisfaction among these patients with the therapy they received for their LBP after they signed an informed consent form. **Results:** Patients with acute LBP were satisfied with the communication, technical quality, and overall satisfaction with their therapy, but not so much with the financial element or interpersonal style. Communication and overall satisfaction were high among patients with persistent low back pain, but the financial and technical quality was low. Male patients were satisfied in terms of communication, time spent with a physical therapist, and general satisfaction and were relatively less satisfied with financial aspects and accessibility and convenience in terms of treatment. Female patients were satisfied in terms of accessibility and convenience, communication, and general satisfaction and were relatively less satisfied with the financial aspect and technical quality in terms of the treatment they received for LBP **Conclusions:** Overall patients were satisfied in terms of communication, time spent with physical therapists. However, patients were relatively less satisfied with the financial aspect and interpersonal manner in terms of the treatment they received for LBP.

INTRODUCTION

A positive outcome is linked to patient satisfaction with health care. "Low back pain" is pain that occurs between the 12th rib and the buttock crease. LBP that isn't caused by a specific condition is known as non-specific LBP (e.g., fracture, osteoporosis, and tumor). LBP is a regular occurrence [1]. But not everyone who gets an episode, or 'acute' LBP, will experience high disability or develop a persistent problem. Sixty percent of people who have acute LBP recover in a few weeks, often with the minimal intervention [2]. Research has consistently demonstrated that treatments have minor effects at best for the 40% of people who acquire persistent or "chronic" LBP (pain that lasts more than 3 months) [3,4]. Prognosis is the expected course of a health condition. Knowing about prognosis is therefore a high priority for patients, practitioners, and researchers. Prognosis has informed clinical management more than diagnostic subtypes of non-specific LBP, which, to date, have not been able to usefully guide treatment or improve patient outcomes. Instead, research has focused on identifying patients with a poor prognosis, who might need more than the minimal 9 intervention approach recommended by guidelines [5]. The drivers of the health services overuse problem in LBP are not well understood [6]. Proposed that health-seeking behavior was

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determined by predisposing, enabling, and illness factors. Predisposing (e.g age, gender, and previous history), enabling (e.g., work status, health insurance) and illness factors (e.g., symptoms, general health, and psychological state) have all been shown to predict health services use. Although research has identified predictors of health services use, the causal role of the factors has been largely neglected. Causal factors are important targets for new interventions, for example, those aimed at reducing unnecessary health services use. Identifying etiology from observational data involves using statistical models that test causal relationships, in contrast to prognostic models which predict future health outcomes [7]. The degree to which a patient is content with the treatment he or she receives [8] is characterized as patient satisfaction with health care. Patient satisfaction with medical care is contingent on expectations being met [9,20]. Patients are now thought of as medical partners as well as purchasers of health care services [10,11]. As a result, people's viewpoints on their health care have become more important in determining the quality of service. Patient satisfaction with health care has received a lot of attention in the medical literature because it is a powerful predictor of healthcare outcomes, treatment adherence, and medical malpractice claims [10,19]. The major purpose of this research was to assess patient satisfaction with physiotherapy treatment for patients with mechanical back pain.

METHODS

This study was a cross-sectional survey that was conducted on a sample of 100 patients with chronic LBP. Non-probability convenient sampling technique was used using predefined inclusion and exclusion criteria. Inclusion criteria include patients receiving physical therapy, Patients receiving medical treatment, both genders are equally inclusive, and ages between 20 to 60 years the rest are included in exclusion criteria. After giving informed consent, a patient satisfaction questionnaire was utilized to assess the level of satisfaction among these patients with the treatment they received for their LBP. The qualitative data was presented in form of mean ± SD. Chi-Square analysis was used to see associations in qualitative variables.

RESULTS

Table 1 shows the mean score of subcategories of the PSQ 18 questionnaire. Patients were satisfied in terms of communication, time spent with physical therapists, and general satisfaction. However, patients were relatively less satisfied with the financial aspect and interpersonal manner in terms of the treatment they received for LBP.

Descriptive Statistics	N	Minimum	Maximum	Mean	SD
General Satisfaction	100	1.00	5.00	3.1200	.90207
Technical Quality	100	1.00	4.50	2.9450	.76672
Interpersonal Manner	100	1.00	5.00	2.8850	.92620
Communication	100	1.00	5.00	3.1950	1.06812
Financial Aspect	100	1.00	5.00	2.8600	.99005
Time spent with doctor	100	1.00	5.00	3.1150	.97663
Accessibility and Convenience	100	1.00	4.75	2.9200	.73930
Valid N (listwise)	100				

Table 1: Sub-categorization of PSQ 18

Table 2 shows the mean score of subcategories of the PSQ 18 questionnaire according to gender. Male patients were satisfied in terms of communication, time spent with a physical therapist, and general satisfaction and were relatively less satisfied with the financial aspect, accessibility, and convenience in terms of the treatment they received for LBP. Female patients were satisfied in terms of accessibility and convenience, communication, and general satisfaction and were relatively less satisfied with the financial aspect and technical quality in terms of the treatment they received for LBP

Gender		N	Minimum	Maximum	Mean	SD
Male	General Satisfaction	50	1.50	5.00	3.1400	.90373
	Technical Quality	50	1.50	4.50	2.9450	.74452
	Interpersonal Manner	50	1.00	5.00	2.7900	.88115
	Communication	50	1.00	5.00	3.1100	1.07992
	Financial Aspect	50	1.00	4.50	2.8400	.88893
	Time Spent With. Doctor	50	1.00	5.00	3.1100	.95986
	Accessibility and Convenience	50	1.00	4.75	2.8350	.80434
	Valid N (list wise)	50				
Female	General Satisfaction	50	1.00	5.00	3.1000	.90914
	Technical Quality	50	1.00	4.50	2.9450	.79586
	Interpersonal Manner	50	1.00	4.50	2.9800	.96869
	Communication	50	1.50	5.00	3.2800	1.06023
	Financial Aspect	50	1.00	5.00	2.8800	1.09059
	Time Spent With Doctor	50	1.00	5.00	3.1200	1.00285
	Accessibility and Convenience	50	1.50	4.25	3.0050	.66526
	Valid N (listwise)	50				

In terms of the therapy they received for LBP, Table 3 reveals that patients with acute LBP were content with communication, technical quality, and general satisfaction, but were less satisfied with the financial aspect and interpersonal approach. Patients with chronic LBP were satisfied with the communication and general satisfaction, but less so with the financial aspect and technical quality of the treatment, they received for their LBP.

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Type of Low Back Pain		N	Minimum	Maximum	Mean	SD
Acute	General Satisfaction	42	1.50	5.00	3.0833	.96219
	Technical Quality	42	1.50	4.50	3.0119	.82075
	Interpersonal Manner	42	1.00	4.50	2.8571	.96453
	Communication	42	1.00	5.00	3.2738	1.20569
	Financial Aspect	42	1.00	5.00	2.7976	.99425
	Time Spent With Doctor	42	2.00	5.00	3.3452	.83730
	Accessibility and Convenience	42	1.50	4.75	2.9702	.69669
	Valid N (listwise)	42				
Chronic	General Satisfaction	58	1.00	5.00	3.1466	.86353
	Technical Quality	58	1.00	4.50	2.8966	.72854
	Interpersonal Manner	58	1.50	5.00	2.9052	.90543
	Communication	58	1.50	5.00	3.1379	.96333
	Financial Aspect	58	1.00	5.00	2.9052	.98321
	Time Spent With Doctor	58	1.00	5.00	2.9483	1.04163
	Accessibility and Convenience	58	1.00	4.75	2.8836	.77263
	Valid N (listwise)	58				

Table 3: Sub-categorization of PSQ 18 according to the type of low back pain

DISCUSSION

The goal of this study was to find out how happy people with LBP were with their physical therapy treatment. Patient satisfaction with health care has received a lot of attention in the medical literature because it is a powerful predictor of healthcare outcomes, treatment adherence, and medical malpractice claims [10,18]. Patient satisfaction with health treatment has long been linked to improved patient outcomes, according to research. Patient satisfaction with health care has a significant impact on treatment adherence [12]. Patients who are satisfied with their medical care are more likely to follow treatment recommendations, experience positive provider-patient interactions, and seek medical help [13,14,17]. As a result, patients' health benefits from following medical advice and accessing health services more frequently and efficiently. Various indicators of this notion have been utilized in most surveys gauging patient satisfaction. Furthermore, while developing measures to quantify patient satisfaction with care, the patients' perspective on these indicators has not always been considered, leaving their validity in doubt. Researchers should be aware of the sort of satisfaction measured in any given study, according to Hekkert et al. [15]. According to several authors, the second disadvantage of patient satisfaction measures is their limited discriminative ability (measures often generate very high satisfaction levels)[16].

CONCLUSION

In conclusion, patients were satisfied in terms of communication, and time spent with physical therapists. However, patients were relatively less satisfied with the financial aspect and interpersonal manner in terms of the treatment they received for LBP.

REFERENCES

[1] Balagué F, Mannion AF, Pellisé F, Cedraschi C. Non-specific low back pain. Lancet. 2012 Feb 4;379(9814):482-91. doi: 10.1016/S0140-6736(11)60610-7.

[2] Hancock MJ, Maher CG, Latimer J, Herbert RD, McAuley JH. Can rate of recovery be predicted in patients with acute low back pain? Development of a clinical prediction rule. Eur J Pain. 2009 Jan;13(1):51-5. doi: 10.1016/j.ejpain.2008.03.007.

[3] Walker BF, Muller R, Grant WD. Low back pain in Australian adults: the economic burden. Asia Pac J Public Health. 2003;15(2):79-87. doi: 10.1177/101053950301500202.

[4] Machado LA, Maher CG, Herbert RD, Clare H, McAuley JH. The effectiveness of the McKenzie method in addition to first-line care for acute low back pain: a randomized controlled trial. BMC Med. 2010 Jan 26;8:10. doi: 10.1186/1741-7015-8-10.

[5] Hemingway H, Marmot M. Clinical Evidence: Psychosocial factors in the etiology and prognosis of coronary heart disease: systematic review of prospective cohort studies. West J Med. 1999 Nov;171(5-6):342-50.

[6] Andersen R, Newman JF. Societal and individual determinants of medical care utilization in the United States. Milbank Mem Fund Q Health Soc. 1973 Winter;51(1):95-124.

[7] Herbert RD. Cohort studies of aetiology and prognosis: they're different. J Physiother. 2014 Dec;60(4):241-4. doi: 10.1016/j.jphys.2014.07.005.

[8] Ware JE Jr, Snyder MK, Wright WR, Davies AR. Defining and measuring patient satisfaction with medical care. Eval Program Plann. 1983;6(3-4):247-63. doi: 10.1016/0149-7189(83)90005-8.

[9] Heidegger T, Saal D, Nuebling M. Patient satisfaction with anaesthesia care: what is patient satisfaction, how should it be measured, and what is the evidence for assuring high patient satisfaction? Best Pract Res Clin Anaesthesiol. 2006 Jun;20(2):331-46. doi: 10.1016/j.bpa.2005.10.010.

[10] Prakash, Bhanu. Patient Satisfaction. Journal of cutaneous and aesthetic surgery. 2010;3:151-5. DOI: 10.4103/0974-2077.74491.

[11] Harnett MJ, Correll DJ, Hurwitz S, Bader AM, Hepner DL. Improving efficiency and patient satisfaction in a tertiary teaching hospital preoperative clinic.

DOI:https://doi.org/10.54393/pbmj.v5i5.428

Anesthesiology. 2010 Jan;112(1):66-72. doi: 10.1097/ALN.0b013e3181c617cb.

[12] Mirsu-Paun A, Tucker CM, Herman KC, Hernandez CA. Validation of a provider self-report inventory for measuring patient-centered cultural sensitivity in health care using a sample of medical students. J Community Health. 2010 Apr;35(2):198-207. doi: 10.1007/s10900-009-9212-2.

[13] Baker R, Mainous AG 3rd, Gray DP, Love MM. Exploration of the relationship between continuity, trust in regular doctors and patient satisfaction with consultations with family doctors. Scand J Prim Health Care. 2003 Mar;21(1):27-32. doi: 10.1080/0283430310000528.

[14] Cvengros JA, Christensen AJ, Hillis SL, Rosenthal GE. Patient and physician attitudes in the health care context: attitudinal symmetry predicts patient satisfaction and adherence. Ann Behav Med. 2007 Jun;33(3):262-8. doi: 10.1007/BF02879908.

[15] Hekkert KD, Cihangir S, Kleefstra SM, van den Berg B, Kool RB. Patient satisfaction revisited: a multilevel approach. Soc Sci Med. 2009 Jul;69(1):68-75. doi: 10.1016/j.socscimed.2009.04.016.

[16] Mpinga EK, Chastonay P. Satisfaction of patients: a right to health indicator? Health Policy. 2011 May;100(2-3):144-50. doi: 10.1016/j.healthpol.2010.11.001.

[17] Christensen AJ, Cvengros JA, Hillis SL, Rosenthal GE. Patient and physician attitudes in the health care context: attitudinal symmetry predicts patient satisfaction and adherence. Ann Behav Med. 2007 Jun;33(3):262-8.

[18] Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. Lancet. 2009 Feb 7;373(9662):463-72. doi: 10.1016/S0140-6736(09)60172-0.

[19] Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. Spine (Phila Pa 1976). 2002 Mar 1;27(5):E109-20. doi: 10.1097/00007632-200203010-00017.

[20] Webster BS, Bauer AZ, Choi Y, Cifuentes M, Pransky GS. Iatrogenic consequences of early magnetic resonance imaging in acute, work-related, disabling low back pain. Spine (Phila Pa 1976). 2013 Oct 15;38(22):1939-46. doi: 10.1097/BRS.0b013e3182a42eb6.

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Original Article

Pattern and Outcomes of Traumatic Brain Injury in Pediatric Patients

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ABSTRACT

Traumatic brain injury (TBI) is the leading cause of mortality and permanent impairment in children. **Objective:** To investigate the pattern and outcomes of TBI in pediatric patients. **Methods:** A descriptive cross-sectional study was conducted at Holy family Hospital Rawalpindi from June 2021 to February 2022 in the Department of Emergency. We included 141 children with no prior history of neurological deficits, who had a CT scan immediately following their presentation. All children were monitored throughout their hospital stay to determine the in-hospital mortality and any neurological deficits. SPSS Version 24 was used for data analysis. **Results:** Male patients were 86 (61%). The majority of patients were between the ages of 5 and 10 years. There were 35 male patients and four female patients who were involved in a road traffic accident. Only 20 of the patients who had hypotension on admission showed recovery. The p-value was significant in 46 hypotensive patients out of which 23 died. The hospital had to treat 11 patients who had been hospitalized for more than a month. Only 31 of the 96 patients with depressed mentation had surgery, compared to other patients with no neurological deficit. **Conclusions:** TBI in pediatric patients was affected by gender, age, time of arrival after injury, and presenting conditions in our study. More needs to be done in the area of public health. The hospital and perhaps the country would benefit from a trauma registry system.

INTRODUCTION

Traumatic brain injury (TBI) is a type of brain injury that develops as a result of a hit to the head, a fall, a bullet, a high-speed crash, or an explosion. TBI can be open (penetrating) or closed (non-penetrating) [1]. Given its role in high childhood mortality and long-term impairments, childhood injury requires rapid treatment. Injury accounts for 5.4% (265,000–348,000) of all childhood deaths each year [2]. TBI is expected to affect 69 million people worldwide every year. TBI burdens are three times higher in low- and middle-income countries (LMICS) than in high-income nations. Head injuries caused by vehicles were found to be prevalent in LMICS. TBI is expected to become the third greatest cause of death and injury in the world by 2020 [3,4]. An early tear, shear, or bleeding occurs in primary brain damage. Following a primary injury, secondary injuries frequently include a cascade of biological processes that might be targeted for intervention. These changes in the brain include cellular, chemical, tissue, and blood vessel changes, all of which lead to further brain tissue destruction [5,6]. The Glasgow coma scale (GCS) is used to grade the severity of TBI, which is divided into mild (13–15), moderate (9–12), and severe (8) categories. The GCS can also help with determining the outcome of TBI cases. TBI mortality rates in Western settings ranged from 8% to 21.2 percent in underdeveloped regions [7,8]. Madaan et al., in a study on the spectrum and

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outcomes of TBI in children, reported mild injury in 64%, moderate in 11%, and severe injury in 25% of patients. While they reported in-hospital mortality in 9.0% of patients [9]. While Bedry & Tadele reported mild TBI in 72.9%, moderate in 19.2% and severe in 7.9% of patients. While they reported mortality in 3.2% of patients [10]. The goal of our research is to determine the pattern and effects of TBI in pediatric patients. Because the pattern of TBI varies from region to region due to differences in lifestyle and playing habits of children. The results of this study will help us to decide which type of injury is more common in our population and how much the mortality rate is there in these patients.

METHODS

A descriptive cross-sectional study was conducted in the Department of Emergency at Holy Family Hospital Rawalpindi from June 2021 to Feb 2022. The sample size for this study was calculated to be 141 patients using the Raosoft sample size calculator with a margin of error of 5%, a confidence interval of 90%, and having incidence to be 163 [11]. The method utilized was a non-probability, consecutive sampling strategy. All children having age 1 to 14 years presenting with TBI, with no previous history of neurological deficit whose CT scan was done immediately after the presentation were included in our study. Children with a history of neurological deficits & whose parents did not give consent were excluded from our study. A total number of 141 children presented in the accident and emergency department of Holy family Hospital Rawalpindi, fulfilling the inclusion criteria of the study. After describing the study's goals to each child's guardian, they signed a consent form. Data regarding child age, gender, and mechanism of injury were collected for each patient. The GCS score was calculated for each child to determine the pattern of TBI. All children were followed till their stay in the hospital to determine the in-hospital mortality and any neurological deficit to assess the outcomes. All the study relevant information was noted on a pre-designed Proforma. Data analysis was carried out using SPSS Version 24. The demographic variables' mean and standard deviation were determined. Gender, injury source, injury pattern, and other parts of the questionnaire were presented using frequency and percentage. Stratification was used to regulate effect modifiers such as age, gender, and injury source. The correlation of these effect modifiers with a pattern of injury and in-hospital mortality was determined using a post-stratification chi-square test. P-value <0.05 was considered a significant effect.

METHODS

There were 86 male patients (61%), whereas females made up a smaller percentage of the population (39%). The average age was 8.773 years in this study. The majority of patients in Table 1 were between the ages of 5 and 10 years, as shown in Table 1.

Gender	Frequency	Percent
Male	86	61
Female	55	39
Age		
Less than 5 years	29	20.6
5-10 years	63	44.7
10-14 years	49	34.8

Table 1: Patient Demographics

Male patients were more likely to be involved in a road traffic accident than female patients, with 35 male patients and four female patients involved. A fall from a height was reported by 51 female patients. Male patients were more likely than females to report a sports injury, with 17 reporting it and 34 reporting it, as shown in Table 2.

Variables		Gender		Total	P Value
		Male	Female		
Mechanism of Injury	Road traffic accident	35	4	39	0.00
	Fall from height	0	51	51	
	Sports injury	17	17	17	
	Baby assault	34	34	34	
Total		86	141	141	

Table 2: Association between Mechanisms of Injury & Gender

There were 17 partially improved male patients and 46 patients who went into a vegetative state, but there were also 23 people who died. There was a significant improvement in the outcomes of 31 female patients, while the p-value for 24 patients who had a partial improvement was 0.00. Patients under 5 years old had an improved outcome, while those between 5 and 10 years old had an improved state, 41 partially improved, and 20 were in a severe/vegetative state, respectively. In the age group 10-14 years, 26 patients were in a severe/vegetative state, compared to 23 who had died, as shown in Table 3.

Variables		Outcome				Total	P-Value
		Improved(Normal State)	partially improved	Severe	Death		
Gender	Male	0	17	46	23	86	0.00
	Female	31	24	0	0	55	
Age							
Less than 5 years		29				29	0.00
5-10 years		2	41	20		63	
10-14 years				26	23	49	

Table 3: Association of Gender & Age with Outcome

Thirty-one out of the improved patients did not report having hypotension on admission, whereas twenty of those with hypotension on admission improved. A significant p value was found in 46 hypotensive patients, 23 of whom died. On admission, only two hypoglycemic patients improved, while 41 partially recovered and 46 had a severe/vegetative outcome, and 23 died, as shown in Table 4.

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Variables		Outcome				Total	P value
		Improved(Normal State)	Partially improved	SevereVegetative	Death		
Hypotension on Admission	Yes	0	20	46	23	89	0.00
	No	31	21	0	0	52	
Hyperglycemia Yes on admission.		2	41	46	23	112	0.00
No		29	0	0	0	29	

Table 4: Patients presenting with hypotension and hyperglycemia and its association with outcome

More than a third of the patients who came to the hospital within the last three days stayed for less than 24 hours. In contrast, 17 patients remained in the hospital for one to three days. 10 patients had to stay at the hospital for less than 24 hours, whereas 11 patients had to stay for a month because they had been injured for more than three days. After three days of injury, 23 patients were admitted to the hospital for more than a month, as shown in Table 5.

Variables		Time of Arrival After Injury			Total	P Value
		less than 24 hours	1-3 days	more than 3 days		
Duration of Stay	less than 24 hours	0	32	0	32	0.00
	1-3 days	27	17	0	44	
	4-7 days	21	0	0	21	
	8 days-01 month	10	0	11	21	
	more than 01 month	0	0	23	23	
Total		58	49	34	141	

Table 5: Duration of Stay in association with the arrival of patients after injury

In comparison, only 31 of the 96 patients with depressed mentation were managed surgically and only 14 of the 14 patients with no neurological deficit were managed conservatively (p-value 0.036). On admission, 112 patients had hyperglycemia, 14 had no deficit, and 98 had depressed mentation. There was a p-value of 0.045 for depressed mentation in 29 patients who did not report high blood glucose levels on admission, as shown in Table 6.

Variables		Management		Total	P Value
		Surgical	Conservative		
Neurological Outcome at Discharge	No Deficit	14	0	14	0.036
	Depressed Mentation	96	31	127	
Neurological Outcome at Discharge					
		No Deficit	Depressed Mentation	Total	P Value
Hyperglycemia on Admission Yes		14	98	112	0.045
No		0	29	29	

Table 6: Association of Neurological Outcome with Management in comparison to Hyperglycemia association with Neurological Outcome

DISCUSSION

Trauma or any incident can take place at any place and time without discriminating between genders and age groups. Meanwhile, in this, we focused primarily on TBI and its outcomes in children. To begin with, it was found that the males suffered greatly from roadside accidents, sports injuries, and baby assaults while females fall from height commonly (p=0.00), Dewan et al., also reported greater male victims of TBI [12]. In accordance with this, only male children suffered from mortality and a severe vegetative state. Another critical finding was that none of the cases of mortality and severe vegetative state was seen among children less than 5 years. In addition, presenting symptoms at the time of admission were found to be correlated with the outcomes. For example, the patients presenting with hypotension and hyperglycemia faced fatal consequences (p=0.00). Moreover, children who are unconscious and having convulsions were significantly subjected to hospital mortality. While individuals with raised ICP depicted a linear trend and reported no deaths [19]. Furthermore, the time of arrival after injury contributed enormously to the outcomes. As patients coming after 3 days of the traumatic insult underwent surgical management, also such patients were hospitalized for almost a month on average. All of These children had to depart from this world (p=0.00). Gupta et al., concluded similar discovery and highlighted the association of delay with mortality in TBIs [13]. Finally, the victims were examined for any underlying neurological deficits at the time of discharge, depressed mentation was seen in both groups either managed surgically or conservatively (p=0.036), and neurological deficits were a common finding of children sustained a TBI, a review conducted by Christianne durish supported the results [14]. Besides, a hyperglycemic state was associated with depressed mentation (p=0.045). On the other hand, a specific topic is tentative to a variety of approaches, as Karibe et al., discussed outcomes of TBIs in elderly population and presented the poor outcomes in the older individuals [15]. Dewan et al., offered epidemiological aspects of the TBIs and suggested that children whether in developing or developed countries were equally prone to traumatic insult to the brain [12]. To attain and achieve a precise conclusion a vast number of factors are needed to be assessed simultaneously. Pediatric TBI is more common in boys than girls, according to a study from the General Hospital in Douala, Cameroon. The study also found that the condition most commonly affects young children and pre-adolescents. Motorcycles were the most common means of transportation involved in road traffic accidents, while falls were the second most common mode of injury [16]. A review from the University of California states after a single or repeated brain damage in younger people, phosphorylated tau and beta-amyloid need to be monitored. When an athlete's career is just getting started, it's critical that they learn about the long-term effects of repeated TBIs and how they can aid those who have been affected [17]. Many of the injuries happened in private households, were caused by falls, resulting in fractures and

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got little or no pre-hospital care, according to a study conducted at Aga Khan University Hospital in Nairobi. Children with burns, brain injuries, or multiple trauma also had a high fatality rate [18]. A study concluded that children have a particular pathological response to TBI, with distinct neurological symptoms, and much research has been done to understand their pathophysiology. Furthermore, recent technological advancements in pediatric TBI diagnostic imaging have aided in precise diagnosis, suitable treatment, preventing complications, and predicting long-term results [20].

CONCLUSION

TBI in pediatric patients was affected by gender, age, time of arrival after injury, and presenting conditions in our study. Too many people suffer from a neuropsychological impairment, depression, and post-traumatic stress disorder. More needs to be done in the area of public health to encourage safe driving habits, such as wearing a helmet. The hospital and perhaps the country would benefit from a trauma registry system. This will allow for further investigation.

REFERENCES

[1] Chen C, Shi J, Stanley RM, Sribnick EA, Groner JI, Xiang H. U.S. Trends of ED Visits for Pediatric Traumatic Brain Injuries: Implications for Clinical Trials. Int J Environ Res Public Health. 2017 Apr 13;14(4):414. doi: 10.3390/ijerph14040414.

[2] Wang H, Naghavi M, Allen C, Barber R, Bhutta Z, Carter A. A systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1459-544. doi.org/10.1016/S0140-6736(16)31012-1.

[3] Dewan MC, Rattani A, Gupta S, Baticulon RE, Hung YC, Punchak M et al. Estimating the global incidence of traumatic brain injury. J Neurosurg. 2018 Apr 1:1-18. doi: 10.3171/2017.10.JNS17352.

[4] Nguyen R, Fiest KM, McChesney J, Kwon CS, Jette N, Frolkis AD et al. The International Incidence of Traumatic Brain Injury: A Systematic Review and Meta-Analysis. Can J Neurol Sci. 2016 Nov;43(6):774-785. doi: 10.1017/cjn.2016.290.

[5] Khatri N, Thakur M, Pareek V, Kumar S, Sharma S, Datusalia AK. Oxidative Stress: Major Threat in Traumatic Brain Injury. CNS Neurol Disord Drug Targets. 2018;17(9):689-695. doi: 10.2174/1871527317666180627120501.

[6] Kumar Sahel D, Kaira M, Raj K, Sharma S, Singh S. Mitochondrial dysfunctioning and neuroinflammation: Recent highlights on the possible mechanisms involved in Traumatic Brain Injury. Neurosci Lett. 2019 Sep 25;710:134347. doi: 10.1016/j.neulet.2019.134347.

[7] Kochar A, Borland ML, Phillips N, Dalton S, Cheek JA, Furyk J et al. Association of clinically important traumatic brain injury and Glasgow Coma Scale scores in children with head injury. Emerg Med J. 2020 Mar;37(3):127-134. doi: 10.1136/emermed-2018-208154.

[8] Fink EL, von Saint Andre-von Arnim A, Kumar R, Wilson PT, Bacha T, Aklilu AT et al. Traumatic Brain Injury and Infectious Encephalopathy in Children From Four Resource-Limited Settings in Africa. Pediatr Crit Care Med. 2018 Jul;19(7):649-657. doi: 10.1097/PCC.0000000000001554.

[9] Madaan P, Agrawal D, Gupta D, Kumar A, Jauhari P, Chakrabarty B et al. Clinicoepidemiologic profile of pediatric traumatic brain injury: experience of a tertiary care hospital from northern India. J Child Neurol. 2020;35(14):970-74. doi.org/10.1177/0883073820944040.

[10] Bedry T, Tadele H. Pattern and Outcome of Pediatric Traumatic Brain Injury at Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia: Observational Cross-Sectional Study. Emerg Med Int. 2020 Jan 29;2020:1965231. doi: 10.1155/2020/1965231.

[11] Chikani MC, Aniaku I, Mesi M, Mezue WC, Chikani UN. Characteristics and outcome of paediatric traumatic brain injuries: An analysis of 163 patients in Enugu. Niger J Med 2021;30:446-51. DOI: 10.4103/NJM.NJM_39_21.

[12] Dewan MC, Mummareddy N, Wellons JC 3rd, Bonfield CM. Epidemiology of Global Pediatric Traumatic Brain Injury: Qualitative Review. World Neurosurg. 2016 Jul;91:497-509.e1. doi: 10.1016/j.wneu.2016.03.045.

[13] Gupta S, Khajanchi M, Kumar V, Raykar NP, Alkire BC, Roy N et al. Third delay in traumatic brain injury: time to management as a predictor of mortality. J Neurosurg. 2019 Jan 18:1-7. doi: 10.3171/2018.8.JNS182182.

[14] Laliberté Durish C, Pereverseff RS, Yeates KO. Depression and Depressive Symptoms in Pediatric Traumatic Brain Injury: A Scoping Review. J Head Trauma Rehabil. 2018 May/Jun;33(3):E18-E30. doi: 10.1097/HTR.0000000000000343.

[15] Karibe H, Hayashi T, Narisawa A, Kameyama M, Nakagawa A, Tominaga T. Clinical Characteristics and Outcome in Elderly Patients with Traumatic Brain Injury: For Establishment of Management Strategy. Neurol Med Chir (Tokyo). 2017 Aug 15;57(8):418-425. doi: 10.2176/nmc.st.2017-0058.

DOI:https://doi.org/10.54393/pbmj.v5i5.429

[16] Ndoumbe A, Motah M, Dah AR, Moumi M. Pediatric traumatic brain injury pattern at the General Hospital, Douala, Cameroon. Open Journal of Modern Neurosurgery. 2018 Dec 7;9(1):49-60. doi: 10.4236/ojmn.2019.91007.

[17] Serpa RO, Ferguson L, Larson C, Bailard J, Cooke S, Greco T et al. Pathophysiology of pediatric traumatic brain injury. Frontiers in neurology. 2021:1194. doi.org/10.3389/fneur.2021.696510.

[18] Ndung'u A, Sun J, Musau J, Ndirangu E. Patterns and outcomes of paediatric trauma at a tertiary teaching hospital in Kenya. African Journal of Emergency Medicine. 2019 Jan 1;9:S47-51. doi.org/10.1016/j.afjem.2018.12.004.

[19] Van Cauter S, Severino M, Ammendola R, Van Berkel B, Vavro H, van den Hauwe L et al. Bilateral lesions of the basal ganglia and thalami (central grey matter)-pictorial review. Neuroradiology. 2020 Dec;62(12):1565-1605. doi: 10.1007/s00234-020-02511-y.

[20] Araki T, Yokota H, Morita A. Pediatric Traumatic Brain Injury: Characteristic Features, Diagnosis, and Management. Neurol Med Chir (Tokyo). 2017 Feb 15;57(2):82-93. doi: 10.2176/nmc.ra.2016-0191

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Original Article

Quality of Parent-Child Relationship, Emotional Regulation and Interpersonal Difficulties in University Students

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ABSTRACT

Studies considered parent-child attachment a significant relationship that can have a great impact an adult's life. However, despite the parent-child attachment, the quality of the parent-child relationship is important, which has a significant impact on children's emotional, physical, and mental health. **Objective**: To find the relationship between the quality of the parent-child relationship and interpersonal difficulties with emotional regulation in university students. **Methods:** The Correlation research design was used for the quantitative method in the study. The study was carried out on 300 university students (males and females) with the age range of 18 to 25 years selected through stratified random sampling from private and government universities. **Results:** The quality of the parent-child relationship was observed to be a positive sign of emotional regulation and interpersonal difficulties in students. The current research also reveal that a negative or less satisfying relationship with their parents result in more issues regarding their emotions and relationships. **Conclusions:** Less satisfying parental relationships leads to various problems of psychological and social health of individuals.

INTRODUCTION

Bowlby's attachment theory has played a valuable role to explain the parent-child relationship and how these early life relationships impact an individual's development. Further, Bowlby considered the mother-child relationship a significant relationship that can impact an adult's life [1]. Child- parent relationship has an important impact on a child's emotional, physical, and mental health. Both parent and child interact each other daily in many situations and this interaction is highly affected by the quality of their relationship. The quality of a relationship refers to an individual's happiness and satisfaction level with their parental relationship. Attachment theory also suggests that the quality of parent–child relationships exerts a large impact on children's development [2]. Emotional development and regulation is a complex process that involves initiating, hindering, and controlling one's emotions. However, studies indicated the poor quality of relationships with parents leads to emotional dysregulation of the individual [3]. Secure attachment promotes the development of healthy relations over time. Longitudinal research by Hair and Ling (2008) to study the effects of the quality of parent-child relationship on

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emerging adult's mental well-being and misbehavior depicted that positive relationships between adolescents and their mother and/or father figures significantly predicted higher levels of mental well-being and lower levels of delinquency [4]. In emerging adulthood the nature of the parent-adolescent relationship is connected to the extensive variety of positive results, for example, mental and emotional prosperity modification and social competence and diminished problematic behavior, like substance abuse, misconduct, and sexual activities [4,5]. The student life is full of challenges and many students face many problems such as health and emotional issues [6]. As the individual grows up, his social network additionally develops and the interaction turns out to be more unique, changed, and complicated. He or she may suffer many issues such as interpersonal issues. Studies proved that emotional dysregulation has been linked to numerous forms of interpersonal difficulties. The effects of anxious and avoidant attachment patterns on child's emotional regulations and interpersonal difficulties shows that avoidant and anxious attachment patterns have been linked to emotional dysregulation and interpersonal problems which may lead to the alcohol problems in early adulthood [7,8]. The theme of the study was all about attachment, quality and emotional regulation of university students and its impact on their interpersonal relationships. The research purpose was mainly to find out the level of quality of parent-child relationships in university students. This research will help in understanding how important is parent-child relationship quality and due to lack of quality what kind of interpersonal difficulties students usually face.

METHODS

Correlational research design was used for quantitative and cross-sectional study. 300 students both male and female from private and government universities of Lahore with the age ranges of 18-25 years were selected for data collection. Quality of Parent-Child Relationship Scale, an ingenious scale was developed by the researcher to get the information of the participants regarding their parental relationship quality. Demographic Questionnaires: A demographic questionnaire is used to get the information of the participants were age, gender, family system, parental education and were include after reviewing the relevant literature.

Emotional Regulation Scale: The emotional regulation was an indigenous scale used to assess the student's emotional regulation strategies that how they regulate their emotions in stressful situations. Emotional regulation scale consisted on 24 items with two factors: emotion regulation and emotion dysregulation. In 2014

Interpersonal Difficulties Scale (IDS): Scale developed by Saleem, Zubia and Mahmood [9] was used to assess the interpersonal problems in University students. It consists of 59 items with six factors, dominated by others was 13 items, low self-esteem was 1 item, mistrust was 12 items, lack of assertiveness was 8 items, lack of boundaries was 8 items, and unstable relationship was 7 items. Items were score on 0 to 4. Keeping in view the ethical consideration, official permissions were taken from the university authorities assuring them of the utility of the research. Following that, participants of BS (Hons) students were selected and research protocols were administered to them in small groups of 25 to 30 after giving all the instructions in the research questionnaires. The researcher raises the participants; morale and interest in the study by sharing the objective and importance of the research before taking the required information. The researcher assured the participants that all information will confidential and the researcher requested the participants to give response honestly.

RESULTS

Table 1 described the mean age of the participants is 2.52 ± 0.501 years. The mean of mother education is 3.08± 1.087. Similarly results showed the mean of father's education 2.68±1.105.

Variables	*M*	*SD*
Age	1.52	.501
Father education	3.08	1.087
Mother education	2.68	1.105

Table 1: Sample Description

Note: M=Mean, SD=Standard Deviation, Means and Standard Deviations of Demographic, Variables of participants(N=300)

Variables	*F*	%
	Age	
18-20years	145	48.3
21-25years	155	51.7
	Gender	
Male	129	50.0
Female	171	50.0
	Family system	
Joint	105	35
Nuclear	195	65
	Class	
Bs1	63	21.0
Bs2	72	24.0
Bs3	80	26.7
BS4	85	28.3
	Father education	
Uneducated	37	12.3
Matric	55	18.3
Intermediate	56	18.7
B.A and above B.A	152	50.7

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Mother education		
Uneducated	47	15.7
Matric and above matric	104	34.7
Intermediate	46	15.3
B.A and above B.A	103	34.3

Table 2: Frequency and Percentages of the Demographic Characteristics of the Participants(N=300)
Note: F= frequency, %= Percentage

Table 2 showed that 48% of participants were from the age range 18 to 20 years and 51% of students were from the 21 to 25 years age range. From 300, 129 (43%) participants were males and 171(57%) were females. About 105(35%) participants were from the joint family system and 195(65%) were from the nuclear family system. Regarding class strategies of participants 63(21%) were from BS1, 72(24%) were from BS2, 80(26%) were from BS3 and 85(28%) were from BS4. Results also depicted that 37(12%) of the participant's fathers were uneducated, 55(18%) fathers had matric education, 56(18%) were about intermediate education and 152(50 %) had Bachelors and above. Similarly, among participants mothers, 47(15%) were uneducated, 104(34%) were matric or above, 46(15%) mothers had intermediate education and 103(34%) from 300 were graduate or above graduation.

Factors	PQMCR	NQMCR	EDR	ER	IDS	PQFCR	NQFCR
PQMCR		-.32***	-.12*	.55***	-.09*	.45***	-.27***
NQMCR		_	.26***	-.11**	.35***	-.08ns	.30***
EDR			_	-.17**	.54***	.02ns	.14**
ER				_	-.07ns	.35***	-.18***
IDST					_	-.09ns	.25***
PQFCRF1						_	-.44***
M	43.01	6.44	20.54	20.82	100.40	42.22	5.59
SD	12.10	4.37	6.90	6.06	35.04	11.94	4.26

Table 3 Correlation: Pearson correlation, Means and Standard Deviations of Quality of Parent Child

Relationship, Emotional Regulation and Interpersonal Difficulties in university students(N=300)
Note: QMCRT=total of quality of mother-child relationship, PQMCR=positive quality of mother child relationship, NQMCR=negative quality of mother-child relationship, QMCRT=total of quality of father-child relationship, PQMCR=positive quality of father-child relationship, NQMCR=negative quality of father-child relationship, ER=emotional regulation, EDR= emotional dysregulation, ERT= total of emotional regulation DBO= dominated by others, LSC= low self-confidence, MT=mistrust, LA=lack of assertiveness, LB= lack of boundaries, UR= unstable relationship, IDST= total of interpersonal difficulties ***p < .00

Table 3 shows that the quality of the parent-child relationship, emotional regulation, and quality of the father-child relationship, interpersonal difficulties, have a significant correlation with each other that confirms the first hypothesis of the main study that has been proved. The positive quality of the parent-child relationship has a positive significant relationship and a negative significant relationship are facing many issues. A positive relationship with the mother leads to a positive relationship with the father. Students who have the negative quality of the mother-child relationship have a negative relationship with their fathers. Results show that there is a significant relationship between emotional dysregulation and interpersonal difficulties and the quality of a father-child relationship which means that students who have the negative quality of father-child relationship have adopted more emotional dysregulation strategies and face more interpersonal problems.

Model	B	SEB	β	t	p<
Step 1[©]= .16, RΔ .03)					
Mother education	.65	.28	.16	2.33	.021*
Step 2(R= .46, RΔ .17)					
Age	.8.35	3.87	.11	2.15	.032*
Mother education	4.12	1.84	.13	2.23	.020*
EDR	2.98	.246	.58	12.11	.001***
Step 3(R=.63, RΔ .37)					
EDR	2.64	.25	.51	10.32	.001***
NQMCR	1.31	.43	.16	2.99	.003***

Table 4: Regression, Hierarchical Regression Analysis of Predictor for Interpersonal Difficulties in Students(N=300)

Note: only significant results are reported, Step 1, F (6,289) =1.34 ***p<.001, Step II, F (8,287) =20.14, **p< .01, *** p<.05 Step III, F (12,283) =15.50, *p< .01, EDR=emotional dysregulation, NQMCR= negative quality of mother child relationship

Table 4 showed Hierarchical Regression Analysis of predictors of interpersonal difficulties in students. The model shows the highly significant predictors of interpersonal difficulties in students. However, overall results revealed that education of mother (β = .13, t= (2.23) P< (.020*), mother AGE (β= .11 t= (2.15) P< (.032), Emotional Dysregulation (β= .58, t= (12.11) P< (.001***), Negative quality of mother child relationship (β= .16 t= (2.99) P< .003**) were significant predictors of interpersonal difficulties in university students.

DISCUSSION

Family is an important structure of society that has a valuable role in one's life. Parent-child relationships are biologically based and individuals' development beyond childhood and adolescence is influenced by these parent-child relationships. The transaction between childhood to adulthood is a crucial developmental phase of life that is influenced by individual, social and familial circumstances. Adolescents are commonly university time periods and

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today university life is full of challenges. Students may face a lot of pressures and problems such as emotional, academic stress-related, and interpersonal relationship [9]. The purpose of the current study is to explore the strength of relation of parent-child and the effect of the level of quality of the relationship. Basically, it explains the level of satisfaction in parent-child relationships, as the behavior of the mother toward the child and also the behavior of the father. How students perceive it either is positive or negative. There is a lot of difference between the individualistic and collectivistic cultures, in individualistic culture, basically focuses on personal growth and development, and self-actualization is based on intrapersonal relationships and equality and personal goals. On the other hand, collectivistic culture is basically group work and interpersonal relationships [10]. Also, the support of others and feelings of belongingness from others. An indigenous scale was developed for assessing the quality of relationships with parents in university students. Two main factors are extracted positive quality of relationship and negative quality of relationship in which main factors are parental involvement, communication, emotional support, giving more time to child, harshness, and discouragement from parents. Parents regulate and shape their children's abilities and their acquirement of emotional regulation through affiliation and interaction between parent and child [11]. The socialization of emotional regulation is based on parental rearing practices, modeling, and the emotional environment of the home and these might be influenced by attachment, marital relationships, and parenting styles [12]. Results of the present study indicate a higher relationship between parent-child interaction and emotional regulation. As results show that students who have a positive quality of relationship with father and mother have higher control over their emotions and adopt healthy ways to regulate their emotions. Also Eisenberg et al (2005) found that parental love, warmth, and affirmative expression are lead to the lowest level of externalizing problems in adolescents which is related to the emotional regulation [15]. Similarly, also results revealed that the negative quality of the relationship between mother and father leads to emotional dysregulation [16]. As modern research suggested that the unsatisfactory or negative relationship quality between parents and children may increase the high risk to develop unsatisfactory adult relationships in adulthood. Also, Bowlby describes that early parent-child relationships lead to later life relationships and students who had a negative and unsatisfactory relationship with their mother and father have more interpersonal problems i.e. low self-confidence and unstable relationships [17]. In Pakistani culture, the current study indicates that there is a significant relationship between the negative quality of mother-child relations and the quality of father-child relationships. Parents are considered authority figures and children are restricted to obey both of them. Therefore, the mother's positive or negative relationship quality leads to the father's positive and negative quality of relationship respectively [9]. The purpose of the current study is to explore the strength of relation of parent- child and the effect of the level of quality of the relationship, basically, it explains the level of satisfaction in parent-child relationships, as the behavior of the mother toward the child and also the behavior of the father. How students perceive it either is positive or negative. There is a lot of difference between the individualistic and collectivistic cultures. The individualistic culture basically focuses on personal growth and development, and self-actualization is based on intrapersonal relationships and equality and personal goals. On the other hand, collectivistic culture is basically the group work and the interpersonal relationships [10]. An indigenous scale was developed for assessing the quality of relationships with parents in university students. Two main factors are extracted positive quality of relationship and negative quality of relationship in which main factors are parental involvement, communication, emotional support, giving more time to child, harshness, and discouragement from parents. Parents regulate and shape their children's abilities and their acquirement of emotional regulation through affiliation and interaction between parent and child [18]. Result of the present study indicate a higher relationship between parent-child interaction and emotional regulation. Similarly, also results revealed that the negative quality of the relationship between mother and father leads to emotional dysregulation. Literature also suggested that children's ability to regulate their emotions is influenced by the parental strict attitude and harsh parenting and it may lead to emotional dysregulation [16]. As modern research suggested that the unsatisfactory or negative relationship quality between parents and children may increase the high risk to develop unsatisfactory adult relationships in adulthood. Also, Bowlby describes that early parent-child relationship led to the later life relationships, and students who had a negative and unsatisfactory relationships with their mother and father have more interpersonal problems such as low self-confidence, and unstable relationships [17].The socialization of emotional regulation is based on parental rearing practices, modeling, and the emotional environment of the home and these might be influenced by attachment, marital relationships, and parenting styles [18-24]. Therefore, the mother's positive or negative relationship quality leads to the father's negative and

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positive quality of relationship.

CONCLUSIONS

Briefly concluding, the present study found that in Pakistan cultural issues regarding the quality of the relationship between parents and children go side by side. On the whole current research reveals that those who have negative or less satisfying relationships with their parent have been facing more issues regarding their emotions and their new relationships. Lack of satisfaction regarding parental relationships leads to various issues related to the psychological and social health of individuals. This study might be helpful in psycho-education for parents and students.

REFERENCES

[1] Gonzalez A, Atkinson L, Fleming AS. Attachment and the comparative psychobiology of mothering. Handbook of developmental social neuroscience. 2009;225.

[2] Belsky J, Fearon RM. Infant-mother attachment security, contextual risk, and early development: a moderational analysis. Dev Psychopathol. 2002 Spring;14(2):293-310. doi: 10.1017/s0954579402002067.

[3] Siegler RS. How Children Develop, Exploring Child Develop Student Media Tool Kit+ Scientific American. Worth Pub; 2006.

[4] Hair EC, Moore KA, Garrett SB, Ling T, Cleveland K. The continued importance of quality parent-adolescent relationships during late adolescence. Journal of Research on Adolescence,2008,18(1): 187–200.doi.org/10.1111/j.1532-7795.2008. 00556.x

[5] Borkowski JG, Bisconti T, Weed K, Willard C, Keogh DA, Whitman TL. The adolescent as parent: Influences on children's intellectual, academic, and socio-emotional development In Borkowski JG, Ramey SL, & Bristol-Power M (Eds.), Parenting and the child's world: Influences on academic, intellectual, and social-emotional development.

[6] Townsend J, Hsieh PC, Van Puymbroeck M, Johnston J, Gassman R, Agley J, Middlestadt S, Youssef Agha A. Sense of coherence, perceived stress and health related quality of life in college students. Illuminare. 2013 Apr 12;11.

[7] Gross JJ, John OP. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. J Pers Soc Psychol. 2003 Aug;85(2):348-62. doi: 10.1037/0022-3514.85.2.348.

[8] Kring AM, Sloan DM, editors. Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment. Guilford Press; 2009 Nov 4.

[9] Saleem S, Ihsan Z and Mahmood Z. Development of Interpersonal Difficulties Scale for University Students. Pakistan Journal of Psychological Research. 2014, 29(2): 277-297.

[10] Kumaraswamy N. Academic stress, anxiety and depression among college students: A brief review. International review of social sciences and humanities. 2013;5(1):135-43.

[11] Wagner III JA. Studies of individualism-collectivism: Effects on cooperation in groups. Academy of Management journal. 1995 Feb 1;38(1):152-73. doi.org/10.2307/256731

[12] Chang L, Schwartz D, Dodge KA, McBride-Chang C. Harsh parenting in relation to child emotion regulation and aggression. J Fam Psychol. 2003 Dec;17(4):598-606. doi: 10.1037/0893-3200.17.4.598.

[13] Morris AS, Silk JS, Steinberg L, Myers SS, Robinson LR. The Role of the Family Context in the Development of Emotion Regulation. Soc Dev. 2007 May 1;16(2):361-388. doi: 10.1111/j.1467-9507.2007.00389. x.

[14] Contreras JM, Kerns KA, Weimer BL, Gentzler AL, Tomich PL. Emotion regulation as a mediator of associations between mother-child attachment and peer relationships in middle childhood. J Fam Psychol. 2000 Mar;14(1):111-24. doi: 10.1037//0893-3200.14.1.111.

[15] Eisenberg N, Zhou Q, Spinrad TL, Valiente C, Fabes RA, Liew J. Relations among positive parenting, children's effortful control, and externalizing problems: a three-wave longitudinal study. Child Dev. 2005 Sep-Oct;76(5):1055-71. doi: 10.1111/j.1467-8624.2005.00897. x.

[16] Shaver PR, Collins N, Clark CL. Attachment styles and internal working models of self and relationship partners. Knowledge structures in close relationships: A social psychological approach. 1996:25-61.

[17] Chang L, Schwartz D, Dodge KA, McBride-Chang C. Harsh parenting in relation to child emotion regulation and aggression. J Fam Psychol. 2003 Dec;17(4):598-606. doi: 10.1037/0893-3200.17.4.598.

[18] Morris AS, Silk JS, Steinberg L, Myers SS, Robinson LR. The Role of the Family Context in the Development of Emotion Regulation. Soc Dev. 2007 May 1;16(2):361-388. doi: 10.1111/j.1467-9507.2007.00389. x.

[19] 19.Ainsworth M DS, Blehar MC, Waters E, Wall SN. Patterns of attachment: A psychological study of the strange situation. Psychology Press 2015.doi.org/10.4324/9780203758045

[20] Blumenthal DR, Neemann J, Murphy C M. Lifetime

DOI: https://doi.org/10.54393/pbmj.v5i5.453

exposure to interparental physical and verbal aggression and symptom expression in college students. Violence and Victims,1998; 13(2): 175. doi.org/10.1891/0886-6708.13.2.175

[21] Goldstein A L, Haller S, Mackinnon S P, Stewart S H. Attachment anxiety and avoidance, emotion dysregulation, interpersonal difficulties and alcohol problems in emerging adulthood. Addiction Research & Theory,2019; 27(2):130-138. doi.org/10.1080/16066359.2018.1464151

[22] Hsieh, M. C. Education in Taiwan is too much and too hard. Retrieve October 2014, fromhttp://www.taipeitimes.com/News/editorials/archieves/2010,2010/03/01/200346692

[23] Tamir M. Why Do People Regulate Their Emotions? A Taxonomy of Motives in Emotion Regulation. Pers Soc Psychol Rev. 2016 Aug;20(3):199-222. doi: 10.1177/1088868315586325.

[24] Schulman KA, Berlin JA, Harless W, Kerner JF, Sistrunk S, Gersh BJ, Dubé R, Taleghani CK, Burke JE, Williams S, Eisenberg JM, Escarce JJ. The effect of race and sex on physicians' recommendations for cardiac catheterization. N Engl J Med. 1999 Feb 25;340(8):61826.doi:10.1056/NEJM199902253400806.

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Original Article

Results of Anterior Fixation for Subaxial Cervical Injuries in a Tertiary Care Centre

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ABSTRACT

Sub-axial injuries of cervical spine involving posterior ligaments, articular facets and pillars are communal, and surgical treatment is debatable, and studies describe variable consequences from combined access of anterior and posterior approach or separately **Objective:** To assess the outcome of early (<72 hours) anterior cervical discectomy and fusion with plating for injuries of the sub-axial cervical spine. **Methods:** A retrospective analysis, from January 2018 to December 2020 was conducted in a tertiary care referral center. 110 patients (67 male, 43 females; mean age 51.1 years; range 19-80 years) who endured anterior cervical discectomy (ACD) at single-level and fusion (ACDF using a polyetheretherketone, (PEEK, cage) with plate fixation for injuries of sub-axial cervical spine were evaluated. Radiological evaluation was done considering fusion, segmental height (SH), advancement of adjacent segment disease (ASD) and lordosis (Cobb Angle). Clinical results were evaluated by means of visual analogue scale (VAS) for neck pain and Frankel Grading for neurological function **Results:** The cervical trauma was instigated by road traffic accident (RTA) in 69 cases, slip down in 16 cases and a fall from a height in 25 cases. Simple lateral cervical X-rays and CT with reconstruction were taken in all subjects and showed dislocation or subluxation of C3 to C4 in 15 patients, 39 patients with C4 to C5 dislocation, 32 patients with C5 to C6 dislocation and C6 to C7 in 24 patients. The preoperative mean Cobb angle was -3.9 ± 8.01 °. 4.1 ± 6.6 ° was the mean Cobb angle instantly later to treatment and 1.8 ± 4.7 ° at the final visit. The operation brings a substantial decrease in the regional kyphotic angle ($p < 0.05$). The SH mean before surgery was 37.01 ± 1.9 mm. The SH mean was 41.2 ± 1.9 mm instantly after operation and 37.9 ± 1.9 mm at the final visit. The mean rise in height at the end of observation was 0.9 mm. The variance between pre-operative SH measurements and final SH was significant ($p < 0.05$). An improvement of VAS from 8.4±1.01 to 2.8±1.6 at 12 months was statistically significant. There was also an improvement in 19.1% of cases for at least one Frenkel grade at 12 months follow-up. **Conclusions:** The fusion with a PEEK cage and the fixation with anterior cervical plate resulted in satisfactory clinical results and high fusion rates deprived of any morbidity at the donor-site. This procedure is effective and safe for single-level sub-axial injuries of the cervical spine.

INTRODUCTION

The direct visualization of faceted displacements is enabled by posterior cervical approach and facilitates decompression of the neural foramina and central canal [1-4]. Drawbacks of this method comprise the increased muscle dissection, relatively longer operative time, increased blood loss, postoperative neck pain and a relatively increased jeopardy of infection at surgical site [5,6]. This method also fails to solve the problem of ventral compression by disc herniation. On the contrary the anterior approach i.e. plate stabilization and anterior cervical discectomy and fusion (ACDF) have been extensively used for sub-axial cervical spine injuries with good clinical outcomes and high success rates. The anterior cervical approach allows the spinal canal to be decompressed by eradicating the disc, thereby preventing further neurological worsening caused by disc dislocation

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[7,8]. Although autologous bone graft is measured to be the 1st line for ACDF, this technique can cause less morbidity such as chronic pain at the donation site, hematoma, infection, adjacent nerve damage, iliac crest fracture and visceral hernia [9,10]. The benefits of using a PEEK cage with plate fixation for fusion for injuries of sub-axial cervical spine were assessed.

METHODS

This retrospective analysis was held in a tertiary care hospital for three-years' duration from January 2018 to December 2020. A total of 110 patients (67 male, 43 females; mean age 51.1 years; range 19-80 years) who endured anterior cervical discectomy at single-level and fusion (ACDF using a PEEK cage) with plate fixation for injuries of sub-axial cervical spine were evaluated. The medical records, operating notes, and clinical and radiological data from outpatient follow-up was evaluated. Medical records were assessed for clinical variables such as gender, age, level of injury, cause of injury and degree of neurological deterioration, according to the Frankel Scale at admission and at follow-up, available at the end. Patients with less than 12 months follow-up, with accompanying injuries of the anterior cervical bone, unstable fractures of the vertebra were not included as they needed either a 360 degree (posterior and anterior) access or other surgical approaches like corpectomy. Based on X-rays and computed tomography (CT), facet fracture or lateral mass was diagnosed. MRI was performed in all patients to assess contusion, ligament or disc disruption, spinal compression and epidural hematoma. All patients were managed according to ATLS and high doses of methylprednisolone were administered intravenously to all cases with acute spinal cord injury that occurred within eight-hours of the trauma. After reduction, surgical stabilization of the anterior part of the cervical bone with interbody fusion was performed. All efforts were given to deliver surgical correction as soon as possible and not later than 72 hours of the trauma. All patients had anterior (right sided) approach with standard anterior cervical discectomy and decompression. The PEEK cage was then filled with local osteophyte-derived bone chip and Demineralized Bone Matrix (DBM) and implanted into the intervertebral space. Lastly, anterior plating was done with titanium plate and screws. The correct positioning of the cage was determined with Intraoperative fluoroscopy along with the position of the cervical spine. Postoperatively, patients were kept with Philadelphia cervical collar for eight weeks. Radiographic data was assessed by a senior radiologist using upright neutral lateral and anteroposterior radiographs at 6 weeks, three, six, and twelve months after surgery to evaluate fusion, segmental height (SH), lordosis (cobb angle) and adjacent segment disease (ASD) progression. The patient's condition was also clinically assessed at 6 weeks, three, six, and twelve months after surgery. The clinical score was judged by the visual analogue scale (VAS) for pain in neck (0 = no pain; maximum pain in 10). Neurological scoring was performed by means of the universally accepted Frankel grading. Data was entered with SPSS 21.0 and analyzed. An independent t-test was applied for analyses. Data was accessible as mean ± standard deviation. P value <0.05 was taken significant.

RESULTS

The registered subjects' clinical features are given in Table 1. The cervical trauma was instigated by RTA in 69 cases, slipping in 16 cases and a fall from height in 25 cases. Simple lateral cervical X-rays and CT with reconstruction were taken in all subjects and showed dislocation or subluxation of C3 to C4 in 15 patients, 39 patients have C4 to C5 dislocation, 32 patients with C5 to C6 dislocation and C6 to C7 in 24 patients. The utmost communal dislocation levels were the C4 and C5 levels.

Variables		Value (n=110)
Mean age (years)		51.1
Sex	Male	67 (61%)
	Female	43 (39%)
Level	C3-4	15 (13.6)
	C4-5	39 (35.5)
	C5-6	32 (29.1)
	C6-7	24 (21.8)
Cause of injury	RTA	69 (62.7)
	Fall from height	25 (22.7)
	Slip down	16 (14.5)

Table 1: Clinical features of the patients.

The mean visual analogue score (VAS) pre-operatively for pain in neck was 8.4 ± 1.01. The mean VAS for pain in neck at the 12 months' follow-up was 2.8 ± 1.6. The variance was statistically significant post-operatively in comparison to the preoperative score (p <0.05). The clinical results summary is presented in Table 2. One patient who was at Frankel grade B deteriorated to A while the rest with A and B grades remained unchanged. Ultimately 21 patients (19.1%) had a minimum of one Frankel grade improvement leading to a significantly high number of patients reached to the best grade (E) at 12 months (43 patients).

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Frankel grade	Preoperative	At 12 Months
A	15	16
B	07	06
C	37	23
D	29	22
E	22	43

Table 2: Clinical Improvement on Frankel Grading

Parameters	Preoperative	Immediately postoperative	At 12 Months
Cobb's angle (°)	-3.9±8.01	4.1±6.6	1.8±4.7
SH (mm)	37.01±1.9	41.2±1.9	37.9±1.9
P-value			<0.05

Table 3: The radiological parameters result

All subjects showed compacted fusion at 12 months. The fusion was reached at an average of 14.9 weeks (range 9-46 weeks) after surgery. At the operation level, no one out of 110 patients had a segmental movement of greater than 2 mm. The preoperative mean Cobb angle was -3.9 ± 8.01°. 4.1 ± 6.6° was the mean Cobb angle instantly later to treatment and 1.8 ± 4.7 ° at the final visit. The operation brings a substantial decrease in the regional kyphotic angle ($p < 0.05$). The SH mean before surgery was 37.01 ± 1.9 mm. The SH mean was 41.2 ± 1.9 mm instantly after operation and 37.9 ± 1.9 mm at the final visit. The mean rise in height at the end of observation was 0.9 mm. The variance between pre-operative SH measurements and final SH was significant ($p < 0.05$). Six subjects (5.5%) exhibited variability in an adjacent segment. The radiological outcomes are presented in Table 3.

DISCUSSION

The stabilization and realignment of injury segment is the primary goal in the management of the sub-axial cervical spine [9,10]. Operative approaches to date have been efficacious in treating sub-axial injuries using combination approach of anterior or posterior or separately; though, the ideal method has yet to be determined [11]. Posterior approaches of stabilization are used with virtuous outcomes using hooks, wires, rod systems and screws. The benefits of posterior cervical access comprise direct viewing of posterior bony-ligamentous complex [13]. But this comes with shortcomings of increased dissection of muscles, longer surgery time, severe loss of blood, post-operative neck pain and a comparatively increased infection rate. Furthermore, the frequency of intervertebral disc rupture can be as high as 40% in unilateral dislocation of facet and 80% when bilaterally [14], this approach cannot solve the problem of ventral compressive disc rupture [15]. Without proper treatment, disc rupture can cause anterior collapse of the disc space and neurological deterioration, potentially leading to kyphotic abnormality. Also, the antero-cervical method allows the spinal canal decompression by eliminating the disc, thereby preventing neural worsening due to additional disc dislocation. Most of the subjects in this analysis had posterior lateral facets or masses fractures [16,17]. The fractures of the masses of the lateral cervical joint often cause cervical spine rotational unsteadiness. These patterns of fracture frequently happen in compression-extension injuries and lead to a rupture of the intervertebral disc annulus. In this study, we constantly found severely ruptured intervertebral discs in operation, and these discoveries directed us to prefer anterior approach [18,19]. Moreover, the fixation of the anterior plate after ACDF in a cervical dislocation can deliver operative stabilization with the benefit of fusion of segment specific to a single motion. Although posterior fixation with screws drawback is fracture of posterior elements fractures, they typically require longer fusion [20,21]. However, biomechanical analysis has shown the usefulness of a posterior fixation with screw over an anterior fixation of plate in injuries of sub-axial cervical spine. Some DBM types have osteoconductive and osteo-inductive capacity. In this sense, using DBM can be a virtuous choice for fusion [22]. ACDF with a PEEK cage occupied with DBM, trailed by fixation of the anterior plate in sub-axial lesions of the cervical bone, exhibited no noteworthy alteration in satisfactory clinical outcomes and fusion rate without pain in comparison to the autologous grafts of bone [23]. The usage of a titanium cage filled with material of osteo-synthetic and the use of an autologous tricortical iliac bone graft versus an anterior plate fixation. They also found no important differences in the fusion rate and clinical results [24,25].

CONCLUSION

The fusion with a PEEK cage and the fixation with anterior cervical plate resulted in satisfactory clinical results and high fusion rates deprived of any morbidity at the donor-site. This procedure is effective and safe for single-level sub-axial injuries of the cervical spine.

REFERENCES

[1] Burkhardt BW, Müller SJ, Wagner AC, Oertel JM. Anterior cervical spine surgery for the treatment of subaxial cervical spondylodiscitis: a report of 30 consecutive patients. Neurosurgical Focus. 2019 Jan 1;46(1): E6.doi.org/10.3171/2018.10. FOCUS18464

[2] Kim SH, Lee JK, Jang JW, Park HW, Hur H. Polyetheretherketone cage with demineralized bone matrix can replace iliac crest autografts for anterior

DOI:https://doi.org/10.54393/pbmj.v5i5.431

[1] cervical discectomy and fusion in subaxial cervical spine injuries. Journal of Korean Neurosurgical Society. 2017 Mar;60(2):211. doi.org/10.3340/jkns.2015.0203.014

[3] Han MS, Lee GJ, Kim JH, Lee SK, Moon BJ, Lee JK. Outcomes of anterior cervical fusion using polyetheretherketone cage with demineralized bone matrix and plate for management of subaxial cervical spine injuries. Korean Journal of Neurotrauma. 2018 Oct 1;14(2):123-8. doi.org/10.13004/kjnt.2018.14.2.123

[4] Sharif S, Ali MY, Sih IM, Parthiban J, Alves ÓL. Subaxial cervical spine injuries: WFNS spine committee recommendations. Neurospine. 2020 Dec;17(4):737. doi.org/10.14245/ns.2040368.184

[5] Gattozzi DA, Yekzaman BR, Jack MM, O'Bryan MJ, Arnold PM. Early ventral surgical treatment without traction of acute traumatic subaxial cervical spine injuries. Surgical Neurology International. 2018; 9.doi.org/10.4103/sni.sni_352_18

[6] Jain V, Madan A, Thakur M, Thakur A. Functional outcomes of subaxial spine injuries managed with 2-level anterior cervical corpectomy and fusion: a prospective study. Neurospine. 2018 Dec;15(4): 368.doi.org/10.14245/ns.1836100.050

[7] Schleicher P, Kobbe P, Kandziora F, Scholz M, Badke A, Brakopp F, et al. Treatment of injuries to the subaxial cervical spine: recommendations of the spine section of the German Society for Orthopaedics and Trauma (DGOU). Global Spine Journal. 2018 Sep;8(2_suppl): 25S-33S.doi.org/10.1177/2192568217745062

[8] Jung YG, Lee S, Jeong SK, Kim M, Park JH. Subaxial cervical pedicle screw in traumatic spinal surgery. Korean Journal of Neurotrauma. 2020 Apr;16(1):18. doi.org/10.13004/kjnt.2020.16.e13

[9] Dunbar L, Vidakovic H, Löffler S, Hammer N, Gille O, Boissiere L, et al. Anterior cervical spine blood supply: a cadaveric study. Surgical and Radiologic Anatomy. 2019 Jun;41(6): 607-11.doi.org/10.1007/s00276-019-02236-5

[10] Yu Y, Li JS, Guo T, Lang Z, Kang JD, Cheng L, Li G, Cha TD. Normal intervertebral segment rotation of the subaxial cervical spine: an in vivo study of dynamic neck motions. Journal of orthopaedic translation. 2019 Jul 1; 18:32-9. doi.org/10.1016/j.jot.2018.12.002

[11] Jung YG, Jung SK, Lee BJ, Lee S, Jeong SK, Kim M, et al. The subaxial cervical pedicle screw for cervical spine diseases: The review of technical developments and complication avoidance. Neurologia medico-chirurgica. 2020;60(5):231-43. doi.org/10.2176/nmc.ra.2019-0189

[12] Salzmann SN, Derman PB, Lampe LP, Kueper J, Pan TJ, Yang J, et al. Cervical spinal fusion: 16-year trends in epidemiology, indications, and in-hospital outcomes by surgical approach. World neurosurgery. 2018 May 1;113: e280-95. doi.org/10.1016/j.wneu.2018.02.004

[13] Zaveri G, Das G. Management of sub-axial cervical spine injuries. Indian journal of orthopaedics. 2017 Dec;51(6): 633-52.doi.org/10.4103/ortho.IJOrtho_192_16

[14] Rizzolo SJ, Piazza MR, Cotler JM, Balderston RA, Schaefer D, Flanders A. Intervertebral disc injury complicating cervical spine trauma. Spine (Phila Pa 1976) 16: S187-S189, 1991.doi.org/10.1097/00007632-199106001-00002

[15] Mende KC, Eicker SO, Weber F. Cage deviation in the subaxial cervical spine in relation to implant position in the sagittal plane. Neurosurgical Review. 2018 Jan;41(1):267-74. doi.org/10.1007/s10143-017-0850-z

[16] Arab A, Alkherayf F, Sachs A, Wai EK. Use of 3D navigation in subaxial cervical spine lateral mass screw insertion. Journal of Neurological Surgery Reports. 2018 Jan;79(01): e1-8.doi.org/10.1055/s-0038-1624574

[17] Madan A, Thakur M, Sud S, Jain V, Thakur RP, Negi V. Subaxial cervical spine injuries: Outcomes after anterior corpectomy and instrumentation. Asian Journal of Neurosurgery. 2019 Jul;14(3): 843.doi.org/10.4103/ajns.AJNS_331_17

[18] Murphy RF, Glotzbecker MP, Hresko MT, Hedequist D. Allograft bone use in pediatric subaxial cervical spine fusions. Journal of Pediatric Orthopaedics. 2017 Mar 1;37(2): e140-4.doi.org/10.1097/BPO.0000000000000691

[19] Chiu RG, Siddiqui N, Rosinski CL, Nallani A, Parola R, Behbahani M, et al. Effect of magnetic resonance imaging on surgical approach and outcomes in the management of subaxial cervical fractures. World Neurosurgery. 2020 Jun 1;138: e169-76. doi.org/10.1016/j.wneu.2020.02.060

[20] Joaquim AF, Mudo ML, Tan LA, Riew KD. Posterior subaxial cervical spine screw fixation: a review of techniques. Global Spine Journal. 2018 Oct;8(7):751-60. doi.org/10.1177/2192568218759940

[21] Feng H, Fang X, Huang D, Yu C, Zhao S, Hao D. Quantitative morphometric study of the subaxial cervical vertebrae end plate. The Spine Journal. 2017 Feb 1;17(2):269-76. doi.org/10.1016/j.spinee.2016.09.019

[22] Armandei M, Saberi H, Derakhshanrad N, Yekaninejad MS. Pivotal role of cervical rotation for rehabilitation

DOI:https://doi.org/10.54393/pbmj.v5i5.431

outcomes in patients with subaxial cervical spinal cord injury. Neurochirurgie. 2020 Aug 1;66(4): 247-51.doi.org/10.1016/j.neuchi.2020.04.127

[23] Zhou Y, Zhou Z, Liu L, Cao X. Management of irreducible unilateral facet joint dislocations in subaxial cervical spine: two case reports and a review of the literature. Journal of Medical Case Reports. 2018 Dec;12(1): 1-7.doi.org/10.1186/s13256-018-1609-z

[24] Goldstein HE, Neira JA, Banu M, Aldana PR, Braga BP, Brockmeyer DL, et al. Growth and alignment of the pediatric subaxial cervical spine following rigid instrumentation and fusion: a multicenter study of the Pediatric Craniocervical Society. Journal of Neurosurgery: Pediatrics. 2018 Jul 1;22(1): 81-8.doi.org/10.3171/2018.1. PEDS17551

[25] Heo Y, Lee SB, Lee BJ, Jeong SK, Rhim SC, Roh SW, et al. The learning curve of subaxial cervical pedicle screw placement: how can we avoid neurovascular complications in the initial period? Operative Neurosurgery. 2019 Dec 1;17(6):603-7. doi.org/10.1093/ons/opz070

DOI:https://doi.org/10.54393/pbmj.v5i5.454

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Original Article

Role of Computed Tomography in the Evaluation of Focal Liver Lesions

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ABSTRACT

The liver lesions have marked differences across geographic regions and ethnic groups. In order to avoid inappropriate diagnosis and unnecessary surgery, Computed Tomography (CT) being a non-invasive imaging modality and with high sensitivity, provides better detection and distinguishing benign from malignant focal liver tumor lesions. **Objective:** To determine the role of Computed Tomography in the evaluation of focal liver lesions. **Methods:** A descriptive study was conducted at Government Kot Khawaja Saeed Teaching Hospital, Lahore, Pakistan. A sample size of 124 patients of both genders, age ranging from 22-90 years were enrolled in this study with a convenient sampling technique. Pregnant females and patients having renal insufficiency were excluded. The variables used to obtain data were: Age, Gender, Presenting complex clinical risk factors, CT findings, and other diagnoses. Toshiba Aquilion 16 CT scanner with KV 80-135 and MAs 500 was used. Injections of 1.5ml/kg IV contrast were given to patients, with a total dosage of 80-100ml at 4.5ml/sec through an 18G intravenous catheter. After contrast injection liver was scanned at 3 different time points or phases. All of the factors mentioned above were documented and kept in each patient's individual case record form (CRF). Data was gathered during the time frame specified. To examine the acquired data and arrange and compile the results, the statistical tool SPSS version 24 was used. Descriptive statistics and a *Chi-square* test was applied to check the comparison. **Results:** Among 124 individuals, 77(62.1%) individuals were males, and 47 (37.9%) individuals were female. Average age of patients was 53.85±13.50 years. Multiple lesions were observed in 79 (63.7%) individuals had multiple lesions while 45 (36.3%) individuals had a single lesion. 94 (75.8%) individuals had malignant lesions while 30 (24.2%) had benign lesions. Lesions were more common in males than in females. The most common presenting complex clinic risk factor was hepatitis C virus with 45 individuals (36.3%) with Hepatitis C +ve. The most common CT finding was Hepatocellular Carcinoma with 41(33.1%). **Conclusions:** The study concluded that Computed Tomography being a non-invasive imaging modality and with high sensitivity, provides better detection and differentiation between benign and malignant focal liver lesions.

INTRODUCTION

For gastroenterologists and hepatologists, focal liver lesions (FLLs) are a common reason for consultation. Solid or cystic masses or regions of tissue recognized as an aberrant component of the liver are known as FLLs [1]. Patients with cirrhosis of the liver or colorectal cancer are more likely to have them recognized, but accidental liver lesions are becoming increasingly common. FLLs were discovered in up to 33% of radiological tests, according to certain reports. It exceeded 50% in autopsy cases [2]. The liver is unique in that it receives blood from two sources: the portal vein (70–80%) and the hepatic artery (20–30%). Any drop in portal blood flow is compensated by an increase in arterial blood flow since these two arteries link at different levels. In the presence of chronic hepatic venous system abnormalities, portal vein resistance increases, resulting in an increase in hepatic arterial flow. Hepatic artery flow is likely to play a role in the progression of liver lesions [3]. Hepatic hemangioma, focal nodular hyperplasia (FNH), benign liver cyst, and focal fat sparing are examples of benign lesions that do not require

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treatment; second, benign lesions that do require treatment include hepatic adenoma, adenomatosis, biliary cystadenoma, hepatic abscess, echinococcal cyst, granulomatous inflammation, and inflammatory pseudo-tumor. Third, Hepatocellular carcinoma (HCC), cholangiocarcinoma, liver metastases from various original sites, biliary cystadenocarcinoma, hepatic angiosarcoma, and lymphoma are examples of malignant mass lesions for which treatment is always required if possible [4]. The prevalence of various liver lesions has marked differences across geographic regions and ethnic groups. In Europe and the United States, a focal liver lesion is more likely to be a metastatic deposit than a primary malignancy; nonetheless, hepatocellular carcinoma is the fourth most prevalent hepatic condition in Pakistan, with a prevalence of 8-10% [5]. Hemangioma has the highest prevalence at 1.4%, followed by FNH (0.4-3%) and adenoma (0.003%). Simple hepatic cysts are common, ranging from 0.1 to 2.5%, but imaging detection improves with age. Women account for 96% of cystadenomas and 66% of cystadenocarcinomas in the biliary system (1% of cystic liver lesions)[6]. It is critical to distinguish between benign and malignant localized liver lesions in individuals in order to avoid unneeded diagnosis and surgery or chemotherapy [7]. In many circumstances, ultrasonography is the first imaging modality used to test for localized liver lesions. However, as it is difficult to distinguish between benign and malignant lesions in many circumstances, conventional sonography's sensitivity remains low (between 55-70%) compared to other modalities like CT or magnetic resonance imaging (MRI). Despite the fact that histopathology is the gold standard, a biopsy is never an option due to its intrusive nature [8,9]. A standardized imaging technique for the detection and characterization of a wide range of benign and malignant liver lesions is triphasic CT) The introduction of contrast agents, which allows the description of precise vascular patterns regardless of tissue specificity, contributes to the improved accuracy observed with CT and MRI [10,11]. The best times to image the liver with triphasic CT scan are during the late-arterial phase (35 seconds after contrast injection) when hyper-vascular liver lesions tend to have the most enhancement relative to background liver, the portal venous phase (60–70 seconds), when hypo-vascular liver metastases and portal veins are best visualized, and the delayed (or equilibrium) phase (3–5 minutes), when washout or contrast retention can be best characterized. The non-enhanced phase is used to provide limited additional diagnostic information for liver lesions while also lowering the radiation exposure [12,13]. CT, as a non-invasive imaging modality with a higher sensitivity than other imaging modalities, allows for improved detection and discrimination between benign and malignant localized liver lesions, avoiding unneeded diagnosis and surgery [14]. With the aid of CT scan, this study will aid in the diagnosis of localized liver lesions.

METHODS

In Government Kot Khawaja Saeed Teaching Hospital, Lahore, Pakistan, a descriptive study was conducted. 124 patients of ages ranging from 22-90 years were enrolled in this study with a convenient sampling technique. Patients of both genders above 18years came to the radiology department of Govt. Kot Khawaja Saeed Teaching Hospital for CT abdomen. The variables used to obtain data were: age, gender, presenting complex clinical risk factors, CT findings, and other diagnoses. Toshiba Aquilion 16 CT scanner with KV 80-135 and MAs 500 was used. Injections of 1.5ml/kg IV contrast were given to patients, with a total dosage of 80-100ml at 4.5ml/sec through an 18G intravenous catheter. After contrast injection liver was scanned at 3 different time points or phases. All of the factors mentioned above were documented and kept in each patient's individual case record form (CRF). The data was gathered during the time frame specified. To examine the acquired data and arrange and compile the results, the statistical tool SPSS version 2.4 was utilized. Descriptive statistics and a Chi-square test was applied to check the comparison

RESULTS

On CT findings, the diseases found were Calcified cyst, Cholangio Carcinoma, CLD, HCC, Hepatic cyst, Hepatic Hemangioma, Hepatic lesion, Hepatic mass, Hepatic nodule, Hepatocellular Adenoma, Hepatomegaly, Hydatid cyst, Liver Abscess, Lymphadenopathy, METS, Multifocal Hepatoma, Multifocal lesions, Neoplastic mass, Nodular hepatic texture with frequency 1(0.8%), 1(.8%),6(4.8%), 41(33.1%),1(.8%),9(7.3%),10(8.1%),1(.8%) ,10(8.1%), 2(1.6%), 1(.8%),(1.6%),2(1.6%),3(2,4%),2(1.6%),16(12.9%),4(3.2%),11(8 .9%),1(.8%),1(.8%),respectively.The most common CT finding was Hepatocellular Carcinoma(Table 1).

Vartiable	Frequency	Percent
Calcified cyst	1	.8
Cholangio Carcinoma	1	.8
CLD	6	4.8
HCC	41	33.1
Hepatic cyst	9	7.3
Hepatic Hemangioma	10	8.1
Hepatic lesion	1	.8
Hepatic mass	10	8.1
Hepatic module	2	1.6
Hepatocellular Adenoma	1	.8

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Vartiable	Frequency	Percent
Hepatocellular Adenoma	2	1.6
Hepatomegaly	2	1.6
Hydatid cyst	3	2.4
Liver Abscess	2	1.6
Lymphadenopathy	16	12.9
METS	4	3.2
Multifocal lesions	11	8.9
Neoplastic mass	1	.8
Nodular hepatic texture	1	.8
Total	124	100.0

Table 1: Descriptive Statistics of CT Findings

Out of 124 individuals, 79 (63.7%) individuals were hepatitis C+ve while 45 (36.3%) individuals were normal. 47 (37.9%) females were hepatitis C+ve while 77(62.1%) males were normal. Among them, 14 (11.3%) females were hepatitis C+ve while 33 (26.6%) were normal. 31 (25%) males were hepatitis C+ve while 46 (37.1%) males were normal (Table 2).

			hepatitis C+ (Y/N)		Total
			Yes	No	
Gender	Male	Count	33	14	47
		% of Total	26.6%	11.3%	37.9%
	Female	Count	46	31	77
		% of Total	37.1%	25.0%	62.1%
Total		Count	79	45	124
		% of Total	63.7%	36.3%	100.0%

Table 2: Cross-Tabulation between Gender and Hepatitis C

Out of 124 individuals, 79 (63.7%) individuals had multiple lesions while 45 (36.3%) individuals had a single lesion. 47 (37.9%) females had focal liver lesions while 77 (62.1%) males had focal liver lesions. Among them, 24 (19.4%) females had multiple lesions while 23 (18.5%) had a single lesion. 55 (44.4%) males had multiple lesions while 22 (17.7%) males had a single lesion (Table 3).

			Number of lesions (Single/Multiple)		Total
			Multiple	Single	
Gender	Male	Count	24	23	47
		% of Total	19.4%	18.5%	37.9%
	Female	Count	55	22	77
		% of Total	44.4%	1707%	62.1%
Total		Count	79	45	124
		% of Total	63.7%	36.3%	100.0%

Table 3: Cross-Tabulation between Gender and Number of Lesions

Out of 124 individuals, 94(75.8%) individuals had malignant lesions while 30(24.2%) individuals had a benign lesion. In 47 (37.9%) females 30 (24.2%) females had malignant lesions while 17 (13.7%) had benign lesion while in 77 (62.1%) males, 64 (51.6%) males had malignant lesions while 13 (10.5%) males had benign lesion (Table 4).

			Type of lesion (Benign/Malignant)		Total
			Benign	Malignant	
Gender	Male	Count	17	30	47
		% of Total	13.7%	24.2%	37.9%
	Female	Count	13	64	77
		% of Total	10.5%	51.6%	62.1%
Total		Count	30	94	124
		% of Total	24.2%	75.8%	100.0%

Table 4: Cross-Tabulation between Gender and Lesion Types

Out of 124 individuals, 39 (31.5%) females had splenomegaly while 8 (6.5%) females were normal. 62 (50%) males had splenomegaly while 15 (12.1%) males were normal (Table 5).

			Splenomegaly		Total
			Yes	No	
Gender	Male	Count	8	39	47
		% of Total	6.5%	31.5%	37.9%
	Female	Count	15	62	77
		% of Total	12.1%	50.0%	62.1%
Total		Count	23	101	124
		% of Total	18.5%	81.5%	100.0%

Table 5: Cross-Tabulation between Gender and Splenomegaly

Out of 124 individuals, 79 (63.7%) individuals had multiple lesions while 45(36.3%) individuals had a single lesion. In the age group 22-42 years, 14 (11.3%) individuals had multiple lesions while 12 (9.7%) individuals had single lesion, in age group 43-62 years, 47 (37.9%) individuals had multiple lesions while 23(18.5%) individuals had single lesion, in age group 63-82 years 16 (12.9%) individuals had multiple lesions while 9 (7.3%) individuals had single lesion, and in age group 83-93 years, 2 (1.6%) individuals had multiple lesions while 1(0.8%) individuals had a single lesion (Table 6).

			Hwpatitis C+(Y/N)		Total
			Yes	No	
Age Group	22-42	Count	16	10	26
		% of Total	12.9%	8.1%	21.0%
	43-62	Count	42	28	70
		% of Total	33.9%	22.6%	56.5%
	63-82	Count	20	5	25
		% of Total	16.1%	4.0%	20.2%
	83-92	Count	1	2	3
		% of Total	0.8%	1.6%	2.4%
Total		Count	79	45	124
		% of Total	63.7%	36.3%	100.0%

Table 6: Cross-Tabulation between Age and Hepatitis C

DISCUSSION

The participants in our research ranged in age from 22-90 years old. Patients aged 43-62 years old were the most common, accounting for 70 (56.5%) of the total. The age range 83-92 years had the lowest number of patients, with only 3 (2.4%) cases. Within the range studied for 22–90

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years, the mean age 53.85±13.50. This mean age finding was consistent with other studies. In the study done by Ahirwar et al., also showed peak incidence in 41-50 age group with 30 patients whereas the peak incidence in our study was observed in 43-62 age group. Similarly, an investigation done by Rathore et al. showed that the age group 41-50 years (25.71%) had the highest number of patients, while the age group 81–90 years had the lowest number(1.42%)[15].

Figure1: The study demonstrates arterial phase enhancement shows focal hepatic lesions on CT

Figure 2: CT showed Cirrhotic liver with irregular margins, well defined hypodense lesion that shows in segment VII appearance likely HCC

In our study on CT findings, the diseases found were AHCC (0.8%), Cholangio Carcinoma (0.8%), Cirrhosis (1.6%), CLD (3.2%), HCC (33.1%), Hepatic Abscess (.8%), Hepatic cyst(7.3%), Hepatic Hemangioma (8.1%), Hepatic lesion (0.8%), Hepatic mass (8.1%), Hepaticnodule (1.6%), Hepatocellular Adenoma (0.8%), Hepatomegaly (1.6%), Hydatid cyst(1.6%), Liver Abscess(1.6%), Lymphadenopathy(1.6%), METS (12.9%), Multifocal Hepatoma (83.2%), Multifocal lesions (8.9%), Neoplastic mass (0.8%), Nodular hepatic texture (0.8%). A study conducted by Tyagi V, et al., showed Hepatocellular carcinoma (20%), Metastasis (33.3%), Hydatid cyst (2%), Abscess (5%), Hemangioma (13.3%), Gallbladder carcinoma, Cholangio-carcinoma and other (5% each) and simple liver cysts (10%) in CT diagnosis. Our study documented 94 (75.8%) malignant lesions while 30 (24.2%) had benign lesions. Out of them, 41 (33.1%) were hepatocellular carcinoma and 16 (12.9%) were metastatic lesions. These results showed HCC to be the most common malignant lesion with a percentage of 33.1% and our results are similar to the study conducted in 2019 by Ominde ST and Mutala TM, found HCC to be the most common malignant lesion at 44.2% [16]. In this study, 44 (86.3%) were diagnosed to be malignant and seven (13.7%) were benign. Later pathological examination revealed that 43 (84.3%) of the lesions were malignant and 8 (15.7%) were benign. A total of 124 patients' data was gathered, with 77 men and 47 females. Our study showed male predominance and there are many studies that also showed similar male predominance. A study done by Hasan et al., showed that out of 40 patients, liver lesions were seen in 26 males and 14 females, indicating a male preponderance. In another study done by Anaye et al., comprised of 63 female and 82 male patients with an average age of 59 and 65 years, respectively [17]. One study conducted by Boas FE et al., showed triple phase CT scan to be 89% sensitive and 97% specific in diagnosing HCC [18]. In another study, the sensitivity of triphasic CT scan in the HCC diagnosis was 78% with a specificity of 73% which was conducted by Alkholy MA et al. [19]. Leeuwen et al., study says that as it allows for image acquisition during maximal enhancement of the liver parenchyma during a single breath-hold, spiral CT is the ideal CT method for routine liver examination. They also came to the conclusion that quick data acquisition allowed for successive scanning of the complete liver at different times following contrast administration, allowing for multiphasic hepatic CT [20].

CONCLUSION

Our study concluded that Computed Tomography being a non-invasive imaging modality and with high sensitivity, provides better detection and differentiation between benign and malignant focal liver lesions. The percentage of HCC in males is more than in females.

REFERENCES

[1] Marrero JA, Ahn J, Rajender Reddy K; Americal College of Gastroenterology. ACG clinical guideline: the diagnosis and management of focal liver lesions. Am J Gastroenterol. 2014 Sep;109(9):1328-47; quiz 1348. doi: 10.1038/ajg.2014.213.

[2] Algarni AA, Alshuhri AH, Alonazi MM, Mourad MM, Bramhall SR. Focal liver lesions found incidentally. World J Hepatol. 2016 Mar 28;8(9):446-51. doi: 10.4254/wjh.v8.i9.446.

[3] Vilgrain V, Paradis V, Van Wettere M, Valla D, Ronot M,

DOI:https://doi.org/10.54393/pbmj.v5i5.454

[3] Rautou PE. Benign and malignant hepatocellular lesions in patients with vascular liver diseases. Abdom Radiol (NY). 2018 Aug;43(8):1968-1977. doi: 10.1007/s00261-018-1502-7.

[4] Hasan NM, Zaki KF, Alam-Eldeen MH, Hamedi HR. Benign versus malignant focal liver lesions: Diagnostic value of qualitative and quantitative diffusion weighted MR imaging. The Egyptian journal of radiology and nuclear medicine. 2016 Dec 1;47(4):1211-20. doi.org/10.1016/j.ejrnm.2016.08.009.

[5] Hafeez S, Alam MS, Sajjad Z, Khan ZA, Akhter W, Mubarak F. Triphasic computed tomography (CT) scan in focal tumoral liver lesions. Journal of the Pakistan Medical Association. 2011;61(6):571.

[6] Guy J, Peters MG. Liver disease in women: the influence of gender on epidemiology, natural history, and patient outcomes. Gastroenterology & hepatology. 2013 Oct;9(10):633.

[7] Scialpi M, Palumbo B, Pierotti L, Gravante S, Piunno A, Rebonato A et al. Detection and characterization of focal liver lesions by split-bolus multidetector-row CT: diagnostic accuracy and radiation dose in oncologic patients. Anticancer Res. 2014 Aug;34(8):4335-44.

[8] Tranquart F, Le Gouge A, Correas JM, Marcus VL, Manzoni P, Vilgrain Vet al. Role of contrast-enhanced ultrasound in the blinded assessment of focal liver lesions in comparison with MDCT and CEMRI: Results from a multicentre clinical trial. European Journal of Cancer Supplements. 2008 Sep 1;6(11):9-15. doi.org/10.1016/j.ejcsup.2008.06.003.

[9] Bialecki ES, Di Bisceglie AM. Diagnosis of hepatocellular carcinoma. HPB (Oxford). 2005;7(1):26-34. doi: 10.1080/13651820410024049.

[10] Winterer JT, Kotter E, Ghanem N, Langer M. Detection and characterization of benign focal liver lesions with multislice CT. Eur Radiol. 2006 Nov;16(11):2427-43. doi: 10.1007/s00330-006-0247-9.

[11] Hennedige T, Venkatesh SK. Imaging of hepatocellular carcinoma: diagnosis, staging and treatment monitoring. Cancer Imaging. 2013 Feb 8;12(3):530-47. doi: 10.1102/1470-7330.2012.0044.

[12] Boas FE, Kamaya A, Do B, Desser TS, Beaulieu CF, Vasanawala SS et al. Classification of hypervascular liver lesions based on hepatic artery and portal vein blood supply coefficients calculated from triphasic CT scans. J Digit Imaging. 2015 Apr;28(2):213-23. doi: 10.1007/s10278-014-9725-9.

[13] Venkatesh SK, Chandan V, Roberts LR. Liver masses: a clinical, radiologic, and pathologic perspective. Clin Gastroenterol Hepatol. 2014 Sep;12(9):1414-29. doi: 10.1016/j.cgh.2013.09.017.

[14] Jiang HY, Chen J, Xia CC, Cao LK, Duan T, Song B. Noninvasive imaging of hepatocellular carcinoma: From diagnosis to prognosis. World J Gastroenterol. 2018 Jun 14;24(22):2348-2362. doi: 10.3748/wjg.v24.i22.2348.

[15] Rathore R, Kumar R, Choudhary S. Role of ultrasound and CT scan in evaluating focal liver lesions. Journal of Evolution of Medical and Dental Sciences. 2015 Dec 28;4(104):16951-4.

[16] Ominde ST, Mutala TM. Multicentre study on dynamic contrast computed tomography findings of focal liver lesions with clinical and histological correlation. SA J Radiol. 2019 May 21;23(1):1667. doi: 10.4102/sajr.v23i1.1667.

[17] Anaye A, Perrenoud G, Rognin N, Arditi M, Mercier L, Frinking P et al. Differentiation of focal liver lesions: usefulness of parametric imaging with contrast-enhanced US. Radiology. 2011 Oct;261(1):300-10. doi: 10.1148/radiol.11101866.

[18] Boas FE, Kamaya A, Do B, Desser TS, Beaulieu CF, Vasanawala SS et al. Classification of hypervascular liver lesions based on hepatic artery and portal vein blood supply coefficients calculated from triphasic CT scans. J Digit Imaging. 2015 Apr;28(2):213-23. doi: 10.1007/s10278-014-9725-9.

[19] Alkholy MA, Alabd OO, Ebied OM, Abd BA, Mostafa E. Comparison of Multidetector computed tomography with Digital Subtraction Angiography and lipidol CT in detection of small hepatocellular carcinoma. Journal of American Science. 2014;10(5):1-8.

[20] van Leeuwen MS, Noordzij J, Feldberg MA, Hennipman AH, Doornewaard H. Focal liver lesions: characterization with triphasic spiral CT. Radiology. 1996 Nov;201(2):327-36. doi: 10.1148/radiology.201.2.8888219

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Original Article

The Effects of Resistance Training For 12 Weeks on Serum Calcium, Phosphorous and Parathyroid Hormone Levels of Urban and Rural Children

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ABSTRACT

Resistance Training (RT) is considered as an integral component of a comprehensive physical activity program for children and healthy adults and has shown to be an important component for the development of bone strength by improving their muscular power, nerve conduction, and deposition of minerals and maintenance of body balance. **Objective:** To determine the effects of resistance training on the mineral content of bone in children aged 11-14 years boys. **Methods:** Volunteer young boys between the ages of 11 to 14 years, 30 each from rural and urban setting of district Peshawar were recruited. Calcium, phosphorus, parathyroid hormone (PTH) and anthropometric parameters were measured before and after three months of resistance training. *Paired sample t-test* was used for changes over time. **Results:** The study found that there was a significant effect of resistance exercise on participant's serum calcium level (8.44± 0.582 *vs.* 10.24± 0.786, *p value<0.001),* phosphorous (3.82± 0.265 *vs.* 4.59± 0.271, *p value<0.001)* and PTH (20.37± 4.620 *vs.* 29.20± 6.099, *p value<0.001)* in experimental group. **Conclusions:** Resistance training has an effective role in the increase of calcium, phosphorus and PTH and anthropometric measurements.

INTRODUCTION

Resistance Training (RT) can add to musculoskeletal strength, body composition, psychological well-being, and a decrease in cardiovascular risk factors [2]. RT in children allow them to grow strong and healthy [3]. RT has been reported to improve bone strength [4]. In addition, it also helps to increase the parathyroid hormones (PTH) secretion. Low-level activity hampers bone mineralization, such as osteoporosis [5]. Calcium balance, peak bone mass, bone mineral content and bone mineral density are the indications that assist in gagging bone health [6]. The bones of a child have a fast rate of development than adults. The rate of development of the skeletal component and the bones differs with the age of a person. RT helps in the increase of the bone mass and especially in the affected parts that bear weight such as the hip and waist. Calcium is important in ensuring strength of bones [7]. If calcium is taken at an early age, it always helps with bone strength at a later or old age [8]. Largely calcium homeostasis is kept up by the activities of calcium-managing hormones, which most eminently incorporate

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parathyroid hormone, calcitonin, and 1, 25-dihydroxy vitamin D. Phosphorus is a basic component and play important role in different organic procedures [9]. Bone accrual is limited with a lack of enough phosphorus in the body. With less bone accrual, there are chances of a child developing rickets [10]. Phosphate is basically completed with calcium in the skeleton as precious hydroxyapatite stones; the majority of the phosphate occurs as unknown calcium phosphate [11]. Maïmoun et al., showed that RT significantly increased blood phosphorous after the resistance exercise [12]. RT reinforces muscles against gravity and with high weight on bones and joints and help make and secure bone despite bone fortifying [13]. The regulation of bone metabolism is enhanced by PTH. The hormone has both anabolic and catabolic properties. When the osteoclasts are activated, calcium and phosphate are released by PTH [14]. Pakistani population is categorized into old, adults, youth and children, of which children consist of 60%. With the increase in population, the opportunity for children to engage in different sports activities is declining [15]. Osteoporosis is characterized by a decrease in bone density and the breakdown of bone microstructures, which increases the risk of bone fracture [16]. That is the main reason for increasing bone problems and fractures among children. The events of the bone problems and fractures in children are alarming, which is mainly due to the inadequate physical activity or imbalance food intake [17].

METHODS

This study was basically designed to evaluate the effects of RT on the mineral content of bone in 60 volunteer children aged from 11 to 14 years boys from urban and rural areas. There were two groups: control and the experimental group of which the RT was given to the experimental group (n=30 in each group, 15 each from rural and urban areas in each group) for 12 weeks and the control group, no exercise was given to the control group. This study was approved by the Ethical and Review Board of Sarhad University, Peshawar. This study was experimental and quantitative in nature. Before the selection of the samples' written consents were taken from their parents for inclusion. A total of 60 volunteers were selected for the study, 30 each from rural and urban areas.

Pre-test of the Sampled Population: Blood samples of 5ml were taken in the gel tube from all the individuals for serum calcium, phosphorous and PTH hormones tests before the training and were sent to Physiology laboratory of Khyber Medical University Peshawar for investigation.

Control Group: The control group continued their normal daily routine during the experimental period. No training was given to the control group.

Training of Experimental Group: The training schedule was continued for 12 weeks, five days per week. Session of the training lasted for 60 minutes progressively. The first 2 weeks were reserved for physical conditioning and from 3rd to 12 weeks the free weight resistance training performed according to the training protocol. It included Step ups, Pushups, Star jumps, abdominal crunches, Chair dips, 90-degree wall sit, reverse back extensions, and Hover exercises. Every exercise was performed for as many controlled repetitions as possible in the given time duration.

Post-Test of Experimental and Control Group: Blood samples for all the variables of interest (Serum calcium, phosphorous and PTH) of control group and experimental group were conducted in same conditions, same procedure and same laboratory.

Blood Sample Collection Process: Blood was collected in 5cc disposable syringes and transferred to gel tubes for serum calcium, phosphorous and PTH. Within 20 minutes of blood collection blood samples were centrifuged with micro centrifuge machine at 3000RPM at 4c°for 20 minutes and plasma and serum were separated. Serum was saved for 3 months at -80c° temperature for PTH. Both pre and post plasma samples were analysed by Bio-Tek ELx50 machine together with CALBIOTECH PTH ELISA kits in Khyber Medical University Physiology lab with the assistance of expert lab technician. Statistical package for the Social Sciences (SPSS) Version 20 was used for data analyses. Descriptive statistics such as mean, standard deviation and inferential statistics such as paired and independent sample statistics were used. Descriptive statistics for pooled data and divided by control *vs* experimental and urban *vs* rural population were carried out and expressed through different tables in the form of mean and standard deviation. In the second stage of analysis, differences between experimental and control group were determined through *independent sample t-test.* Difference in mean for the same population before and after the intervention was determined through paired sample statistics given in the subsequent sections.

RESULTS

Group	N	Min Age	Max Age	Mean Age	SD
Control Group	30	11 years	14 years	12.53	1.074
Experimental Group	30	11 years	14 years	12.36	1.098

Table 1: Descriptive Statistics of age of Sample Group

Table 2 shows the data on the basis of experimental vs. control group and table 3 shows the data on the basis of urban and rural population for control and experimental group.

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Variables	Control Group			Experimental Group		
	Pre-Test	Post-Test	SD	Pre-Test	Post-Test	SD
Height	1.47	1.48	0.079	1.49	1.51	0.081
Weight	49.57	51.03	7.867	49.53	47.87	8.500
BMI	23.10	23.32	3.946	22.37	20.84	3.166
Calcium	8.60	8.44	0.582	8.51	10.24	0.768
Phosphorous	4.01	4.20	0.507	3.82	4.59	0.271
PTH	15.43	20.37	4.620	16.47	29.20	6.099

Table 2: The Mean and Standard Deviation of all data on the basis of experimental and Control Group Significant value = 0.001

The above table 2 showed the mean and their significance value for the urban and rural population of the control and experimental group. There was no significant difference in the pre and posttest of all parameters in the control group for urban and rural area. There was no significant difference in the pre and posttest of all parameters in the experimental group for urban and rural area except the calcium and PTH. Only significant differences were observed in calcium in rural children and PTH in urban area at pre stage and post stage. That at pre stage rural population showed less PTH level than urban population (14.80mg/dl & 18.13mg/dl, p value <.01) while at post stage urban population showed less calcium than rural population(9.90mg/dl & 10.57mg/dl, *p value <.01).*

Variables		Control Group		Experimental Group			
		Pre-Test	Post-Test	SD	Pre-Test	Post-Test	P-Value
Height	Urban	1.48	1.49	0.519	1.50	1.53	0.256
	Rural	1.46	1.47	1.47	1.47	1.50	0.221
Weight	Urban	48	49.60	0.343	51	48.93	0.351
	Rural	51	52.47	0.327	48	46.80	0.503
BMI	Urban	22.07	22.34	0.186	22.57	20.83	0.743
	Rural	24.14	24.31	0.174	22.17	20.85	0.988
Calcium	Urban	8.63	8.47	0.621	8.75	9.90	0.380
	Rural	8.57	8.41	0.783	8.27	10.57	0.014
Phosphorous	Urban	3.93	4.15	0.779	3.87	4.56	0.379
	Rural	4.09	4.25	0.574	3.78	4.62	0.553
PTH	Urban	14.80	21.73	0.475	18.13	29.73	0.069
	Rural	16.07	19	0.106	14.67	28.67	0.640

Table 3: The Mean and p value of urban and rural for all parameters for control and experimental group Significant value = 0.001

Table 4 showed the independent sample t-test of all parameters for the control and experimental group. There was no significant difference at the pre stage of intervention of the control vs. experimental group. Whereas, significant differences were seen at the post interventional stage of control vs. experimental group for BMI calcium, phosphorus and PTH. At post stage of interventional statistics for BMI (23.325± 3.946 vs. 20.84± 3.166, p value <0.001), calcium (8.44± 0.582 vs. 10.25± 0.786, p value <0.001), phosphorus (4.20± 0.507 vs. 4.59± 0.271, p value < 0.001) and PTH (20.37± 4.620 vs. 29.20± 6.099, p value < 0.001).

Variables	Control Group		
	Pre-Test	Post-Test	P - Value
Height	1.47± 0.078	1.48± 0.079	0.988
Weight	49.57± 8.50	51.03± 7.86	0.383
BMI	23.109± 4.253	23.325± 3.946	0.457
Calcium	8.60± 0.324	8.44± 0.582	0.763
Phosphorous	4.01± 0.277	4.20± 0.507	0.010
PTH	15.43± 4.754	20.37± 4.620	0.417
Variables	**Experimental Group**		
	Pre-Test	**Post-Test**	**P - Value**
Height	1.49± 0.084	1.51± 0.081	0.134
Weight	49.53± 8.83	47.87± 8.50	0.140
BMI	22.37± 3.293	20.84± 3.166	0.009
Calcium	8.51± 1.469	10.24± 0.786	<0.001
Phosphorous	3.82± 0.265	4.59± 0.271	<0.001
PTH	16.47± 5.043	29.20± 6.099	<0.001

Table 4: Independent sample T-test for Control and Experimental group Significant value = 0.001

Table 5 showed paired wise statistics for height, weight, BMI, calcium, phosphorus and PTH of control vs. experimental group. It is clear from statistics that control group showed significant weight gain during interventional period as shown by (49.57kg to 51.03kg, p value<0.001). Similarly, the changes in experimental group were also significant. However, it showed a reduction in weight and BMI as shown (49.53kg to 47.87kg & 22.37kg/m2 to 20.84kg/m2, p value<0.001)respectively.

Variables	Control Group		
	Pre-Test	Post-Test	P - Value
Height	1.47 ± 0.078	1.48 ± 0.079	0.134
Weight	49.57 ± 8.504	51.03 ± 7.867	<0.001
BMI	23.109± 4.253	23.325± 3.946	0.047
Calcium	8.60± 0.324	8.44± 0.582	0.173
Phosphorous	4.01± 0.277	4.20± 0.507	0.240
PTH	15.43± 4.754	20.37± 4.620	<0.001
Variables	**Experimental Group**		
	Pre-Test	**Post-Test**	**P - Value**
Height	1.49 ± 0.084	1.51 ± 0.081	0.2
Weight	49.53 ± 8.831	47.87± 8.500	<0.001
BMI	22.373± 3.293	20.842±3.166	<0.001
Calcium	8.51± 1.469	10.24± 0.768	<0.001
Phosphorous	3.82± 0.265	4.59± 0.271	<0.001
PTH	16.47± 5.043	29.20± 6.099	<0.001

Table 5: Paired sample statistics of Height, Weight, BMI, Calcium, Phosphorous and PTH of Control and Experimental group Significant value = 0.001

It is clear from statistics that control group showed significant difference in PTH level during interventional period as shown by (15.43µg/ml to 20.37 µg/ml, p value<0.001). Similarly, the changes in experimental group were also significant in calcium, phosphorus and PTH as

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shown (8.51mg/dl to 10.24 mg/dl, p value<0.001), (3.82 mg/dl to 4.59 mg/dl, p value<0.001) and (16.47 µg/ml to 29.20 µg/ml, p value<0.001) respectively. RT is beneficial for reducing weight and BMI (weight p value <0.001, and BMI p value <0.001). At pre test stage the levels of calcium, PTH and phosphorus were same in both groups. The data of pretest of control group and experimental group revealed no significance difference in the calcium, phosphorus and PTH level of both groups (p value >0.001). At pre stage of intervention and post stage of intervention calcium and phosphorus levels revealed no significance in the control group (p value >0.001). At post interventional stage experimental group revealed significance difference in the calcium, phosphorus and PTH level vs. control group after 12 weeks of resistant exercises, whereas routine chores of daily life produced no significant effect (p value <0.001). At post stage of intervention only PTH showed significant difference in the control group than the pre interventional stage (p value <0.001).

DISCUSSION

The present study determined the effect of free weight resistance exercises on different physical parameters weight, height, BMI, and chemical parameters for bone health (calcium, phosphorus and parathyroid hormones) were determined. The study was conducted on two groups, control vs. experimental, equally selected from urban and rural population. The study revealed that RT has significant effect on the serum calcium level in both urban and rural children after 12 weeks of training. Many reports have suggested that calcium level is mainly dependent on the level and intensity of exercise. A study looked [18] at the effects of calcium and resistance exercise on bone density in healthy children aged 7 to 16 years, and found that bone density increased. Similar studies of Welch and Weaver (2005) have also reported that moderate exercise appears to have a positive effect on calcium balance and to increase bone metabolism as well [19]. It is also important to report that another study has reported a significant increase in calcium and phosphorus concentration after 8 weeks of continuous training for 3 days a week for 90-120 minutes [20]. The study revealed that RT has significant effect on the parathyroid hormones in both urban and rural children after 12 weeks of training. Physical exercise is important for improving body systems in order to achieve high peak bone mass and avoid bone fractures. When working out, the concentrations of PTH and calcium in the blood were calculated. PTH and serum calcium levels increased in response to physical activity. Long-term activity boosts PTH production, according to the findings [21].

CONCLUSIONS

The current study reveals that resistance training increases the serum calcium level, phosphorous and parathyroid hormones in the blood of children. The researcher further concluded that moderate exercise appears to have a positive effect on calcium balance and as well as increase bone metabolism. Irrespective of the nature of training, exercise in any form is beneficial. Resistance training is important for improving systems in order to achieve high peak bone mass and avoid bone fractures. Resistance training needs special consideration for bone mineralization.

REFERENCES

[1] Bradney M, Pearce G, Naughton G, Sullivan C, Bass S, Beck T et al. Moderate exercise during growth in prepubertal boys: changes in bone mass, size, volumetric density, and bone strength: a controlled prospective study. J Bone Miner Res. 1998 Dec;13(12):1814-21. doi: 10.1359/jbmr.1998.13.12.1814.

[2] Faigenbaum AD. State of the art reviews: Resistance training for children and adolescents: Are there health outcomes?. American Journal of Lifestyle Medicine. 2007 May;1(3):190-200. doi.org/10.1177/1559827606296814.

[3] Milteer RM, Ginsburg KR; Council on Communications And Media; Committee On Psychosocial Aspects Of Child And Family Health. The importance of play in promoting healthy child development and maintaining strong parent-child bond: focus on children in poverty. Pediatrics. 2012 Jan;129(1):e204-13. doi: 10.1542/peds.2011-2953.

[4] Lloyd T, Andon MB, Rollings N, Martel JK, Landis JR, Demers LM et al. Calcium supplementation and bone mineral density in adolescent girls. JAMA. 1993 Aug 18;270(7):841-4.

[5] Lane NE. Epidemiology, etiology, and diagnosis of osteoporosis. Am J Obstet Gynecol. 2006 Feb;194(2 Suppl):S3-11. doi: 10.1016/j.ajog.2005.08.047.

[6] Patterson-Kane JC, Firth EC. Physiology, and Adaptations to Exercise and Training. The Athletic Horse: principles and practice of equine sports medicine. 2013 Jun 6:202.

[7] Smith SM, Heer MA, Shackelford LC, Sibonga JD, Ploutz-Snyder L, Zwart SR. Benefits for bone from resistance exercise and nutrition in long-duration spaceflight: Evidence from biochemistry and densitometry. J Bone Miner Res. 2012 Sep;27(9):1896-906. doi: 10.1002/jbmr.1647.

[8] Rittweger J, Beller G, Ehrig J, Jung C, Koch U, Ramolla J et al. Bone-muscle strength indices for the human lower leg. Bone. 2000 Aug;27(2):319-26. doi: 10.1016/s8756-3282(00)00327-6.

[9] Berndt T, Thomas LF, Craig TA, Sommer S, Li X,

DOI:https://doi.org/10.54393/pbmj.v5i5.465

Bergstralh EJ et al. Evidence for a signaling axis by which intestinal phosphate rapidly modulates renal phosphate reabsorption. Proc Natl Acad Sci U S A. 2007 Jun 26;104(26):11085-90. doi: 10.1073/pnas.0704446104.

[10] Takeda E, Taketani Y, Sawada N, Sato T, Yamamoto H. The regulation and function of phosphate in the human body. Biofactors. 2004;21(1-4):345-55. doi: 10.1002/biof.552210167.

[11] Farrow EG, White KE. Recent advances in renal phosphate handling. Nat Rev Nephrol. 2010 Apr;6(4):207-17. doi: 10.1038/nrneph.2010.17.

[12] Maïmoun L, Simar D, Caillaud C, Peruchon E, Sultan C, Rossi M et al. Effect of antioxidants and exercise on bone metabolism. J Sports Sci. 2008 Feb 1;26(3):251-8. doi: 10.1080/02640410701501689.

[13] Walters P. Muscular Strength Assessment and Training. Christian Paths to Health and Wellness. 2013 Mar 26:107.

[14] Sundberg M, Düppe H, Gärdsell P, Johnell O, Ornstein E, Sernbo I. Bone mineral density in adolescents. Higher values in a rural area—a population-based study of 246 subjects in southern Sweden. Acta Orthop Scand. 1997 Oct;68(5):456-60. doi: 10.3109/17453679708996262.

[15] Gordon-Larsen P, McMurray RG, Popkin BM. Determinants of adolescent physical activity and inactivity patterns. Pediatrics. 2000 Jun;105(6):E83. doi: 10.1542/peds.105.6.e83.

[16] Diaz-Curiel M. Effects of Exercise on Osteoporosis, Advanced Osteoporosis Treatment, Alternative Treatment of Osteoporosis, Primary Osteoporosis. Journal of Osteoporosis and Physical Activity. 2013 Jan 21.

[17] Haapasalo H, Kannus P, Sievänen H, Heinonen A, Oja P, Vuori I. Long-term unilateral loading and bone mineral density and content in female squash players. Calcif Tissue Int. 1994 Apr;54(4):249-55. doi: 10.1007/BF00295946.

[18] Khodkaran MH, Hosseini A, Ghasemi A. Effect of resistance training and intake of calcium and phosphorous on bone density of the nonathletic adolescents. European Journal of Experimental Biology. 2014;4(5):72-5.

[19] Welch JM, Weaver CM. Calcium and exercise affect the growing skeleton. Nutrition reviews. 2005 Nov 1;63(11):361-73. doi.org/10.1111/j.1753-4887.2005.tb00373.x.

[20] Karakukcu C, Polat Y, Torun YA, Pac AK. The effects of acute and regular exercise on calcium, phosphorus and trace elements in young amateur boxers. Clin Lab. 2013;59(5-6):557-62. doi: 10.7754/clin.lab.2012.120505.

[21] 21.Barry DW, Kohrt WM. Acute effects of 2 hours of moderate-intensity cycling on serum parathyroid hormone and calcium. Calcified Tissue International. 2007 Jun;80(6):359-65. doi.org/10.1007/s00223-007-9028-y.

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Original Article

The Morbidity Patterns of Children with Severe Malnutrition

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ABSTRACT

Malnutrition is a widespread problem worldwide **Objective:** To identify the morbidity patterns of children with severe acute malnutrition **Methods:** A cross-sectional study was conducted in the Pediatric Unit-II of Abbasi Shaheed Hospital for a six-month duration from July 2021 to December 2021. Children aged 1 to 60 months with severe acute malnutrition (WHZ score <-3 SD) were selected. All patients were assessed for clinical symptoms, various disease states such as metabolic abnormalities, infections, congenital/hereditary anomalies, and outcomes such as left against medical advice (LAMA), stabilization, or death on discharge. Data was analyzed and collected using descriptive statistics in SPSS version 17. **Results:** A total of 150 children were admitted according to the admission criteria. The number of males was 85 (56.7%) and females 65 (43.3%), and the male to female ratio was 1.4: 1. 120 (80%) had severe wasting without edema and 30 (20%) had malnutrition with edema. The average length of stay was 10 + 3.6 days. The main incidence in children with MAS are diarrhea (46.7%), pneumonia (18.7%), sepsis (15.3%), and other diseases such as meningitis 5(3.3 %), severe skin infections, 7(4.7%), urinary tract infections 9(6%), and eye lesions due to vitamin A deficiency 2(1.3%). 13 (8.7%) patients had measles with diarrhea and pneumonia. Acute watery diarrhea was observed in 68(45.3%) of diarrhea cases. 21 (14%) children had congenital or hereditary defects. 9 (6%) had central nervous system disorders. **Conclusions:** The spectrum of incidence in hospitalized children with severe malnutrition includes both congenital or hereditary defects and infections. The sepsis and diarrhea with metabolic disturbances mainly contributed to the mortality.

INTRODUCTION

Malnutrition is a widespread problem worldwide and 2 billion children worldwide suffer from acute malnutrition (SAM), with the greatest burden in sub-Saharan Africa and South Asia [1,2]. In Southeast Asia, the mortality rate varies from 6% to 40%, and some series of complicated MAS have a mortality rate of more than 32%, even with the treatment suggested by the WHO. In developing countries such as Pakistan, this is often the result of socio-economic, political, environmental or natural disasters [3]. A significant proportion of sick children admitted to hospital also have MAS. Associated disease may further contribute to malnutrition with worse outcomes. Inpatient malnourished children have a higher complication rate, higher mortality, longer hospital stays, and higher hospitalization costs [4,5]. The lack of infrastructure to monitor growth and regular institutional assessments is responsible for the persistence and late detection of malnutrition in these children [6,7]. Better nutritional status is associated with better survival and better outcomes. After clinical recovery, aggressive nutritional management is the cornerstone of caring for these children and a more promising strategy for improving outcomes [8,9]. This prospective study was conducted using WHO guidelines and basic principles of management of severe acute malnutrition. We plan to identify the morbidity patterns of children with MAS. This test may be helpful in screening for and early detection of complications requiring hospitalization to prevent

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mortality from these complications. This study aims to identify the morbidity patterns of children with severe acute malnutrition.

METHODS

This cross-sectional study was conducted at the Abbasi Shaheed Hospital for a six-month duration from July 2021 to December 2021. The study included children aged 1 to 59 months with MAS defined as Z-score (WHZ) <-3 SD), with or without bilateral pitting edema, and with any of the following symptoms: anorexia, severe anemia, severe dehydration, systemic infection, and high fever. Children over 60 months of age with severe birth defects or severe neurological disorders or medical and surgical conditions that make feeding through the mouth or nose difficult were not included. All children were done with a detailed laboratory and clinical evaluation by a general practitioner, with specific stress on their comorbidities and nutritional status. The demographic profile, including gender, age, weight, height, WHZ score and length of stay, discomforts related to the presentation, and an appropriate physical examination were recorded on a pre-designed form. Patients were monitored and assessed daily during their hospital stay in order to identify various medical conditions and related congenital or hereditary disorders. The children were managed according to the WHO standard guidelines for the management of SAM. Nasogastric tube feeding was preferred for children who were too sick to be fed orally. All patients were given oral vitamin A on admission (200,000 IU for patients> 12 months or 100,000 IU if <12 months), additional doses were given on days 2 and 14 in patients with clinical symptoms of vitamin A deficiency. Children with diarrheal dehydration are managed with a rehydration solution. In the first phase of treatment (3-4 days), F-75 medicated milk (prepared from powdered milk in the hospital kitchen) was used, followed by F-100 or RUTF medicated milk (ready-to-use therapeutic food) as the case may be in the second phase. Infants less than 6 months of age used infant formula and diluted F-100. All children underwent blood glucose, complete blood count, urine tests, and serum electrolytes. Depending on the patient's clinical condition, additional laboratory tests were performed, such as chest X-ray, blood culture, urine culture and hypersensitivity, arterial blood gas analysis, and abdominal ultrasound. Almost all patients were treated with penicillin-gentamicin antibiotics, with the exception of 12 young children who received the combination of ceftriaxone and amikacin. The social science statistical package (SPSS) for Windows version 17 was used for data analysis. Quantitative variables were expressed as mean + standard deviation, and qualitative variables as frequency and percentage.

RESULTS

A total of 150 children were admitted according to the admission criteria. The number of males was 85 (56.7%) and females 65 (43.3%), and the male to female ratio was 1.4: 1. 120 (80%) had severe wasting without edema and 30 (20%) had malnutrition with edema. The average length of stay was 10± 3.6 days. Table 1 describes the main characteristics of children with MAS.

Characteristics	Overall n=150 (%)	1-6 months n=44	7-24 months n=71	25-59 months n=32
Gender				
Male	85(56.7)	25(29.4)	48(56.5)	12(14.1)
Female	65(43.3)	21(32.3)	23(35.4)	21(32.3)
WHZ Scores				
3 SD	58 (38.7)	15(25.9)	26(44.8)	17(29.3)
4 SD	92(61.3)	27(29.3)	49(53.3)	16(17.4)
Edema				
Yes	30 (20)	05(16.7)	17(56.7)	8(26.7)
No	120(80)	37(30.8)	58(48.3)	25(20.8)
Feeding at the time of admission:				
Breast Feeding	42 (28)	19(45.2)	21(50.0)	2(4.8)
Bottle Feeding	39 (26)	17(43.6)	19(48.7)	3(7.7)
Semi-solids only	31 (20.7)	0	11(35.5)	20(64.5)
Breast Feeding & Semi -Solids	38 (25.3	03(7.9)	20(52.6)	4(10.5)
Mean Height (cm)	66.8	54.6	65.0	79.5
Mean Weight (Kg)	5.3	3.01	5.21	7.37

Table 1: Baseline Features of Children with Severe Acute Malnutrition n=150

Table 2 shows the incidence pattern, and the main incidence in children with MAS are diarrhea (46.7%), pneumonia (18.7%), sepsis (15.3%), and other diseases such as meningitis 5(3.3 %), severe skin infections, 7(4.7%), urinary tract infections 9(6%), and eye lesions due to vitamin A deficiency 2(1.3%). 13 (8.7%) patients had measles with diarrhea and pneumonia. Four patients had tuberculosis (TB), three had pulmonary tuberculosis, and one had meningeal tuberculosis. Rickets was found in 11 (7.3%) children with biochemical and radiological changes. One patient had malaria (Table 2).

Morbidity	Number	Percentage
Diarrhea	70	46.7
Pneumonia	28	18.7
Sepsis	23	15.3
Measles	13	8.7
Rickets	11	7.3
Metabolic abnormalities		
Hyponatremia	30	2 0
Hypokalaemia	21	1 4
Hypoglycaemia	16	10.7

Table 2: Morbidity Pattern in Children with Severe Acute Malnutrition (n=150)

Acute watery diarrhea was observed in 68(45.3%) of diarrhea cases, while persistent diarrhea was observed in

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only four of them. 58 patients were severely dehydrated, while others were or were not dehydrated. The second most common type of morbidity was pneumonia, including secondary to measles and tuberculosis. Out of 23 (15.3%) patients with sepsis, 18 had leucocytosis and 5 had leukopenia as a marker of sepsis. Blood culture sensitivity was positive in 6 patients, Klebsiella pneumonia 3, Enterobacter 2 and Streptococcus pyogenes 1. Anemia occurred in 123 (82%) patients with severe malnutrition. The haemoglobin level was <4 g / dL in 12 patients, 4.1 to 7 g / dL in 35 patients, and 7.1 to 10 g / dL in 90 patients and remaining 12 have above 15 g / dL. 88 (58.7%) of the children had a fever during the presentation at temperatures between 100 ° F and 104 ° F. None of them were hypothermic (<95 ° F); only one child had a normal temperature of less than 97° F.

One or more metabolic abnormalities have been observed in patients with MAS on admission or during hospital stay. The most common metabolic abnormality in 45(30) % of children was hyponatraemia followed by hypokalaemia (18%). Hypoglycaemia was observed in 12.7% of cases, and 10 (6.7%) had hypernatremia (> 150 meq / l). 21 (14%) children had congenital or hereditary defects. 9 (6%) had central nervous system disorders such as hydrocephalus 2, cerebral cyst 2, leukodystrophy 1, and seizure disorders 4. Five had congenital heart disease, 2 had ventricular communication, and 3 had pulmonary hypertension. Of the 130 children who received first-line antibiotic therapy with intravenous penicillin and gentamicin, 93 recovered and 57 (38%) received cephalosporin and amikacin. 9 patients switched to other antibiotics such as ciproxin 5, vancomycin 2, and imipenem 2.

DISCUSSION

In our study, most children had significant weight loss (80%) and 20% had edema malnutrition. Similar numbers were reported in Asian studies where severe wasting occurred in 75% of cases and edema malnutrition occurred in 25% of cases [10-12]. Studies from Africa have shown higher rates (48.2% -70%) of edema malnutrition [13,14]. Several studies have shown that MAS is more common in boys than in girls. The explanation for the apparent male dominance is unknown [15]. According to our research, male dominance (56.7%) has been documented; but no reason could be attributed to it. In contrast, other Pakistani studies reported a female predominance [16]. Lack of breastfeeding, inadequate vaccinations, poor hygiene and sanitation, and MAS likely contribute to the high rate of these infections in the present study [17,18]. In severe cases of pneumonia, which may not be manifested by the usual clinical symptoms, the presence of MAS increases the risk of death, and in hospitalized children, a blood culture or chest X-ray may be necessary. Studies from Asia have found bacteremia and/or sepsis in 16% of cases. In our study, the majority of sepsis patients had leucocytosis (78.3%), which is similar to the study in Pakistan. Blood culture efficiency was positive in 6 patients, Klebsiella pneumonia 3, Enterobacter 2, and Streptococcus pyogenes 1. In contrast, research in Africa showed a high prevalence of gram-positive organisms (68.6-71%); A study in Uganda listed Staphylococcus aureus, streptococcus and H influenza as the most common bacterial causes of pneumonia [19,20]. Urine culture reports showed E. coli and Klebsiella species. In a study conducted in Gambia, E. coli was found in 55.6% of isolated urine cultures. Malnutrition remains very common in hospitalized children with chronic conditions such as chronic renal failure, heart failure, or neurological disorders [21]. We have seen MAS cases associated with congenital heart disease, urolithiasis, neurological, metabolic and chromosomal abnormalities but these abnormalities have been excluded in other studies. Micronutrient deficiencies, especially vitamin A, zinc, and iron, are important risk factors for high mortality in children with MAS and infections. Ejaz et al., Reported a high frequency of micronutrient deficiencies, with iron deficiency anemia the most frequent (80.3%), followed by vitamin D deficiency (rickets 35.7%) and vitamin A deficiency (18.7%) [21,22]. In addition, we found that the incidence of anemia (iron, folate, vitamin B12 deficiency) was high at 82%, but that the incidence of rickets (7.3%) and vitamin A deficiency (1.3%) was low. Blood transfusion, intravenous fluid infusion, hypokalaemia, and sepsis are major risk factors for mortality [23,24]. This high mortality rate indicates critical and advanced patient stages in tertiary hospitals. The strength of our study was a fairly good sample size with clinical, laboratory, and radiological evaluations of patients in Pakistan, which may have contributed to the local source of data on MAS, however as the study was limited to only one hospital, it cannot be estimated for the country's population.

CONCLUSION

The spectrum of incidence in hospitalized children with severe malnutrition includes both congenital or hereditary defects and infections. The sepsis and diarrhea with metabolic disturbances mainly contributed to the mortality. We recommend training in personal hygiene, hand washing, mother and baby nutrition, and immunization to prevent infections and malnutrition. Women's education, the provision of safe drinking water, sanitation, immunization through the implementation of integrated disease management programs for newborns

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and children, and environmental management of acute malnutrition in primary care are essential to prevent morbidity and mortality.

REFERENCES

[1] Grellety E, Golden MH. Severely malnourished children with a low weight-for-height have a higher mortality than those with a low mid-upper-arm-circumference: I. Empirical data demonstrates Simpson's paradox. Nutr J. 2018 Sep 15;17(1):79. doi: 10.1186/s12937-018-0384-4.

[2] Yohannes T, Laelago T, Ayele M, Tamrat T. Mortality and morbidity trends and predictors of mortality in under-five children with severe acute malnutrition in Hadiya zone, South Ethiopia: a four-year retrospective review of hospital-based records (2012-2015). BMC Nutr. 2017 Feb 27;3:18. doi: 10.1186/s40795-017-0135-5.

[3] Girum T, Kote M, Tariku B, Bekele H. Survival status and predictors of mortality among severely acute malnourished children <5 years of age admitted to stabilization centers in Gedeo Zone: a retrospective cohort study. Ther Clin Risk Manag. 2017 Jan 23;13:101-110. doi: 10.2147/TCRM.S119826.

[4] Awasthi S, Verma T, Sanghvi T, Frongillo EA. Path to severe acute malnutrition in children below 2 years of age: Findings of qualitative research in Uttar Pradesh, North India. Clinical Epidemiology and Global Health. 2019 Jun 1;7(2):246-52. doi.org/10.1016/j.cegh.2018.11.001.

[5] Gavhi F, Kuonza L, Musekiwa A, Motaze NV. Factors associated with mortality in children under five years old hospitalized for Severe Acute Malnutrition in Limpopo province, South Africa, 2014-2018: A cross-sectional analytic study. PLoS One. 2020 May 8;15(5):e0232838. doi: 10.1371/journal.pone.0232838.

[6] Kazi U, Tariq S, Saleem S, Fareeduddin M. Clinical Spectrum of admitted Severely Acute Malnourished Children at The Indus Hospital Karachi: An Evaluation of One year's experience. Annals of Jinnah Sindh Medical University. 2018;4(2):70-4.

[7] Ali W, Khuhro AA, Rajper SB, Rehman FU. Morbidity patterns and outcome in children with severe acute malnutrition at a Tertiary Care Hospital. The Professional Medical Journal. 2020 Sep 10;27(09):1799-803. doi.org/10.29309/TPMJ/2020.27.09.3528.

[8] Gokhale CN, Borgaonkar CA, Shanbhag SS, Solanki MJ, Rasal MM. Morbidity pattern among primary school children in a tribal area of Maharashtra. Int J Community Med Public Health. 2018 Jan;5(1):165-9. DOI: 10.18203/2394-6040.ijcmph20175776.

[9] Uwaezuoke SN, Ndu IK, Eze IC. The prevalence and risk of urinary tract infection in malnourished children: a systematic review and meta-analysis. BMC Pediatr. 2019 Jul 27;19(1):261. doi: 10.1186/s12887-019-1628-y.

[10] Debnath SC, Riaz BK, Islam Z, Samin S. Malnutrition and morbidity profile of under five children: a cross-sectional scenario in a rural area of Bangladesh. MOJ Public Health. 2017;5(6):00151.

[11] Kurrey VK, Lokesh S, Rakesh N, Sharja P. Study of health status and morbidity pattern in 5-18 years Birhor children: A primitive tribe of Chhattisgarh. Indian Journal of Child Health. 2017 Jun 25;4(2):180-3. doi.org/10.32677/IJCH.2017.v04.i02.016.

[12] Martin-Canavate R, Custodio E, Yusuf A, Molla D, Fasbender D, Kayitakire F. Malnutrition and morbidity trends in Somalia between 2007 and 2016: results from 291 cross-sectional surveys. BMJ Open. 2020 Feb 17;10(2):e033148. doi: 10.1136/bmjopen-2019-033148.

[13] Acevedo P, Esteban MT, Lopez-Ejeda N, Gómez A, Marrodán MD. Influence of malnutrition upon all-cause mortality among children in Swaziland. Endocrinologia, diabetes y nutricion. 2017 Apr 1;64(4):204-10. doi.org/10.1016/j.endinu.2017.01.008.s

[14] Namaganda LH, Almeida R, Kajungu D, Wabwire-Mangen F, Peterson S, Andrews C et al. Excessive premature mortality among children with cerebral palsy in rural Uganda: A longitudinal, population-based study. PLoS One. 2020 Dec 29;15(12):e0243948. doi: 10.1371/journal.pone.0243948.

[15] John C, Adedeji IA, Adah R, Diala UM, Lar L, Envuladu EA et al. Nutritional and morbidity outcomes of children managed for severe acute malnutrition in Jigawa State, Nigeria. Nigerian Journal of Medicine. 2019 Nov 7;28(3):210-4. DOI: 10.4103/1115-2613.278587.

[16] Debnath SC, Haque ME, Hasan DMM, Samin S, Rouf MA, Rabby MF. Undernutrition and Morbidity Profile of Exclusively Breastfeeding Children: A Cross-sectional Study. Int J Prev Med. 2018 Jun 26;9:55. doi: 10.4103/ijpvm.IJPVM_201_17.

[17] Striessnig E, Bora JK. Under-five child growth and nutrition status: spatial clustering of Indian districts. Spatial Demography. 2020 Apr;8(1):63-84. doi.org/10.1007/s40980-020-00058-3.

[18] Raza M, Kumar S, Ejaz M, Azim D, Azizullah S, Hussain A. Electrolyte Imbalance in Children With Severe Acute Malnutrition at a Tertiary Care Hospital in

DOI:https://doi.org/10.54393/pbmj.v5i5.433

Pakistan: A Cross-Sectional Study. Cureus. 2020 Sep 19;12(9):e10541. doi: 10.7759/cureus.10541.

[19] De Onis M. Child growth and development. Nutrition and health in a developing world. 2017:119-41.

[20] Vonasek BJ, Chiume M, Crouse HL, Mhango S, Kondwani A, Ciccone EJ et al. Risk factors for mortality and management of children with complicated severe acute malnutrition at a tertiary referral hospital in Malawi. Paediatr Int Child Health. 2020 Aug;40(3):148-157. doi: 10.1080/20469047.2020.1747003.

[21] Ibrahim UA, Aikhionbare HA, Aliyu I. Urinary tract infection in children with protein-energy malnutrition in Aminu Kano Teaching Hospital Kano, Northwest Nigeria. Nigerian Journal of Basic and Clinical Sciences. 2019 Jan 1;16(1):64. DOI: 10.4103/njbcs.njbcs_5_18.

[22] Muzigaba M, Kigozi G, Puoane T. Short-term and sustained effects of a health system strengthening intervention to improve mortality trends for paediatric severe malnutrition in rural South African hospitals. South African Journal of Child Health. 2017 Apr 6;11(1):38-45.

[23] Gathara D, Malla L, Ayieko P, Karuri S, Nyamai R, Irimu G et al. Variation in and risk factors for paediatric inpatient all-cause mortality in a low income setting: data from an emerging clinical information network. BMC Pediatr. 2017 Apr 5;17(1):99. doi: 10.1186/s12887-017-0850-8.

[24] Isingoma BE, Mbugua SK, Karuri EG. Nutritional status of children 7-36 months old from millet consuming communities of Masindi District, Western Uganda. BMC Nutr. 2019 Feb 11;5:11. doi: 10.1186/s40795-019-0273-z

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Original Article

The Splenic Artery and Segmental Branches Morphometric Study in Humanoid Cadaver Spleens by Method of Dissection

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ABSTRACT

Human spleen has various functions including immune system regulation and haematopoisis. The spleen is an extremely vascularized and fragile organ. It is the second major lymphatic organ, containing 25% of lymphoid tissue in the body, and has haematologic and immunologic roles. **Objective:** To understand the segmental branches morphometry of the polar and splenic arteries. **Methods:** The analysis was performed on 86 spleens collected from adult human cadavers of not known gender, stored in 10% formalin solution. In the Department of Anatomy, Mohi-ud-Din Islamic Medical College (MIMC), Mirpur, Azad Jammu & Kashmir and Women Medical and Dental College Hospitals, Abbottabad for six- months duration from July-December 2021 **Results:** In 59(68.6%) spleen samples; there were 2 primary branches, 23(26.7%) samples had three primary branches, and 4 (4.7%) specimens had four primary branches. 20 (23.3%) samples had superior polar arteries, 34(39.5%) had inferior polar arteries, and both inferior and superior polar arteries in 7(8.1%) samples. The inferior polar artery length ranged from 0.9-5.90 cm, with 3.17 cm of average length and 3.30 cm median length. The superior PB diameter ranged from 0.8-4.12 mm, with 2.20 mm average length and 2.4 mm median length. The mean diameter of middle PB ranged from 0.8 mm to 3.6 mm, with an average of 2.10 mm and 2.4 mm median length. The superior polar artery diameter ranged from 0.5-3.1 mm, with 1.40 mm average length and 1.4 mm of median. The inferior polar artery diameter varies from 0.5-2.9 mm, with 1.3 mm of an average diameter with 1.4 mm median. **Conclusions:** As various splenic sparing surgeries depend on a better information of the vascular anatomy of the spleen, this analysis enhances the current information about the segmental branches' morphometry of the splenic artery.

INTRODUCTION

In the human body; the major lymphatic organ is spleen supplied by the splenic artery, the main division of the celiac trunk [1,2]. It crosses the lienorenal ligament and approaches the spleen hilum where it splits into 2-3 main branches, each of which divides mainly into 2-4 secondary branches [3,4]. Also, inferior and superior polar arteries arise from the primary branches or splenic trunk and pass into the spleen pole without entrance in the hilum [5,6]. The spleen partial elimination is probable because its division into sections parted by a fibrous septum, and every section has its individual major artery blood supply. The occurrence of spleen segmentation can be accredited to its progression or final artery division [7,8]. Improved structural information of segmental distribution and lesions of the splenic artery is important for partial organ removal [9]. Since various spleen-sparing surgeries depend on improved knowledge of the spleen vascular anatomy, this study complements the current understanding of the segmental branches' morphometry of the splenic artery [10]. To learn about the splenic artery and its segmental branches. Examine the polar arteries and assess the dimension of the segmented and main pole branches. Evaluate the diameter of the polar branches and primary segmental branches.

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METHODS

The analysis was performed on 86 spleens collected from adult human cadavers of not known gender and age, stored in 10% formalin solution. The gross dissection was performed according to the instructions in the Cunningham Manual. The identification of the spleen was done and released from the stomach and posterior wall of abdomen by dissecting the lienorenal and gastrosplenic ligament. About 10cm proximal to the spleen hilum; splenic artery was cut, after which the it was removed. The fat and fascia near the hilum were removed to reveal segmental splenic artery branches. First, major segmental branches of the polar and splenic arteries, if present, were recognized and recorded, and after that the lengths of polar arteries and segmental branches were evaluated directly by means of a digital Vernier caliper. The outer diameter of the polar arteries and segmental branches were assessed directly 1 cm distal from their origin by means of a digital Vernier caliper. During the measurement, care was taken not to press the artery against the edge of the caliper.

RESULTS

In 59 (68.6%) spleen samples; there were 2 primary branches, 23(26.7%)samples had three primary branches, and 4(4.7%)specimens had four primary branches(Table 1). 20 (23.3%) samples had superior polar arteries, 34 (39.5%) had inferior polar arteries, and both inferior and superior polar arteries in 7 (8.1%) samples (Table 2). The inferior polar artery length ranged from 0.9-5.90 cm, with 3.17 cm of average length and 3.30 cm median length. The superior PB diameter ranged from 0.8-4.12 mm, with 2.20 mm average length and 2.4 mm median length. The mean diameter of middle PB ranged from 0.8 mm to 3.6 mm, with an average of 2.10 mm and 2.4 mm median length. The superior polar artery diameter ranged from 0.5-3.1 mm, with 1.40 mm average length and 1.4 mm of median. The inferior polar artery diameter varies from 0.5-2.9 mm, with 1.3 mm of an average diameter with 1.4 mm median(Table 3,4).

Primary segmental branches	Numeral of specimens (86)	%age
One	Nil	0
Two	59	68.6
Three	23	26.7
Four	4	4.7

Table 1: Numeral of splenic artery with its primary segmental branches

Polar artery	Numeral of specimens (79)	%age
Inferior Polar Artery	Nil	0
Superior Polar Artery	59	68.6
None (no polar artery)	23	26.7
Superior & Inferior Polar Artery (Both)	4	4.7

Table 2: Distribution of Polar artery

Length	Superior primary segmental	Middle primary segmental branch	Inferior primary Segmental	Extra primary segmental branch	Superior Polar artery	Inferior polar artery
No	86	49	86	5	20	34
SD	0.740	0.670	0.990	0.8	1.210	1.34
Mean	1.70	1.13	1.92	1.4	2.80	3.17
Maximum	4.3	2.1	5.1	1.7	5.51	5.9
Minimum	0.4	0.3	0.30	0.4	0.8	0.9
Median	1.2	1.1	1.6	1.59	2.4	3.30

Table 3: Dimension of polar artery and primary segmental branches

Length	Superior primary segmental	Middle primary segmental branch	Inferior primary Segmental	Extra primary segmental branch	Superior Polar artery	Inferior polar artery
No	86	49	86	5	20	34
SD	0.821	0.690	0.820	0.5	0.660	0.570
Mean	2.20	2.10	2.13	2.3	1.400	1.310
Maximum	4.12	3.6	4.4	3.9	3.1	2.9
Minimum	0.8	0.8	0.6	1.9	0.5	0.5
Median	2.4	2.4	2.10	1.2	1.4	1.4

Table 4: The polar artery and primary segmental branches diameter

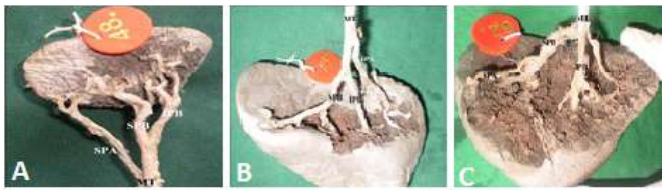

Figure 1A: Superior Polar artery B: Inferior polar artery C: both inferior and superior polar artery

DISCUSSION

The splenic artery supplies the spleen, which divides into 2 or 3 terminal branches and ends at the hilum. These are the so-called superior, middle and inferior main branches [11,12]. The specific part of the spleen is supplied by these branches divided by avascular plane. Therefore, these arteries split the spleen into different arterial sections [13,14]. We observed 2-4 major branches in this study. In few spleens, branch that arises from the splenic artery itself or from its main branches, do not penetrate the hilum, but enter the spleen poles and called as the inferior and superior polar arteries. These similarly supply the spleen specific segment, which are regarded as the polar segments [15,16]. The dimension of the superior PB ranged from 0.4-4.3 cm, with 1.70 cm average length and 1.2 cm of median. The mean dimensions of middle PB vacillated from 0.3-2.1 cm, with 1.13 cm average length and 1.1 cm median

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length. The dimension of the inferior PB vacillated from 0.30-5.1 cm, with 1.92 cm average length and 1.6 cm median length. The extra length of PB varies from 0.4-1.7 cm, with 1.4 cm of average length and 1.59 cm median length. In our study, 18 (22.8%) samples had superior polar arteries, 32 (40.5%) have inferior polar arteries, and both inferior and superior polar arteries in 6 (5.2%) samples. A detailed information of the anatomy of the individual segmental branches is vital for accessing and ligating the arteries during surgical procedures. In this analysis, the superior polar artery length varies from 0.8-5.49 cm, with an average of 2.76 cm and 2.8 cm median length. The superior polar artery length varies from 0.8-5.51 cm, with 2.80 cm of average length and 2.4 cm median length [17,18]. The inferior polar artery length ranged from 0.9-5.90 cm, with 3.17 cm of average length and 3.30 cm median length. The superior PB diameter ranged from 0.8-4.12 mm, with 2.20 mm average length and 2.4 mm median length [19]. The mean diameter of middle PB ranged from 0.8 mm to 3.6 mm, with an average of 2.10 mm and 2.4 mm median length [20]. The PB inferior diameter ranged from 0.6 mm to 4.4 mm, with an average of 2.13 mm and 2.10 mm median length.

CONCLUSION

Complete splenectomy is usually performed following spleen injury, predisposing to immunosuppression and predisposing the normal host to life-endangering contaminations and infections, and generates a different haematologic depiction. To remedy this, a partial splenectomy can be performed by ligation of the specific splenic artery segmental branch. As various sparing of spleen surgeries depends on a better information of the spleen vascular anatomy, this analysis enhances the current information about the segmental branches' morphometry of the splenic artery.

REFERENCES

[1] Revathi S. A Cadaveric study of Segmental Branches of Splenic Artery-Anatomy and Its Variations (Doctoral dissertation, Madurai Medical College, Madurai).

[2] Maske SS, Kataria SK, Raichandani L, Dhankar R. A Cross-sectional study of anatomical variations in the splenic artery branches.

[3] Tenaw B, Muche A. Assessment of anatomical variation of spleen in an adult human cadaver and its clinical implication: Ethiopian cadaveric study. Int J Anat Var 2018 Dec; 11:139-42.

[4] Srividhya E, Rajapriya V. variations in the branching pattern of coeliac artery in adult human cadavers of tamilnadu with clinical and embryological relevance. Int J Anat Res. 2020;8(2.2): 7499-04.doi.org/10.16965/ijar.2020.145

[5] Granite G, Meshida K, Wind G. Branching pattern variations of the celiac trunk and superior mesenteric artery in a 72-year-old white female cadaver. Int J Anat Var Vol. 2019 Dec;12(4):55. doi.org/10.37532/ijav.2019.12(4).55-59

[6] Eberlova L, Liska V, Mirka H, Tonar Z, Haviar S, Svoboda M, et al. The use of porcine corrosion casts for teaching human anatomy. Annals of Anatomy-Anatomischer Anzeiger. 2017 Sep 1; 213:69-77. doi.org/10.1016/j.aanat.2017.05.005

[7] Nawal AN, Maher MA. Gross anatomical, radiographic and ultra-structural identification of splenic vasculature in some ruminants (camel, buffalo calf, sheep and goat). Int. J. Adv. Res. Biol. Sci. 2018;5(2):44-65.

[8] Fomin D, Chmieliauskas S, Petrauskas V, Sumkovskaja A, Ginciene K, Laima S, et al. Traumatic spleen rupture diagnosed during postmortem dissection: A STROBE-compliant retrospective study. Medicine. 2019 Oct;98(40).doi.org/10.1097/MD.0000000000017363

[9] Elamin RA. Measurement of Splenic Volume in Adult Sudanese Population Using Computed Tomography (Doctoral dissertation, Sudan University of Science and Technology).

[10] Bardol T, Subsol G, Perez MJ, Geneviève D, Lamouroux A, Antoine B, et al. Three-dimensional computer-assisted dissection of pancreatic lymphatic anatomy on human fetuses: a step toward automatic image alignment. Surgical and Radiologic Anatomy. 2018 May;40(5):587-97. doi.org/10.1007/s00276-018-2008-2

[11] De oliveira GB, Camara FV, Bezerra FV, de Araujo Junior HN, de oliveira RE, da Silva costa H, et al. Morphology and anatomic-surgical segmentation of the spleen of Pecari tajacu Linnaeus, 1758. Bioscience Journal. 2018 Sep 1;34(5): 1339-48. doi.org/10.14393/BJ-v34n5a2018-36415

[12] Gutsol AA, Blanco P, Samokhina SI, Afanasiev SA, Kennedy CR, Popov SV, et al. A novel method for comparison of arterial remodeling in hypertension: quantification of arterial trees and recognition of remodeling patterns on histological sections. PloS one. 2019 May 21;14(5): e0216734.doi.org/10.1371/journal.pone.0216734

[13] Negoi I, Beuran M, Hostiuc S, Negoi RI, Inoue Y. Surgical anatomy of the superior mesenteric vessels related to pancreaticoduodenectomy: a systematic

DOI:https://doi.org/10.54393/pbmj.v5i5.461

review and meta-analysis. Journal of Gastrointestinal Surgery. 2018 May;22(5):802-17.doi.org/10.1007/s11605-018-3669-1

[14] Bolintineanu LA, Costea AN, Iacob N, Pusztai AM, Pleş H, Matusz P. Hepato-spleno-mesenteric trunk, in association with an accessory left hepatic artery, and common trunk of right and left inferior phrenic arteries, independently arising from left gastric artery: case report using MDCT angiography. Rom J Morphol Embryol. 2019 Jan 1;60(4):1323-31.

[15] Blanco P, Samokhina SI, Afanasiev SA, Kennedy CR, Popov SV, Burns KD, et al. A novel method for comparison of arterial remodeling in hypertension: Quantification of arterial trees and recognition of remodeling patterns on histological sections.

[16] Haobam RS. Study of the Anatomical variations of the liver in Human (Doctoral dissertation, Christian Medical College, Vellore).

[17] Khanday S. Anatomical variations in the human body: exploring the boundaries of normality (Doctoral dissertation, Kingston University).

[18] Alvino VV, Fernández-Jiménez R, Rodriguez-Arabaolaza I, Slater S, Mangialardi G, Avolio E, Spencer H, et al. Transplantation of allogeneic pericytes improves myocardial vascularization and reduces interstitial fibrosis in a swine model of reperfused acute myocardial infarction. Journal of the American Heart Association. 2018 Jan 22;7(2): e006727. doi.org/10.1161/JAHA.117.006727

[19] Derewicz D, Taras R, Florescu C, Balgradean M, Sajin M. morphometry of podocytes–a single center study of pediatric patients: is there any correlation with proteinuria level?

[20] Breguet R. Role of abdominal and interventional radiology in multidisciplinary management of alcohol-related liver disease (Doctoral dissertation, University of Geneva).

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Original Article

Frequency of Abnormal Pap's Smears in Patients with Vaginal Discharge

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ABSTRACT

Cervix malignancy is one of the common types of cancer all across the globe. Among all the types of cancers in females, cervical cancers are the major cause of mortality. The detection and management of these types of cancers are necessary. One of the easiest tests is Pap's smear which is a rapid and painless screening test for detection of cervical dysplasia or cervical malignancy. **Objective:** To calculate the current magnitude and most frequent abnormal Pap's smear in the female population of Sindh, Pakistan, and to determine the frequency of abnormal Pap's smears in patients with vaginal discharge. **Methods:** It was descriptive cross-sectional research conducted for six months in department of Obstetrics & Gynecology Unit, Civil Hospital Karachi from November, 2017 to May, 2018. A total of 214 women with vaginal discharge were included in this study. Demographic variables and history of previous pelvic or abdominal surgery was recorded. All enrolled women underwent examination of cervix and cell sample was obtained with Ayr's spatula for pap's smear and evaluated **Results:** The average age of the women was 34.86 years, frequency of abnormal pap's smears in patients with the vaginal discharge was observed in 4.67% (10/214) cases. Out of 10 cases, infection was observed in 8 women and 2 patients exhibited dysplasia. The frequency of abnormal Pap's smears in patients with vaginal discharge was found to be low but the complaint of vaginal discharge was very common. **Conclusions:** It was concluded that factor such as increasing age, low socioeconomic status and high parity were the contributory factors for the vaginal discharge. So, there must be raised awareness among females about their reproductive system and self-concern for their own health.

INTRODUCTION

Malignancy of the cervix also known as cervical cancer is the most common type of malignancies in females worldwide, and remains a leading cause of death due to cancer in the women of developing countries, affecting nearly 7.9% of all cancers in the females [1,2]. In developing countries nearly 70% a cancer is of cervical origin and is major cause of mortality in developing countries [3,4]. In Pakistan, cervical cancer ranks among fourth commonest malignancies and rising prevalence has been evident from various studies [3,5]. In the developed countries like United States, the frequency and incidence of cervical cancer is relatively low. This decline in invasive cervical cancer over the past few decades in the United States has been observed [6] but it is still a high risk for females in various developing countries. In developing countries, the trend of epidemiology has been accredited to mass screening with Papanicolaou tests (Pap test), which allows the detection as well as the treatment and management of different pre-invasive diseases [7]. The etiologic role of human papillomavirus (HPV) infection has been investigated in cervical cancer which has led to the addition of HPV testing in the screening regimen of females with age of 30 years to 65 years [8]. However, females with definite symptoms, and abnormalities in initial screening test results, or who presented with a gross lesion of the cervix were recommended to be best investigated through colposcopy and biopsy [9]. According to the study, 10.2% of cases have been detected by Pap's smears [3]. Pap's smear is easy, rapid, and basically painless screening test for the detection of cervical dysplasia or cervical malignancy [3,5,10]. Since its advent, there has been a dramatic reduction in morbidity and mortality due to cervical malignancy worldwide. Cervical intraepithelial neoplasia is a curable disease if detected at early stage. Bal et al., have

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found abnormal pap smears in 5% cases, atypical squamous cells of undetermined significance 0.3%, squamous intraepithelial lesion in 3.4% cases and invasive carcinoma in 1.3% [3]. Zaigham et al., have found 46% of women with abnormal transformation zone on screening for cervical neoplasia, of which 13% were found to have cervical cancer [11]. Lack of knowledge and decreased awareness regarding the role of Pap's smear has been seen in 70% of women of reproductive age. Another study by Noreen et al., in screening for precancerous lesions in Pap's smears found 3of .6% patients with dysplastic changes, 2.8% with CIN-1.0.4% with CIN-11, 0.4% with CIN-III or severe dysplasia [12]. Numerous lesions like inflammatory, infectious and reactive lesions mimic pre-cancerous lesions that give rise to false-negative results hence a careful reporting is essential Bukhari et al., have found the frequency of normal pap smears in 50%, neoplastic in 10.2%, infective 38.3% and inadequate in 1.8% cases respectively [1]. Therefore, this research was designed to determine the frequency of abnormal Pap's smears to detect premalignant and malignant lesions or any abnormal smears in women attending OPD with the complaint of vaginal discharge. This will help to overcome morbidity and mortality by early detection of tumors in the pre-malignant stage and early management to prevent the progression of cervix disease.

METHODS

It was a descriptive cross-sectional study design conducted in the Department of Obstetrics & Gynecology Unit 1, a 60-bedded ward in Civil Hospital Karachi for the duration of the study six months from November 2017 to May 2018. Non-probability consecutive sampling technique was used to recruit the participants for the study. A total of 214 female patients were included in the study. The patients included in the study were females with an age range of 18 years to 60 years one or more of the complaints of recurrent vaginal discharge for greater than 4 weeks, married or unmarried, primiparous or multiparous. The patients were included in the study after getting written informed consent. The females with bleeding disorders like a history of hemophilia or platelet dysfunction or clotting dysfunction, complaints of post-coital bleeding and intermenstrual bleeding were excluded from the study. Patients were recruited according to the inclusion and exclusion criteria, the risks and benefits of the study were explained to them and after their informed consent, a detailed Performa was filled containing the information on demographic variables like, age, gender, admission number, and any history of previous pelvic or abdominal surgery was recorded. All women enrolled have a Pap's smear in which the first after history examination of the cervix was carried out, taking a cell sample from the cervix with Ayr's spatula for analysis. Patients with abnormal smears were recommended for colposcopy for further evaluation. Data analysis was performed using IBM SPSS Version 20. Mean and standard deviation was computed for age. Abnormal Pap's smear parity, marital status, socioeconomic status, and husband living abroad was calculated by frequency and percentages effect modifiers like age. Marital status, husband living abroad, and socioeconomic status be controlled through stratification Chi-square test was applied by taking p< 0.05 as significant.

RESULTS

A total of 214 women presenting with vaginal discharge were included in this study. Most of the patients were below 40 years of age. The average age of the women was 34.86+8.90 years. Regarding parity status, 76(35 51%) were nulliparity and 138(64.49%) had multi-party. All of the women were married including 26(21.15%) divorced and 28(13.08%) lived separated from their husbands. The socio-Economic status of the women was observed to be low, 54(25.23%) women were not living with their husbands. The frequency of abnormal pap's smears in patients with the vaginal discharge was observed in 4.67% (10/214) cases. Out of 10 cases, infection was observed in 8 women and dysplasia was observed in 2 patients. Stratification analysis with respect to age, parity, marital status, living status with husband, and socioeconomic status was tabulated in table 1.

	Abnormal Pap's smear				
Age (Years)	**Yes**	**No**	**Total**	**Chi-square**	**p-value**
< 30	2(2.4%)	81(97.6%)	83	3.76	0.190
31-40	3(3.7%)	79(96.3%)	82		
42-50	4(11.1%)	32(88.9%)	36		
>50	1(7.7%)	12(92.3%)	13		
Parity					
Nill Parity	1(1.3%)	75(98.7%)	76	2.98	0.084
Multi Parity	9(6.5%)	129(93.5%)	138		
Marital Status					
Married	6(3.8%)	154(96.3%)	160		
Divorced	0(0)	26(100%)	26	7.38	0.025
Separated	4(14.3%)	24(85.7%)	28		
Living with husband					
Yes	6(3.8%)	154(96.3%)	160	1.21	0.271
No	4(7.4%)	50(92.6%)	50		
Socioeconomic status					
Very low	7(8.6%)	74(91.4%)	81		
Low	3(2.8%)	103(97.2%)	106	4.99	0.082
Middle	0(0)	27(100%)	27		
n=214					

Table 1: Frequency of abnormal Pap's smear in patients with the vaginal discharge with age, parity, marital, socioeconomic, and living status

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DISCUSSION

Vaginal discharge is a frequently occurring gynecological problem after menstrual disorders. Discharge of the vagina may arise from upper or lower genital parts or tract, which can be a type of normal physiological or abnormal pathological condition but its occurrence can be alarming for females [13]. Unfortunately, in the developing countries of the world, there is silent culture by females, resulting in delayed diagnosis as well as treatment. A pathological discharge is observed to be ignored by considering it as a normal physiological discharge, which may be abnormal in many fastidious women. Cervical cancer is one of the most common types of cancer among females and is the leading cause of mortality and morbidity in developing countries [14]. Cervical infections frequently occur at reproductive age in women and are linked with various serious clinical complaints leading to abnormal vaginal discharge [15]. There are observed several risk factors associated with cervical cancer and cervical intraepithelial neoplasia due to cervical infections [16,17]. This is due to the fact that abnormal or disturbed flora of the vagina can initiate producing carcinogenic nitrosamines leading to carcinogenesis so the screening of discharge is necessary. Pap smear is one of the screening tests accomplished by using cells of the uterine cervix [18,19]. The Pap test was introduced by George Papanicolaou and is known as the cervical screening test, with the advantages of its simple nature, quick to perform, and painless procedure. Thus this study was intended to determine the frequency of abnormal Pap's smears in patients with vaginal discharge, a total of 214 women, aged over 18- 60 years, either married or unmarried irrespective of parity resenting with vaginal discharge were included in this study. Cervical cancer and recommended screening policy of it varies from country to country based on the age, intervals of screening, and the total number of scheduled screening examinations of pap smears. Pakistan is a developing country and there are no specified screening programs to carry out this test so cervical smears were carried out at the hospital by taking a sample from the females who visited the hospital. Regarding parity status, there were 76 (35.51%) nulliparity and 138 (64.49%) had multiparity. The present study, findings are in accordance with the results of Kulkarni et al., who also showed a significant relationship between the discharge with variable high parity [20], and these findings were in contrast to the study which was conducted in Goa concluding the insignificance association between high parity and discharge [21]. All women were married of which 26 (21.15%) divorced and 28 (13.08%) lived separated from their husbands which showed a significant impact of the vaginal discharge occurrence with the active sexual life, these results were in consistent with the results of research [22]. Most of the patients included in this research belonged to the lower socioeconomic condition showing a higher frequency of vaginal discharge in comparison medium-income group, depicting that female belonging to the lower-income group have a higher frequency and prevalence of vaginal discharge. These results were supported by the studies [20,23] reporting more vaginal discharge among females belonging to relatively lower socioeconomic status. As the majority, 49.5% of the female population of the present research had low socioeconomic status and did not have any awareness about this health issue and were ignorant of the fact that this is a pathological problem and can be managed by consulting their physician and can be prevented by adopting safe sexual practices, to prevent abortion, early childbirth etc. This research also found that there was a high prevalence of vaginal discharge among women of 41 years to 50 years, multipara, and separated which was in contrast to the findings [21] who reported a relatively higher rate of vaginal discharge in the group of young and unmarried females, which might be because of the fact that young and unmarried female having the abnormal vaginal discharge were vigilant to report this issue to the hospital, as this research was confined to a hospital. The major causative factors associated with abnormal vaginal discharge were poor hygiene, unsafe abortion, and various sexually transmitted disease. The frequency of abnormal pap's smears in females in the present research was observed to be 4.67% (10/214), and 8 women showed infection out of those 10 cases, while dysplasia was observed in 2 female patients. Likewise, the frequency of dysplastic smears was in accordance with the results of research by Nausheen documenting 4.16% [24], and another reported 6.12% [25]. Similarly, the study by showed a frequency of 2.6%. Another study also reported inflammatory cytological patterns of cervical smear (53.33%), and squamous metaplasia (2.7%) respectively [27].

CONCLUSIONS

The frequency of abnormal Pap's smears in patients with vaginal discharge was found to be low but as the frequency of vaginal discharge was highly prevalent among females so this problem need to be considered. The research concluded that various factors leads towards the vaginal discharge such as increasing age, high parity low socioeconomic status, poor hygiene etc. which are the major contributory as well as risk factors which may lead to cervical malignancies if not managed properly. There is a need of creating awareness among the community about health care facilities so that the females can instills themselves in self-assessment and care for their own

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health. Built-in service component and the factor of high confidentiality can lead to the improvement in self-reporting of various reproductive problems. That will allow overcoming the morbidity and mortality by early detection of tumor in premalignant stage and early management, therefore, can be done to prevent progression of the disease.

REFERENCES

[1] Bukhari MH, Saba K, Qamar S, Majeed MM, Niazi S, Naeem S. Clinicopathological importance of Papanicolaou smears for the diagnosis of premalignant and malignant lesions of the cervix. J Cytol. 2012 Jan;29(1):20-5. doi: 10.4103/0970-9371.93213.

[2] McGuire S. World Cancer Report 2014. Geneva, Switzerland: World Health Organization, International Agency for Research on Cancer, WHO Press, 2015. Adv Nutr. 2016 Mar 15;7(2):418-9. doi: 10.3945/an.116.012211.

[3] Bal MS, Goyal R, Suri AK, Mohi MK. Detection of abnormal cervical cytology in Papanicolaou smears. J Cytol. 2012 Jan;29(1):45-7. doi: 10.4103/0970-9371.93222

[4] Milenković V, Sparić R, Dotlić J, Tulić L, Mirković L, Milenković S et al. Reliability and relationship of colposcopical, cytological and histopathological findings in the diagnostic process. Vojnosanit Pregl. 2012 Oct;69(10):869-73.

[5] Asotic A, Taric S, Asotic J. Correlation of cervical smear and pathohistological findings. Med Arch. 2014;68(2):106-9. doi: 10.5455/medarh.2014.68.106-109.

[6] Peto J, Gilham C, Fletcher O, Matthews FE. The cervical cancer epidemic that screening has prevented in the UK. Lancet. 2004 Jul 17-23;364 (9430):249-56. doi: 10.1016/S0140-6736(04)16674-9.

[7] McGraw SL, Ferrante JM. Update on prevention and screening of cervical cancer. World J Clin Oncol. 2014 Oct 10;5(4):744-52. doi: 10.5306/wjco.v5.i4.744.

[8] Priebe AM. 2012 cervical cancer screening guidelines and the future role of HPV testing. Clin Obstet Gynecol. 2013 Mar;56(1):44-50. doi: 10.1097/GRF.0b013e3182836b6a.

[9] Saslow D, Solomon D, Lawson HW, Killackey M, Kulasingam SL, Cain J et al. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. CA Cancer J Clin. 2012 May-Jun;62(3):147-72. doi: 10.3322/caac.21139.

[10] Schiffman M, Wentzensen N, Wacholder S, Kinney W, Gage JC, Castle PE. Human papillomavirus testing in the prevention of cervical cancer. J Natl Cancer Inst. 2011 Mar 2;103(5):368-83. doi: 10.1093/jnci/djq562.

[11] Zaigham A, Shaheen A, Awan AS, Rauf R. Colposcopy: A Valuable Screening Tool for the Diagnosis of Premalignant and Malignant Cervical Pathologies. Journal of Islamic International Medical College (JIIMC). 2013;8(1):15-22.

[12] Noreen R, Qudussi H. 'Pap smear' for screening of precancerous conditions of cervix. J Ayub Med Coll Abbottabad. 2011 Apr-Jun;23(2):41-4.

[13] Mitchell H. Vaginal discharge—causes, diagnosis, and treatment. BMJ. 2004 May 29;328(7451):1306-8. doi: 10.1136/bmj.328.7451.1306.

[14] Haworth RJ, Margalit R, Ross C, Nepal T, Soliman AS. Knowledge, attitudes, and practices for cervical cancer screening among the Bhutanese refugee community in Omaha, Nebraska. J Community Health. 2014 Oct;39(5):872-8. doi: 10.1007/s10900-014-9906-y.

[15] Marconi C, Duarte MT, Silva DC, Silva MG. Prevalence of and risk factors for bacterial vaginosis among women of reproductive age attending cervical screening in southeastern Brazil. Int J Gynaecol Obstet. 2015 Nov;131(2):137-41. doi: 10.1016/j.ijgo.2015.05.016.

[16] Jahic M, Mulavdic M, Hadzimehmedovic A, Jahic E. Association between aerobic vaginitis, bacterial vaginosis and squamous intraepithelial lesion of low grade. Medical archives. 2013 Mar 1;67(2):94. DOI: 10.5455/medarh.2013.67.94-96.

[17] Sivaranjini R, Jaisankar T, Thappa DM, Kumari R, Chandrasekhar L, Malathi M et al. Spectrum of vaginal discharge in a tertiary care setting. Trop Parasitol. 2013 Jul;3(2):135-9. doi: 10.4103/2229-5070.122140.

[18] Kafi SK, Mohamed AO, Musa HA. Prevalence of sexually transmitted diseases (STD) among women in a suburban Sudanese community. Ups J Med Sci. 2000;105(3):249-53. doi: 10.3109/2000-1967-179.

[19] Lojindarat S, Luengmettakul J, Puangsa-Art S. Clinical significance of atypical glandular cells in cervical Papanicolaou smears. J Med Assoc Thai. 2012 Aug;95(8):975-82.

[20] Kulkarni RN, Durge PM. A study of leucorrhoea in reproductive age group women of Nagpur City. Indian J Public Health. 2005 Oct-Dec;49(4):238-9.

[21] Patel V, Pednekar S, Weiss H, Rodrigues M, Barros P, Nayak B et al. Why do women complain of vaginal discharge? A population survey of infectious and pyschosocial risk factors in a South Asian community. Int J Epidemiol. 2005 Aug;34(4):853-62.

DOI: https://doi.org/10.54393/pbmj.v5i5.448

doi: 10.1093/ije/dyi072.
[22] Rice PA, Schachter J. Pathogenesis of pelvic inflammatory disease. What are the questions? JAMA. 1991 Nov 13;266(18):2587-93.
[23] Tewiri PV, Neelam, Kulkiro MK. A study of lukol in leucorrhoea, pelvic inflammatory diseases and dysfunctional uterine bleeding. Anc Sci Life. 2001 Oct;21(2):139-49.
[24] Nausheen A, Karim SA. The screening for cervical cancer by Pap smear in hospital based population. Ann Abbasi Shaheed Hosp Karachi Med Dent Coll. 2004;9:544-7.
[25] Kos M, Sarkanj-Golub R, Cupić H, Balicević D. Povezanost upale i promjena epitela na uzorku citoloskih razmaza vrata maternice [The correlation of inflammation and epithelial changes in the Pap smears of cervix uteri]. Acta Med Croatica. 2005;59(4):297-302.
[26] Khattak ST, Naheed T, Akhtar S, Jamal T. Detection of abnormal cervical cytology by pap smears. Gomal Journal of Medical Sciences. 2006;4(2).
[27] Rani S. Frequency of Abnormal Cervical Smear in Women Presenting With Vaginal Discharge. Interdiscipline Research. 2016.

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Original Article

Hepatoprotective and Anti-inflammatory Potential of Crude methanolic extract of *Euphorbia Pilulifera via* NF-KB/Nrf2/Akt/TGF-β1 pathway

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ABSTRACT

Liver fibrosis is a natural process that initiates after liver injury to repair the damaged tissue. The liver has a significant capacity for self-repair of the damaged tissue. To a great extent, the miscellaneous interactions of immune cell subtypes manage these repair procedures like fibrosis and wound healing. **Objectives:** To assess the hepatoprotective and anti-inflammatory potential of *Euphorbia pilulifera* through modulating the NF-KB/Nrf2/AKT/TGF-β1 pathway. **Methods:** *Euphorbia pilulifera* methanolic extract was primarily assessed for its cytotoxic potential against HepG2 cells. Methanolic extract of *E. pilulifera* showed 90% hepatoprotective activity against CCl_4-induced toxicity in HepG2 cells. The methanolic extract downregulated the NF-κB gene by 90%; the AKT, gene by 14%, and the TGF-β1 gene expression by 69% at the concentration of 50µg/ml at the mRNA level. On the other hand, methanolic extract of *E. pilulifera* increased the expression of the Nrf2 gene by 44% at 50µg/ml concentration. Furthermore, the antioxidant activity of leaves extract through DPPH radical scavenging assay was estimated. **Results:** Methanolic extract showed 50.83± 0.39% inhibition against DPPH radicals at 200µg/ml concentration. In addition, the anti-inflammatory potential of the crude extract was assessed. The methanolic extract at 25µg/ml concentration revealed the maximum percentage of hemolysis protection. The methanolic extract was found highly effective against inflammation and hepatotoxicity. **Conclusions:** *Euphorbia pilulifera* leaf extract has the potential to ameliorate hepatic injury and inflammation in HepG2 cells.

INTRODUCTION

Liver fibrosis, chronic fibrosis and hepatic cirrhosis lead to liver cancer[1,2], the third leading cause of cancer-related deaths in the world [3]. Thus, herbal remedies can be substitutional approach against hepatic injury. Medicinal plants serve as a splendid reservoir for drug candidates. From the past few years, herbal medicines, have obtained more scientific awareness and demand against diverse diseases, including neurological malignancies, chronic hepatic diseases, inflammations and many others[4]. The therapeutic relevance of the plants is attributable to their extensive array of phytochemicals called secondary metabolites [5]. These plant-based chemicals provide clinically innocuous, economical and available therapeutic alternative [6]. In this regard, the rich indigenous flora of Pakistan contains a number of plants and their constituents that are mostly effective against malignant diseases such as chronic liver diseases [7]. For instance, *Podophyllum hexandrum* (kakora), *Echinops echinatus* (ont katara), *Glycyrrhiza glabra, Phyllanthus niruri, Picrorrhiza kurroa* and *Silybum marianum* etc. are some of the known local plants having anti-hepatotoxic actions [8]. However, *Euphorbia pilulifera* (snake weed) remains poorly investigated for liver disorders. Thus, therapeutic potential of *E. pilulifera* leaves against liver injury was investigated in

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this study, with the aim to propose new herbal hepatic drugs in near future. To propose a medicinal drug candidate, knowledge of its underlying mechanistic routes is imperative. Among important inflammatory pathways, NF-κB cascade, is a prospective key determinant of hepatic fibrosis which can be targeted to recover injury [9]. NF-κB cascade's role towards apoptosis and oxidative stress stimulation is momentous in all kinds of cellular inflammatory reactions [10] in which Nrf2 activation is also involved. Nrf2 activation reduces the oxidative stress and inflammation by the repression of the NF-KB pathway [11] NF-κB pathway is also repressed by AKT signaling pathway during hepatic fibrosis [12]. Moreover, TGF-β1 actuates Kupffer cells and aggravates hepatic fibrosis [13]. Therefore, the current study is anticipated to halt the NF-κB/Nrf2/AKT/TGF-β1 pathway against liver injury via prospective inhibitory medicinal plant. In the present study, the hepatoprotective and anti-inflammatory potential of *Euphorbia pilulifera* was deliberated to explore. The hepatoprotective activity of the methanolic extract against CCl_4-induced toxicity on HepG2 cells was evaluated via *in vitro* analysis. Furthermore, the antioxidant and anti-inflammatory potential of the methanolic extract was estimated. Hence, it was found that *E. pilulifera* has potential to reverse the liver injury through NF-κB/Nrf2/AKT/TGF-β1 pathway. This study can help to attain the health targets in the near future for feasible development to combat liver-related complications.

METHODS

***E. pilulifera* crude extract preparation:** The leaves of *Euphorbia pilulifera* were collected from CEMB (Centre of Excellence in Molecular Biology) and identified by Dr. Zahoor of the Botany Department, University of the Punjab Lahore, Pakistan. The leaves of the plant were washed with tap water, air-dried, and then grounded into a very fine powder in an electric grinder. Approximately 100g of powder was weighed and soaked in 500ml of 70% methanol and left overnight at room temperature. The next day, the mixture was filtered through a Whatman No.1 filter paper. The remnant was again soaked overnight in 50% methanol and repeated the procedure two more times. The filtrate obtained after three times extraction was combined and dried. The dried crude extract was weighed, and stored for further use.

MTT cytotoxicity assay on HepG2 cells: MTT assay was used to evaluate the cytotoxic potential of *E. pilulifera* methanolic extract on HepG2 cells. For this purpose, HepG2 cells at the density of 2×10^4 cells/well were plated in a 96-well plate and incubated in 5% CO_2 atmosphere at 37°C. The next day cells were analyzed and upon 70–80% confluency, treated with several concentrations of extract starting from 200µg/ml-3.12µg/ml in triplicate in corresponding wells. Plain cells without treatment were considered as control. After 24 hours of treatment, media from the plate was removed, and 20µl of freshly prepared MTT solution was added. After 3 hours, purple-colored formazon crystals were developed, which were dissolved by adding 100µl of Dimethyl sulfoxide for 20 minutes. The developed color was quantified at 570nm and 650nm using ELISA (enzyme-linked immunosorbent assay) spectrophotometer. The % of cell viability was determined using the formula below:

$$\%\ Cell\ viability = \frac{OD\ test\ (570\text{-}650)}{OD\ Control\ (570mm\text{-}650mm)} \times 100$$

Estimation of hepatoprotective activity of *Euphorbia pilulifera*: HepG2 cells were cultured in DMEM media in 96-well plate. The next day, the media was aspirated, and cells were washed with IX PBS. After washing, the cells were treated with different concentrations of *E. pilulifera* methanolic extract, serially diluted from 200µg/ml to 3.12µg/ml in DMEM. After 24 hours, media was discarded and cells were incubated in 0.1% CCl_4 serum-free media for 2 hours. The next day, MTT assay was performed to analyze the hepatoprotective activity of the methanolic extract.

Expression analysis of genes by Real-Time PCR: The total RNA was isolated using TRIzol reagent and cDNA was synthesized using cDNA synthesis kit in accordance with the manufacturer's directions. To evaluate the gene markers (Table 1) and pathway in samples, a real-time polymerase chain reaction (PCR) was conducted using SYBR Green master mix. Moreover, by using the RT-PCR comparative CT method (ΔΔCT), fold change was analyzed.

Gene	Forward primer	Reverse primer	Product size
AKT	GGACCTCAAGCTGGAGAACC	CGACCGCACATCATCTCGTA	199bp
Nrf2	TTAGTCAGCGACAGAAGGAC	TCCACTGGTGTCTGTCTGGAT	179bp
GAPDH	CGGATTTGGTCGTATTGG	AGATGGTGATGGGATTTC	473bp
TGF-β1	ACTGCGCCCTTCTCCCTG	CTTCACCAGCTCCATGTCGATAG	188bp
NF-KB	GTTTGTCCAGCTTCGGAGGA	GACCTGTACTTCCAGTGCCC	153bp

Table 1: Gene's primer sequences and product size used in this study

DPPH radical scavenging activity: To evaluate the anti-oxidative properties of the methanolic extract, DPPH free radical scavenging activity assay was conducted following the reported protocol. Briefly, different concentrations (3.125µg/ml to 200µg/ml) of methanolic extract and standard (Gallic acid) were added, and then 0.1% DPPH solution was added to it. The mixture was incubated in the dark for 30 minutes. The absorbance was read at 517 nm. The % inhibition of DPPH was determined from the equation below:

$$\%\ Hemolysis = \frac{Absorbance\ of\ test\ sample}{Absorbance\ of\ control} \times 100$$

Membrane stabilization percentage was also determined

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$$\% \ Protection = \left(100 - \left[\frac{\text{Absorbance of test sample}}{\text{Absorbance of control}} \right] \right) \times 100$$

Statistical analysis: The scientific data was presented in the form of means and standard error and calculated via Microsoft Excel. Data was evaluated by GraphPad Prism software (version 8). Statistical significance was analyzed by *two-way ANOVA*.

RESULTS

Dose-dependent non-toxic potential of *Euphorbia pilulifera* methanolic extract: MTT assay of the crude methanolic extract showed more than 90% cell viability up to 200µg/ml concentration (Figure 1). So, the methanolic extract was considered as non-toxic as their CC_{50} was more than 200µg/ml.

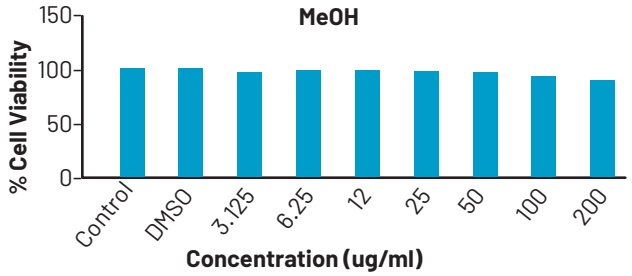

Figure 1: The dose-dependent non-toxic potential of E. Pilulifera methanolic extract in HepG2 cells

Data are expressed as a percentage of control. Results are presented as means ± SEM from 3 experiments conducted in triplicates.

Cytoprotective effect of *E. pilulifera* crude extract against CCl_4 & H_2O_2-induced toxicity: MTT cytotoxic assay of the methanolic crude extract showed cell viability up to 90.04± 0.90% at 200µg/ml against CCl_4 and 86.54± 1.24% at 200µg/ml against H_2O_2 toxicity (Figure 2). So, the *E. pilulifera* methanolic extract is considered as hepatoprotective.

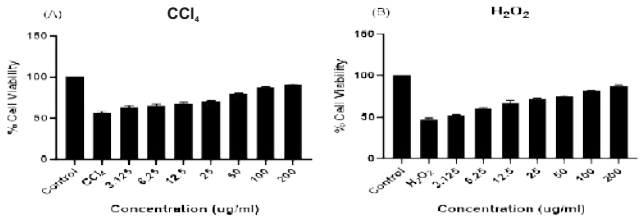

Figure 2: The dose-dependent cytoprotective activity of E. pilulifera methanolic extract in HepG2 cells

(A) Cytoprotective activity against CCl4. **(B)** Cytoprotective activity H2O2-induced toxicity. Results are presented as means± SEM from 3 experiments conducted in triplicates.

DPPH radical scavenging activity: The methanolic extract of E. pilulifera showed a dose-dependent antioxidant activity against DPPH free radicals (Figure 3). Methanolic extract showed a significant DPPH-radical scavenging effect with an IC50 of 165.70 µg/ml.

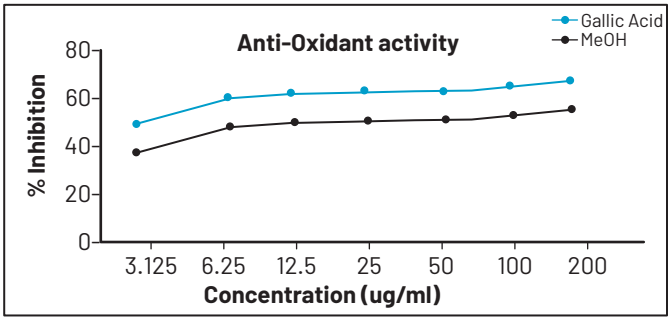

Figure 3: DPPH radical scavenging activity of the methanolic extract and the standard compound gallic acid

The values are means± SEM of three independent experiments performed in triplicates.

Anti-inflammatory activity of Euphorbia pilulifera methanolic extract: E. pilulifera methanolic extract at 25µg/ml concentration revealed the maximum percentage of hemolysis protection (Figure 4A). In the heat-induced hemolysis method, the E. pilulifera methanolic extract at 25µg/ml concentration indicated the lowest hemolysis (Figure 4B).

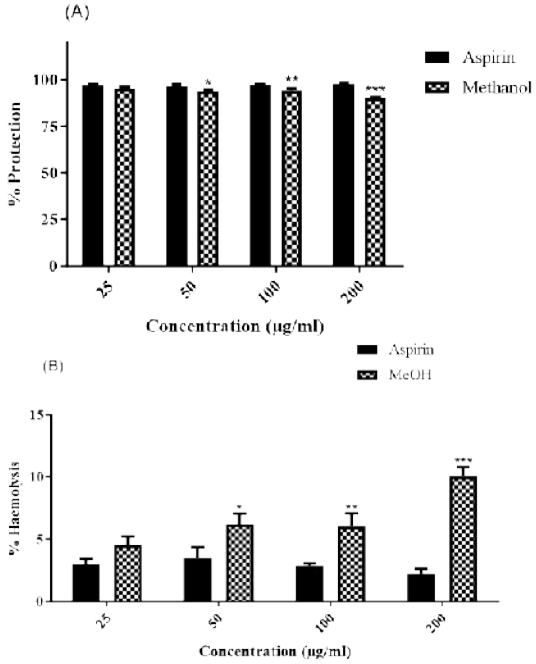

Figure 4: Anti-inflammatory activity of Euphorbia pilulifera methanolic extract

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(A) The bar plot represents the percentage protection of human red blood cells by methanolic extract of Euphorbia pilulifera as compared to aspirin (standard drug) as well as their corresponding percentage error. **(B)** The bar plot represents %age inhibition of hemolysis of human red blood cells by methanolic extract of Euphorbia pilulifera as compared to aspirin as well as their corresponding percentage error. *p<0.01, ** p<0.001, ***p<0.0001 vs. control(Aspirin).

Euphorbia pilulifera methanolic extract ameliorates CCl4-induced injury through NF-κB/Nrf2/AKT/TGF-β1 pathway: E. pilulifera methanolic extract alleviated CCl4-induced damage in HepG2 cells via regulation of NF-κB/Nrf2/AKT/TGF-β1 pathway. The results showed that E. pilulifera methanolic extract downregulated NF-κB gene by 90% and TGF-β1 gene expression by 69% at the concentration of 50µg/ml and AKT gene by 30% at 100µg/ml concentration at mRNA level. While E. pilulifera methanolic extract was found to increase Nrf2 expression by 44% at 50µg/ml concentration as compared to control cells(Figure 5).

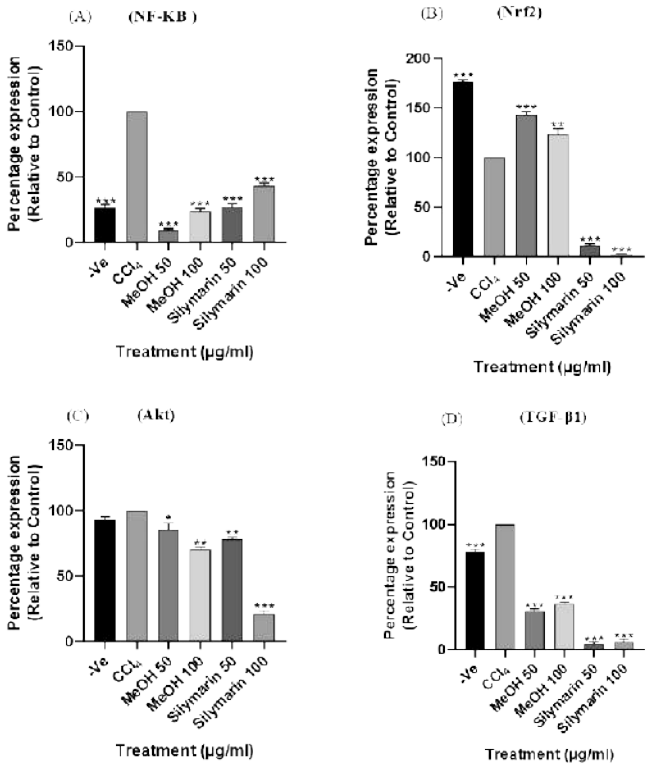

Figure 5: Effect of E. pilulifera methanolic extract on NF-κB/Nrf2/AKT/TGF-β1 expression

(A) Downregulation of NF-κB **(B)** Upregulation of Nrf2 gene. (C) AKT gene mRNA expression. (D) Modulation of TGF-β1 mRNA expression. The results are denoted as means ± SEM acquired from three independent experiments and are demonstrated as the relative percentage of the control. -Ve: Negative cells without any treatment, CCl4:CCl4 treated cells (control). *p <0.01, **p < 0.001, ***p<0.0001 vs. control.

DISCUSSION

Chronic liver diseases are a severe healthcare burden globally due to increase mortality and morbidity rate. Due to the prevalence of hepatic ailments globally and the limitations of existing remedies, the progress of safe, innovative, and inexpensive drugs with enhanced efficacy is essential. Medicinal plants are an appropriate source of dormant pharmacological agents that need to be investigated . Therefore, the current study focuses on identifying plant-based natural compounds for the treatment of liver-related diseases, aiming to find out drugs averting the development of liver diseases. For this purpose, Euphorbia pilulifera was selected because of its well-known therapeutic potential against different diseases. Euphorbia pilulifera is a weed belonging to the genus Euphorbiaceae reported to have many biological activities such as anti-inflammatory, analgesic, wound healing, anti-asthmatic, anti-diabetic, etc. Many plants of the genus Euphorbiaceae are reported to possess protective activity against chronic liver injuries . The methanolic extract with different concentrations (3.125µg/ml -200µg/ml) of E. pilulifera samples was considered non-toxic in HepG2 cells even at higher doses with more than 90% cell viability, so, they were further studied for their potential therapeutic activity against liver injury. A previous study revealed that Euphorbia pilulifera extracts were non-toxic to the Vero cell line at a higher concentration of 100µg/ml and its IC50 was greater than 100µg/ml . Further, the in vitro hepatoprotective activity of the methanolic extract against the CCl4 and H2O2-induced cytotoxicity was investigated. The extract of E. pilulifera displayed significant cytoprotective potential by averting the HepG2 cells from cell death caused by CCl4. A previous study on the in vitro hepatoprotective effect of crude methanolic extract and sub-fractions of Inula crithmoides ethyl acetate fraction showed the highest hepatoprotective effect against CCl4-induced toxicity . Oxidative stress, which results from the production of free radicals in the body, is one of the major mechanisms underlying the progression of several pathological conditions . Medicinal plants and their constituents can alleviate these free radicals. DPPH radical scavenging assay showed that E. pilulifera methanolic extract showed significant DPPH-radical scavenging activity with IC50

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15.39± 0.94µg/ml. Likewise, the antioxidant potential of Albizia odoratissima was evaluated through DPPH . Inflammation is reflected as an advantageous process under normal circumstances. E. Pilulifera methanolic extract also exhibit anti-inflammatory potential. E. Pilulifera methanolic extract at 25µg/ml concentration revealed the maximum percentage protection from hemolysis. Rehman et al., likely described the anti-inflammatory potential of Beta vulgaris L. extracts by executing a dose-dependent HRBC membrane stabilization assay. Further, the downstream pathway involved in the hepatoprotective activity of the E. pilulifera was investigated. Herein, NF-κB pathway activation contributes to oxidative stress and is considered in almost all inflammatory reactions in the cell. Deregulation of the NF-κB pathway can cause a reduction in oxidative stress, therefore making it an effective therapeutic target . Some other studies specified that Nrf2 activation diminished oxidative stress and inflammation via repression of the NF-κB pathway . In the current study, the results indicated that E. pilulifera methanolic extract downregulated the NF-KB gene by 90% at 50 µg/ml concentration. Furthermore, the Nrf2 gene expression was increased by 44% at 50 µg/ml concentration compared to control cells (CCl4-treated cells). The results demonstrated that E. pilulifera methanolic extract could avert liver fibrosis through modulation of NF-κB and Nrf2 expression. Likewise, TGF-β is an essential cytokine that plays an important role in liver physiology and disease progression . E. Pilulifera methanol extract downregulated AKT and TGF-β1 genes by 14 % and 69 % respectively at 50µg/ml concentration as compared to control cells (CCl4-treated cells). AKT signaling pathway also has a vital role in tumor oncogenesis, as it regulates cell propagation and apoptosis.

CONCLUSION

The results demonstrated that E. pilulifera methanolic extract can treat liver fibrosis by targeting TGF- β1 and AKT genes. In conclusion, E. Pilulifera methanolic extract is found highly effective in reversing the effect of CCl4 damage. The methanolic extract of E. pilulifera was also found to modulate NF-KB/Nrf2/AKT/TGF-β pathway to reverse the liver damage. In the future, the E. pilulifera leaf extract can be explored for active constituent which may prove helpful in obtaining cost-effective and potent drugs against liver diseases.

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REFERENCES

[1] Pellicoro A, Ramachandran P, Iredale JP, Fallowfield JA. Liver fibrosis and repair: immune regulation of wound healing in a solid organ. Nat Rev Immunol. 2014 Mar;14(3):181-94. doi: 10.1038/nri3623.

[2] Iqubal A, Iqubal MK, Haque SE. Experimental hepatotoxicity inducing agents: a Review. Int J Clin Pharmacol Res. 2016 Jan 1;6(11):325-5.

[3] Baecker A, Liu X, La Vecchia C, Zhang ZF. Worldwide incidence of hepatocellular carcinoma cases attributable to major risk factors. Eur J Cancer Prev. 2018 May;27(3):205-212. doi: 10.1097/CEJ.0000000000000428.

[4] Shakya AK. Medicinal plants: Future source of new drugs. International Journal of Herbal Medicine. 2016;4(4):59-64. DOI: 10.13140/RG.2.1.1395.6085.

[5] Velu G, Palanichamy V, Rajan AP. Phytochemical and pharmacological importance of plant secondary metabolites in modern medicine. InBioorganic phase in natural food: an overview 2018 (pp. 135-156). Springer, Cham. doi.org/10.1007/978-3-319-74210-6_8.

[6] Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H. Medicinal plants: Past history and future perspective. Journal of herbmed pharmacology. 2018;7(1).

[7] Shahid F, Shahid R, Waseem T, Hussain S. Flora of Pakistan: An ethnopharmacological perspective. Journal of Shifa Tameer-e-Millat University. 2020 Aug 9;3(1):42-8. doi.org/10.32593/jstmu/Vol3.Iss1.79.

[8] Dash RP, Kala M, Nivsarkar M, Babu RJ. Implication of Formulation Strategies on the Bioavailability of Selected Plant-Derived Hepatoprotectants. Crit Rev Ther Drug Carrier Syst. 2017;34(6):489-526. doi: 10.1615/CritRevTherDrugCarrierSyst.2017019623.

[9] Wan C, Jin F, Du Y, Yang K, Yao L, Mei Z et al. Genistein improves schistosomiasis liver granuloma and fibrosis via dampening NF-kB signaling in mice. Parasitol Res. 2017 Apr;116(4):1165-1174. doi: 10.1007/s00436-017-5392-3.

[10] Merchant M, Morkotinis V, Hale A, White M, Moran C. Crocodylian nuclear factor kappa B. Comp Biochem Physiol B Biochem Mol Biol. 2017 Nov;213:28-34. doi: 10.1016/j.cbpb.2017.07.009.

[11] Dai Y, Zhang H, Zhang J, Yan M. Isoquercetin attenuates oxidative stress and neuronal apoptosis after ischemia/reperfusion injury via Nrf2-mediated inhibition of the NOX4/ROS/NF-κB pathway. Chem Biol Interact. 2018 Mar 25;284:32-40. doi: 10.1016/j.cbi.2018.02.017.

DOI: https://doi.org/10.54393/pbmj.v5i5.487

[12] Wang F, Liu S, DU T, Chen H, Li Z, Yan J. NF-κB inhibition alleviates carbon tetrachloride-induced liver fibrosis via suppression of activated hepatic stellate cells. Exp Ther Med. 2014 Jul;8(1):95-99. doi: 10.3892/etm.2014.1682.

[13] Mahmoud AM, Mohammed HM, Khadrawy SM, Galaly SR. Hesperidin protects against chemically induced hepatocarcinogenesis via modulation of Nrf2/ARE/HO-1, PPARγ and TGF-β1/Smad3 signaling, and amelioration of oxidative stress and inflammation. Chem Biol Interact. 2017 Nov 1;277:146-158. doi: 10.1016/j.cbi.2017.09.015.

[14] Landry KB, Azam S, Rehman S, Tariq S, Iqbal B, Abbas M et al. Phytochemical analysis of Berberis lyceum methanolic extract and its antiviral activity through the restoration of MAPK signaling pathway modulated by HCV NS5A. Asian Pacific Journal of Tropical Biomedicine. 2021 Mar 1;11(3):132. DOI: 10.4103/2221-1691.306133.

[15] Tariq S, Koloko BL, Malik A, Rehman S, Ijaz B, Shahid AA. Tectona grandis leaf extract ameliorates hepatic fibrosis: Modulation of TGF- β /Smad signaling pathway and upregulating MMP3/TIMP1 ratio. J Ethnopharmacol. 2021 May 23;272:113938. doi: 10.1016/j.jep.2021.113938.

[16] Dubey S, Mehta S. Hepatoprotective activity of Euphorbia hirta Linn. Plant against carbon tetrachloride-induced hepatic injury in rats. InInternational Conference on Food, Biological and Medical Sciences, FBMS 2014 Jan 28:108-111.

[17] Perumal S, Pillai S, Cai LW, Mahmud R, Ramanathan S. Determination of minimum inhibitory concentration of Euphorbia hirta (L.) extracts by tetrazolium microplate assay. J Nat Prod. 2012;5(2):68-76.

[18] Malash BN, Ibrahim SM, Ibrahim AR, Kabbash A, El-Aasr M. In vitro and in vivo hepatoprotective study of Inula crithmoides L., Pluchea dioscoridis (L.) Desf. and Phyllanthus reticulates Poir. Journal of Pharmaceutical Sciences and Research. 2015 Nov 1;7(11):987.

[19] Takao LK, Imatomi M, Gualtieri SC. Antioxidant activity and phenolic content of leaf infusions of Myrtaceae species from Cerrado (Brazilian Savanna). Brazilian Journal of Biology. 2015 Nov 10;75:948-52. doi.org/10.1590/1519-6984.03314.

[20] Banothu V, Neelagiri C, Adepally U, Lingam J, Bommareddy K. Phytochemical screening and evaluation of in vitro antioxidant and antimicrobial activities of the indigenous medicinal plant Albizia odoratissima. Pharm Biol. 2017 Dec;55(1):1155-1161. doi: 10.1080/13880209.2017.1291694.

[21] Rehman S, Shah S, Mehmood Butt A, Masood Shah S, Jabeen Z, Nadeem A. Biochemical Profiling and Elucidation of Biological Activities of Beta vulgaris L. Leaves and Roots Extracts. Saudi J Biol Sci. 2021 Jan;28(1):592-602. doi: 10.1016/j.sjbs.2020.10.048.

[22] Khatun M, Ray RB. Mechanisms Underlying Hepatitis C Virus-Associated Hepatic Fibrosis. Cells. 2019 Oct 14;8(10):1249. doi: 10.3390/cells8101249.

[23] Dooley S, ten Dijke P. TGF-β in progression of liver disease. Cell Tissue Res. 2012 Jan;347(1):245-56. doi: 10.1007/s00441-011-1246-y.

[24] Ilagan E, Manning BD. Emerging role of mTOR in the response to cancer therapeutics. Trends Cancer. 2016 May;2(5):241-251. doi: 10.1016/j.trecan.2016.03.008

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Original Article

Factors Affecting Contraceptive Behavior among Young Married Couples

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ABSTRACT

Improving reproductive health is central to achieving the Millennium Development Goals on improving maternal health, reducing child mortality and eradicating extreme poverty. This requires that married couples should understand and adopt safe and effective methods of fertility control. **Objective:** To study the contraceptive behavior of young married couples presenting to fertility and contraceptive clinic – Dept. of Obstetrics & Gynecology, Liaquat University Hospital, Hyderabad. **Methods:** 100 young married couples with age in between 18 to 25 years were enrolled (chosen via non-probability - consecutive sampling) for this cross-sectional analysis. After taking written informed consent, data was collected using an anonymous, self-structured, interview based questionnaire comprising of inquiring regarding basic biodata and sociodemographic details. Detailed history of marital relations, contraceptive knowledge and behavior along with complaints regarding self-perceived barriers to contraceptive use were noted. The data obtained was analyzed using SPSS version.21 & Microsoft Excel 360. **Results:** Active contraceptive practice at the time of survey was 31.5% and the only known contraceptive behavior among the couples were either oral contraceptive pills, condoms or abstinence method. Contraceptive practice was more common among more educated individuals, with higher socioeconomic status and those living in a nuclear family and already having at least 1 male child. Contraceptive use was less reported in couples early after their marriage and use was more frequent in later years. **Conclusions:** There is a dearth of knowledge among young married couples regarding more modern methods of contraception and the contraceptive practice is rather limited. The perception towards contraceptive too can be improved through proper education.

INTRODUCTION

Despite being "the sixth most populous country on the planet with the population exceeding 184 million, Pakistan is facing a huge challenge of poverty where 61% of its population is living below US$2 a day [1, 2]. About 45% of its population has limited access to health services both public and private, especially in rural areas where 65% of its population resides [3]. The country lags far behind on almost all development indicators, particularly with regard to maternal and child health [4]. It has been estimated that approximately 28,000 women die annually in Pakistan due to preventable pregnancy-related complications. In 2008, Pakistan was included amongst the six countries that contributed to more than 50% of maternal deaths happening worldwide. Maternal and neonatal health are strongly interlinked. Around 33% of neonates in Pakistan die due to maternal infections and other problems related to pregnancy and delivery [5, 6]. The level of health among Pakistani women is alarmingly poor and contributes to both maternal and child morbidity and mortality. Some estimates from recent studies suggest that the lifetime risk of maternal death for Pakistani women is one in 93 [7]. Only half of the deliveries in Pakistan take place in the presence of skilled health provider and rural and less educated women are less likely to revive skilled delivery

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care. Antenatal care coverage is far from optimal; 27% of pregnant women in Pakistan still receive no antenatal care and 40% do not receive postnatal care after delivery. In addition to maternal health, the dismal state of newborn health (as identified by neonatal mortality rate) has remained virtually unchanged over the past 15 years [8]. Modern contraceptive methods, which have been documented to be highly effective means of improving maternal health by preventing unintended pregnancies in order to ensure healthy timing and spacing of births, only account for 26% of contraceptive use in Pakistan. Moreover, the overall levels of contraceptive use in rural areas continue to remain very low (around 31%), compared to 45% in urban areas. An estimated 890,000 induced abortions occur annually in Pakistan whereby one in seven pregnancies is terminated by induced abortion often performed in clandestine conditions and abortion being used as means to control fertility and an outcome of failed contraception [9, 10]. Out of the total fertility rate (TFR) of 3.8 in Pakistan, one birth is unwanted. There are a number of structural and sociocultural factors that pose a challenge to improving maternal and newborn health (MNH) status in Pakistan. Lack of money, transportation, denial of family permission, or/and distance from health facility are some of the critical problems" [11, 12]. The fact that a majority of the population residing in the country comprises of young adults with peak fertility levels, and many fertile years up ahead of them, further necessitates the need to study the contraceptive behavior in our set-up if we hope to curtail the high population growth rate and meet the sustainable development goals.

METHODS

100 young married couples with age in between 18 to 25 years were approved (chosen via non-probability - consecutive sampling) for this cross-sectional analysis. After taking written informed consent, data was collected using an anonymous, self-structured, interview based questionnaire comprising of inquiring regarding basic biodata and sociodemographic details. Detailed history of marital relations, contraceptive knowledge and behavior along with complaints regarding self-perceived barriers to contraceptive use were noted. The data obtained was analyzed using SPSS version.21 & Microsoft Excel 360.

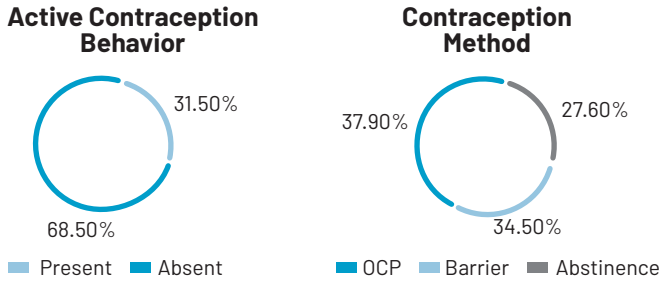
RESULTS

Among the 100 couples participating in the study, we achieved a 92% response rate. The remaining responses were discarded owing to incomplete data. The mean age male partners stood at 23 (SD ± 0.54) while the mean age of the female partners was 20 (SD ± 1.2).

Age (Years)	Males; n (%)	Females; n (%)
18 – 19	04 (4.35%)	09 (9.78%)
20 – 21	15 (16.30%)	74 (80.43%)
22 – 23	61 (66.30%)	06 (6.53%)
24 – 25	12 (13.05%)	03 (3.26%)

Table 1: Age-group Distribution

It was the first marriage for the entire sample of female partners while 15.2% of male spouses had been married before (with 35.7% of them still in wedlock with their first partners 64.3% being separated due to death or divorce). The mean number of children borne to the study couples were 3 (SD ± 2) and 58.7% were expecting more (female spouse presently pregnant). Active contraceptive practice at the time of survey was 31.5% and the only known contraceptive behavior among the said couples were either oral contraceptive pills, condoms or abstinence method.



Contraceptive practice was more common among literate individuals, with higher socio-economic status and those living in nuclear family and already having at least 1 male child. Contraceptive use was less reported in couples early after their marriage and use was more frequent in later years.

Age (Years)		Active Contraceptive Practice	n (92)
Literacy Status	Literate	Present	24
		Absent	12
	Illiterate	Present	05
		Absent	51
Socioeconomic Status	Low	Present	04
		Absent	31
	Middle	Present	09
		Absent	22
	High	Present	16
		Absent	10
Family Type	Joint	Present	08
		Absent	31
	Nuclear	Present	21
		Absent	32
Male Child	Present	Present	27
		Absent	13
	Absent	Present	02
		Absent	50
Marital Time (Years)	up to 2	Present	03
		Absent	21
	3 to 4	Present	07
		Absent	24
	5 or more	Present	19
		Absent	18

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Table 2: Factors related to Contraceptive Practice

DISCUSSION

Pakistan incorporated "family planning program in public sector in 1960s realizing its importance in population growth control. Despite far-sightedness of Pakistani government, population control is still a dream to come true. Contraceptive prevalence rate (CPR) of 31.5% is very discouraging, if we compare it with active contraception behavior of neighboring countries as 48% in India, 58% in Bangladesh and 70% in Srilanka [13]. This study points towards many factors that may be associated with poor contraceptive status including low literacy rate and poor socio-economic status of couples. Relationship of low contraceptive rate (CPR) with poverty and illiteracy is a well-acknowledged fact. Low income was found as a barrier for modern contraceptive method use in Pakistan contraceptive demands survey [14]. Similarly, Saleem and Bobak in the secondary analysis of national reproductive health and family planning survey 2000, found that women's education was the key factor in raising family planning practices. Women's economical and educational status in Karachi was reported to be associated with rapid fertility decline [15, 16]. Reported singulate mean age of marriage in Pakistan was 27.1 years for males and 22.7 years for females. Results of our study were different where mean age at marriage for both male and female was low. Thus, there is need to promote family planning measures in youngsters to decrease birth rate [17, 18]. A positive correlation was observed between contraceptive uptakes, rise in parity and number of living male children, in line with other Pakistani studies. Awareness and knowledge of different contraceptive methods is the key point in the adaptation of family planning and making a choice for a particular method. Although nearly all the respondents knew at least a single method of contraception, current contraceptive practice was far from the ideal". Commonly used methods were oral contraceptive pills, condoms and abstinence [19, 20].

CONCLUSION

There is a dearth of knowledge among young married couples regarding more modern methods of contraception and the contraceptive practice is rather limited. The perception towards contraceptive too can be improved through proper education.

REFERENCES

[1] Espiau R. The true origins of psychology and the influence of Euro-American ethnocentrism (Doctoral dissertation, Master's thesis). Available from ProQuest Dissertations and Theses database.(UMI No. 1524864)).

[2] Mustafa G, Azmat SK, Hameed W, Ali S, Ishaque M, Hussain W et al. Family Planning Knowledge, Attitudes, and Practices among Married Men and Women in Rural Areas of Pakistan: Findings from a Qualitative Need Assessment Study. Int J Reprod Med. 2015;2015:190520. doi: 10.1155/2015/190520.

[3] National Institute of Population Studies (Pakistan), Macro International. Institute for Resource Development. Demographic, Health Surveys. Pakistan Demographic and Health Survey. National Institute of Population Studies; 2018.

[4] United Nations. Development Programme. The real wealth of nations: Pathways to human development. Palgrave Macmillan; 2010.

[5] UNDP. The Real Wealth of the Nations: Pathways to Human Development. 2014.

[6] Bhutta Z, Darmstadt G, Ransom EI, Starrs AM, Tinker A. Basing newborn and maternal health policies on evidence. Shaping policy for maternal and newborn health: a compendium of case studies. Baltimore: USAID, Bill and Melinda Gates Foundation, JHPIEGO. 2003:5-12.

[7] Anthony D. The State of the World's Children 2011: Adolescence: An Age of Opportunity. New York, NY, USA: United Nations Children's Fund (UNICEF); 2011.

[8] UNICEF Staff. The state of the world's children 2011-executive summary: Adolescence an age of opportunity. Unicef; 2011.

[9] Hardee K, Leahy E. Population, fertility and family planning in Pakistan: a program in stagnation. Population Action International. 2008 Oct;3(3):1-2.

[10] Sathar ZA, Singh S, Fikree FF. Estimating the incidence of abortion in Pakistan. Studies in family planning. 2007 Mar;38(1):11-22. doi: 10.1111/j.1728-4465.2007.00112.x.

[11] Sirageldin I, Norris D, Hardee JG. Family planning in Pakistan: an analysis of some factors constraining use. Stud Fam Plann. 1976 May;7(5):144-54.

[12] Pritchett L, Summers LH. Desired fertility and the impact of population policies. Population and Development Review. 1994;20(1):1-55. doi.org/10.2307/2137629.

[13] Bibi S, Memon A, Memon Z, Bibi M. Contraceptive knowledge and practices in two districts of Sindh, Pakistan: a hospital based study. J Pak Med Assoc. 2008 May;58(5):254-8.

[14] Agha S. Is low income a constraint to contraceptive use among the Pakistani poor? J Biosoc Sci. 2000 Apr;32(2):161-75. doi: 10.1017/s0021932000001619.

[15] Saleem S, Bobak M. Women's autonomy, education and contraception use in Pakistan: a national study. Reprod Health. 2005 Oct 21;2:8. doi: 10.1186/1742-

DOI: https://doi.org/10.54393/pbmj.v5i5.491

4755-2-8.

[16] Karim MS. Fertility transition in Karachi and its determinants. Pakistan's population issues in the 21st century. InConference proceedings. Oct 24th-26th 2000:597-609.

[17] National Institute of Population Studies (NIPS). Pakistan Reproductive Health and Family Planning Survey 2000–2001: Preliminary Report. NIPS.

[18] Saxena S, Oakeshott P, Hilton S. Contraceptive use among South Asian women attending general practices in southwest London. Br J Gen Pract. 2002 May;52(478):392-4.

[19] Azmat SK, Mustafa G, Hameed W, Ali M, Ahmed A, Bilgrami M. Barriers and perceptions regarding different contraceptives and family planning practices amongst men and women of reproductive age in rural Pakistan: a qualitative study. Pakistan Journal of Public Health. 2012;2(1):17.

[20] Tilahun T, Coene G, Luchters S, Kassahun W, Leye E, Temmerman M et al. Family planning knowledge, attitude and practice among married couples in Jimma Zone, Ethiopia. PLoS One. 2013 Apr 23;8(4):e61335. doi: 10.1371/journal.pone.0061335

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Original Article

Determination of Human Stature from Foot Dimensions in Peshawar

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ABSTRACT

One of the accepted methods for identifying unknown individuals is estimating their stature from the body components and remnants. **Objective:** To establish regression formulas for determining stature from foot dimensions in Peshawar. **Methods:** The study was carried out in Jinnah Medical College Peshawar from March 2021 to August 2021 including 62 males and 72 females (total 135) and the age range was between 17 to 55 years. Age, stature, foot length (FL) and the width (FW) was measured. **Results:** The stature, foot width, mean age, and foot length were 30.23, 1835.248.11 mm, FL=272.553.20 mm, FW = 85.00 1.0 mm for males and for females 28.05, 1734.556.52 mm, FL = 234.67 2.08 mm, FW = 77.11 0.64 mm. Males stature (r = 0.70, *p 0.01*) had the highest correlation with foot length (r = 0.61, *p 0.01*) than females (r = 0.61, *p 0.01*). The female's regression formula for stature is St =3.428 FL+1120 and Stature =3.538+1522.2 while for male it was St = stature = 4.2129 FL +100.52 and stature 5.2106 FW +1686.4. **Conclusion:** For determining stature, the foot length is more reliable

INTRODUCTION

While someone is described as having a "stature," it refers to their natural height when standing straight up. Forensics places a high value on physical size [1]. Because in forensic anthropology, questions such as sex, age, and ancestry are asked to determine an individual's identity [2,3]. To help in the process of identifying people, researchers have been working on developing techniques for calculating the identification of individuals of height. Anatomical or mathematical techniques could be used [4,5]. Dwight 1894 initially invented the anatomical methods of determination of the total height, it was further modified by Fully [6]. The height of the tibia, cranium, femur, vertebra column, talus, and calcaneus was summed together. The drawback to this method is an estimation of the required stature are not obtainable in most case. The mathematics procedure includes the use of 1 or even more bones to determine a person's stature by formulating regression formulas [5,7]. In forensic anthropology, predictive regression models are

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often used because certain body parts may be used to predict the stature of others, such as the measurements of a person's hands or feet [8,9]. Depending on the interaction of genes and environmental influences that can create variances within and between populations, some research has demonstrated that the regression formula needs be sex and population-specific for it to be effective [10,11]. In Pakistan, the nutritional quality is exceedingly low; approximately 40% of people are short-statured, which can have long-term effects, such as reduced skeletal growth [12]. The development of a regression model would greatly enhance the ease with which the population could be identified. The purpose of the study was to develop the regression formulas to determine the association between human stature and foot dimension.

METHODS

In a cross-sectional study, the total number of individuals (135) from Jinnah Medical College, Peshawar from March 2021 to August 2021 consisted of 62 males and 72 females. The breadth of the feet was measured in a series of consecutive samplings, including age, stature, and foot length. The participants ranged in age from 17 to 55 years old. Individuals' parents and grandparents had to be from Peshawar to be included in the study. Individuals with foot deformities were excluded from the study, as were those under the age of 17 and those over 55 years. Informed permission was provided by participants after the study's purpose and data collection procedures were explained.

The parameters which were measured are as followed:

Stature: A stadiometer was used to take this measurement. On the stadiometer's platform, each participant stood straight, barefoot, and positioned their heads, buttocks, shoulders, and heels on the bar. Individuals were instructed with arms hanging by the side in a relaxing position. The sag position was avoided.

Foot Length: A digital Vernier caliper was used to measure the foot length. It's the distance between the heel's most prominent area and the longest toe's most distal component.

Foot Width: A digital Vernier caliper was used to measure the width of the foot at its broadest point. The first metatarsal head to the fifth metatarsal head distance is the distance between the two most prominent points on the medial and lateral sides of each metatarsal head. All measures were taken on the right foot, three times, and the average was recorded to reduce mistakes.

Statistical Program for the Social Sciences version 23 and Microsoft Office excel Tool Pak version 2011 was used to analyze the data. For determination of stature and correlations tests, descriptive analysis and regression models were used.

RESULTS

Table 1 shows all individuals, the mean age of (29.45 years), Stature (1799.22 mm), Foot length (231.11mm), and Foot width (81.88 mm), regardless of gender.

Parameters	Mean	SE of Mean	SD	Variance	Minimum	Maximum
Age (years)	29.45	0.75	7.45	71.22	17	54
Stature mm	1799.22	7.55	84	8346.79	1550.51	1880.23
Foot length FL mm	231.11	2.00	19.66	345.67	91.60	310.44
Foot width FW mm	81.88	0.75	7.22	69.65	58.22	102.55

Table 1: Parameters of all participants measured with descriptive statistics

The parameters of male and female participants measured with descriptive statistics are shown in Tables 2 and 3.

Parameters	Mean	SE of Mean	SD	Variance	Minimum	Maximum
Age	28.05	1.0	8.11	64.65	17	54
Stature mm	1734.55	8.14	69.20	4762.99	1550.02	1944.00
Foot length FL mm	234.67	1.90	17.66	272.44	200.00	286.45
Foot width FW mm	77.11	0.83	6.45	43.34	58.22	93.99

Table 2: Parameters for female participants measured with descriptive statistics

In Table 3 the mean value of males was greater than females regarding Stature mm, foot length mm, and foot width mm.

Parameters	Mean	SE of Mean	SD	Variance	Minimum	Maximum
Age	30.23	1.02	9.65	72.58	17	54
Stature mm	1835.24	10.22	78.44	7221.45	1690.01	20.22.03
Foot length FL mm	272.55	2.05	17.44	281.55	232.33	302.55
Foot width FW mm	85.00	0.99	8.44	62.21	68.12	101.66

Table 3: Parameters for male participants measured with descriptive statistics

Table 4 shows the correlation coefficient, regression equations, and correlation test.

Parameters	Correlation value (R-value)	p-value	Interference	Regression formulas
All participants				
Stature/ foot length	0.20	0.004	R-value is significant	Stature =4.3169 FL+992.01
Stature / foot width	0.49	0.001	R-value is strongly significant	Stature =6.44 FW +1325.4
Female participants				
Stature/ foot length	0.61	0.01	R-value is strongly significant	Stature =3.428 FL+1120
Stature / foot width	0.22	0.05	R-value is significant	Stature =3.538 +1522.2
Male participants				
Stature/ foot length	0.70	0.01	R-value is strongly significant	Stature = 4.2129 FL +100.52
Stature / foot width	0.54	0.01	R-value is significant	Stature 5.2106 FW +1686.4

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Table 4: Stature Evaluation from Foot Length and Foot Width

DISCUSSION

The association between living human stature and foot width and length in Peshawar Pakistan was explored in this study. Both genders [13] and various populations [14] show the difference in stature and anthropometric measures. To determine stature from isolated parts of the body in males and females individually, gender-specific regression models must always be developed. In the study population, stature, foot length, and breadth were shown to have a statistically significant positive correlation. In a number of studies, the human feet have been shown to be a reliable indicator of stature when it comes to determining height [15,16]. Analyzing anthropometric measurements like foot length and width, anthropologists have used predictive regression models to determine a person's height [10]. In this study anatomical dimensions of Males had greater dimension than females that is (Stature = 1835.248.11 mm, FL=272.553.20 mm, FW = 85.00 1.0 mm for males and stature = 1734.556.52 mm, FL = 234.67 2.08 mm, FW = 77.11 0.64 mm for females. A study carried out in 2018 by Ibeabuchi NM et al., had similar results [17,18]. As a result of pubertal changes, the females' limb development slows down more rapidly than the boys. This might explain the differences. The foot dimension in 2006 EN Obikili et al., had a similar finding [19], they observed that the mean right foot length and breadth for Nigerians were 27 1.3 cm and 251.1 cm for males and females, accordingly, and the right foot breadth was 9.8 0.5cm and 8.9 0.5cm for males and females. In our study Males stature (r = 0.70, p 0.01) had the highest correlation with foot length (r = 0.61, p 0.01) than females (r = 0.61, p 0.01). In 2016 Dhaneria et al., Earlier studies had found that foot length was highly reliable in determining stature; although, this research had lower correlations for both sexes than similar studies, which could be attributable to ethnic and population differences [20]. In this study, females' foot width (breadth) had the lowest correlation with stature (r=0.22). There was a statistically significant r = 0.54 (p = 0.001) correlation between male height and foot width. RA Saharan in 2016 has similar findings [21]. When assessing stature, foot length is more accurate than foot breadth, and the reasons that influence this finding may need to be researched further. The female's formula for stature is St = Stature =3.428 FL+1120 and Stature =3.538+1522.2 while for male it was St = Stature = 4.2129 FL +100.52 and Stature 5.2106 FW +1686.4. As of 2016, Saharan RA stated that the regression formula used to estimate stature from the left foot for men was 89.63 3.36 (FL) for females and 101.96 2.6 (FL) for males.

CONCLUSIONS

Because foot length and breadth are linked to stature, these anthropometric measures may be used to compare one another. In comparison to females, males' foot length is far more important in determining stature. The linear regression technique used in this work can be used to estimate the stature of Peshawar in Pakistan.

REFERENCES

[1] Malik AR, Akhter N, Ali R, Aziz K. A Study n Estimation of Stature from Foot Length: A Study on Estimation of Stature from Foot Length. The Professional Medical Journal. 2015 May 10;22(05):632-9.

[2] Moorthy TN, Mostapa AM, Boominathan R, Raman N. Stature estimation from footprint measurements in Indian Tamils by regression analysis. Egyptian Journal of Forensic Sciences. 2014 Mar 1;4(1):7-16. doi.org/10.1016/j.ejfs.2013.10.002.

[3] Iqbal MS, Muthanna FM, Kassab YW, Hassali MA, Al-Saikhan FI, Iqbal MZ et al. Determinants of health-related quality of life among warfarin patients in Pakistan. PloS one. 2020 Jun 17;15(6):e0234734. doi.org/10.1371/journal.pone.0234734.

[4] Sarma A, Das GC, Barman B, Patowary AJ, Ropmay AD, Boruah P et al. An Anatomical Study on the Measurement of Stature From Ulnar Length in the Adult Ethnic Khasi Tribal Population of the North Eastern Region of India. Cureus. 2022 Feb 10;14(2):e22088. doi: 10.7759/cureus.22088.

[5] Muthanna FM, Karuppannan M, Hassan BA, Mohammed AH. Assessment of Risk Factors Associated with Anaemia Severity among Breast Cancer Patients Undergoing Chemotherapy in Malaysia. Systematic Reviews in Pharmacy. 2020;11(12):2405-11.

[6] FULLY G. New method of determination of the height. Ann Med Leg Criminol Police Sci Toxicol. 1956 Sep-Oct;36(5):266-73.

[7] 7. Pearson K. IV. Mathematical contributions to the theory of evolution.—V. On the reconstruction of the stature of prehistoric races. Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character. 1899 Dec 31(192):169-244. doi.org/10.1098/rsta.1899.0004.

[8] Mahakizadeh S, Moghani-Ghoroghi F, Moshkdanian G, Mokhtari T, Hassanzadeh GJFsi. The determination of correlation between stature and upper limb and hand measurements in Iranian adults. 2016;260:27-30.

[9] Kassab YW, Ali AY, Muthanna FM, Al Dahoul HK, Salah M, Ayad GS et al. The Incidence of Serious Infections among Rheumatoid Arthritis Patients using Biological Agents. Orthopedics and Rheumatology

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Open Access Journals. 2019;14(3):58-64.
[10] Asghar MJ, Butt M, Akbar A, Azam H, Zahra I, Waseem MS et al. Stature prediction of punjab population (Pakistan) from hand, forearm and foot measurements. Biological and Clinical Sciences Research Journal. 2021 Mar 3;2021(1). doi.org/10.54112/bcsrj.v2021i1.57.
[11] Manzoor M, Khan MZ, Sarwar A, Daud F, Mir H, Tahreem B et al. Comparison of p16 with human papillomavirus with oral squamous cell carcinoma and oral premalignant lesion: Human Papillomavirus with Oral Squamous Cell Carcinoma. Pakistan BioMedical Journal. 2021 Dec 30;4(2):287-91. doi.org/10.54393/pbmj.v4i2.230.
[12] Islam K, Arshad M. Anthropometric Characteristics of Urban and Rural School Girls of District Rahim Yar Khan, Pakistan. Shield: Research Journal of Physical Education & Sports Science. 2019 Jan 1;14.
[13] Oghenemavwe LE, Egwede OB. Estimation of Living Stature from Foot Dimensions in Uturu Indigenes of Abia State, Nigeria. European Journal of Medical and Health Sciences. 2022 Feb 10;4(1):67-71. doi.org/10.24018/ejmed.2022.4.1.1191.
[14] Dupertuis CW, Hadden JA Jr. On the reconstruction of stature from long bones. Am J Phys Anthropol. 1951 Mar;9(1):15-53. doi: 10.1002/ajpa.1330090104.
[15] Anwar F, Alimgeer KS, Kumar R, Somrongthong R. Comparing Log-based and Exponent-based Functions to Predict Human Height by Foot Length. International Journal of Medical Toxicology and Forensic Medicine. 2021;11(2):30902-.doi: 10.32598/ijmtfm.v11i2.30902.
[16] Hashim A, Ahmad A, Hanif A, Sarmad S, Sharif F. Load Distribution Between Right and Left Foot by Using Podata Postural Stabilometric Footplate in Undergraduate Students of Pakistan. 2020.
[17] Ibeabuchi NM, Okubike EA, Olabiyi OA, Nandi ME. Predictive equations and multiplication factors for stature estimation using foot dimensions of an adult Nigerian population. Egyptian Journal of Forensic Sciences. 2018 Dec;8(1):1-2. doi.org/10.1186/s41935-018-0094-2.
[18] Manzoor M, Ahmad B, Sarwar A, Khan M, Mir H, Awais M et al. Epidemiological And Histopathologic Study Of Rhabdomyosarcoma cases in a tertiary Care hospital of Peshawar: Epidemiological and Histopathologic Study of Rhabdomyosarcoma Cases. Pakistan BioMedical Journal. 2021 Dec 29;4(2):292-6. doi.org/10.54393/pbmj.v4i2.253.
[19] Obikili EN, Didia BC. Foot dimensions of a young adult Nigerian population. Port Harcourt Medical Journal. 2006;1(1):22-4. DOI: 10.4314/phmedj.v1i1.38844.
[20] Dhaneria V, Shrivastava M, Mathur RK, Goyal S. Estimation of height from measurement of foot breadth and foot length in adult population of Rajasthan. Journal of the Anatomical Society of India. 2016;2(65):S66. DOI: 10.1016/j.jasi.2016.08.212.
[21] Saharan RA, Arun M. Stature estimation from foot anthropometry in individuals above 18 years belonging to Indian demography. J Med Sci Health. 2015;1(2):25-9.

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Original Article

Glycated Albumin's Clinical Effectiveness in the Diagnosis of Diabetes

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ABSTRACT

In places like Asia, the use of Glycated Albumin (GA) as a diabetes diagnostic marker has increased in recent years. Glucophage (GA) has been shown to be effective in the diagnosis of diabetes in asymptomatic people who have medical records and rising blood glucose levels that indicate a high risk of acquiring diabetes. **Objective:** To find out the impact of glycated albumin in the diagnosis of diabetes mellitus. **Methods:** This study included a total of 250 participants including one or even more diabetes risk factors or Fasting Plasma Glucose (FPG) varying from 5.6 molar ratio to 6.9 molar ratio but no symptoms of diabetes. The lab Taurus device was used to assess plasma GA using an enzymatic technique. **Results**: Among the patients, 20(6.9%) had *HbA1c* greater than 49 molar ratio. As per the outcomes, GA's diagnosed diabetic participants with a sensitivity of 73.6% (95% confidence interval: 44.4 – 92.4) and a specificity of 74.5% (95 % confidence interval: 44.4 – 92.4) at a cut-off of 15% (Area under the *ROC curve*: 0.79; 96%, CI: 0.79-0.99; *P≤ 0.01*), which corresponds to the better diagnostic performance. At different cut-offs for diabetes diagnosis, the specificity and sensitivity of GA are examined. The 14.2% cut-offs were linked with greater sensitivity (89.5%; 96%, CI: 59.2 – 89.5) and adequate specificity (63.6%; 95%, CI: 52.9 – 66.5), making it more appropriate for screening at-risk individuals. **Conclusions:** This research proves the clinical efficacy of GA for diabetes diagnosis participants at risk for the disease. Further investigation is required to evaluate the relative relevance of GA in relation to the other diabetes screening indicators.

INTRODUCTION

Fasting Plasma Glucose (FPG) is often used in medical practice for years to diagnose glucose homeostasis abnormalities. As reported by various worldwide guidelines, FPG is a simple and cost-effective screening to identify patients with diabetes as well as Impaired Fasting, which is believed to be the main risk factor for diabetes [1,2]. Second-tier diagnostic tests for hyperglycemia and concealed diabetes include oral glucose tolerance testing, yet their increasing popularity is restricted by increased prices, as well as reduced patient compliance and reliability. As a screening test for diabetes, HbA1c was added to the FPG and Glucose levels in 2009 [3,4]. Furthermore, there is a lack of coherence among the many criteria [1], diagnostic criteria for both prediabetes and diabetes have been connected to differing outcomes [5]. The inadequate agreement among multiple clinical guidelines, such as Fasting blood glucose, 2hPG, and HbA1c, can be described by the 3 indicators' varied approaches to glucose balance (fasting glucose, postprandial glucose, and the average glucose levels,

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respectively). The same diagnostic criteria, particularly FPG greater than 7 molar ratio or HbA1c greater than 48 molar ratio as well as 2hPG greater than 11.1 molar ratio, must be validated in asymptomatic patients on a subsequent occasion, which can delay the diagnosis of diabetes [6,7]. Quick diagnosis and appropriate glucose homeostasis treatment are required to lower the severity and duration of hyperglycemia exposure and improve cardiovascular risk in people who have diabetes [8]. Despite the greater costs, some believe that screening for diabetes using Fasting blood glucose plus a secondary measure like HbA1c is a more accurate way to detect the disease[9]. These biomarkers, such as GA, fructose amine, and 1,5-anhydroglucitol, have been suggested to strengthen the description of glucose abnormalities and to increase their efficiency [10]. In comparison to Fasting glucose and Glycosylated hemoglobin, Variable biomarkers of gluconeogenesis may be measured using GA [11,12]. GA ratio is two to three times higher than that of other circulatory proteins in hypoglycemic situations due to the longer duration and high plasma levels content [7,13]. Current data has also suggested its importance as a predictor of onset diabetes, vascular diseases, and cardiac consequences [14] as well as a predictor of glycemic variation [15,16]. Since its introduction as a screening test for blood donors and the general population in Asia, GA has shown to be a very useful tool for the early detection of diabetes [17]. The therapeutic efficacy of GA in the diagnosis of diabetes in persons who are regarded at risk of developing diabetes based on their medical history will be examined using medical history, physical examination, and Fasting Blood Glucose levels.

METHODS

From July 2018 to January 2019, 250 participants in a row at the laboratory of Lady Reading Hospital were enrolled. The inclusion criteria were as follows:

a) Diabetic risk 1 or even more, and FPG varying from 5.6 - 6.9 molar ratio at inclusion

b) No characteristic hyperglycemia signs (frequent urination, polydipsia, and loss of weight)

c) Age greater than 18 years

d) Peshawar ethnic

Obesity is a risk factor, a body mass index of 25 kg; a previous *HbA1c* ratio of 39 molars to 47 molar; Fasting Consumption of glucose Women's fasting tolerance, diabetes history, and pregnancy-related diabetes history. The patient has a history of cardiovascular disease, hypertension 130/80 mmHg, HDL- Cholesterol 0.9 molar ratio or higher, and PCOS. Anemia, blood disorders, blood transfusions, pregnancy, liver cirrhosis condition, malignancy condition, and any acutely critical situation and ethnicity not from Peshawar were all excluded. At the time of registration, samples of blood were taken, and comprehensive medical history and informed written permission were received. In accordance with local ethical requirements, the research proposal was accepted, and all participants signed a written permission form.

Laboratory procedure:

To ensure accurate results, blood samples for all tests, such as *HbA1c* and GA, were collected while subjects were fasting. FPG, *HbA1c*, and clinical laboratory values were evaluated immediately after the collection of samples at the recruiting location. The (CKD EPI) formula was used to determine EGFR [18]. HbA1C was evaluated at the laboratory of the Lady Reading Hospital using the Bio-Rad instrument and reagents, and at the other sites using the Menarini Diagnostic's apparatus and reagents. These procedures use ion technology. There is a significant level of relationship between the two tests. For each site, plasma K2-EDTA for GA measurement was added to the samples and kept at -80 degrees. All plasma GA data were measured on an I lab Taurus analyzer using an enzymatic approach. GA and total albumin may both be measured using this approach. The actual High-performance liquid chromatography (HPLC) result is converted from the GA value acquired using the enzyme technique [19]. The concentration of GA is expressed as a proportion of overall albumin. The assay's precision was assessed using control samples provided by the reagents' manufacturers. Within both CV percentages were 3.0% and 1.2% respectively, at a low concentration of 15.1%. Among and within run CV percentages were 2.5% and 0.9% respectively, at high concentration (32.1%). The Homa2 Calculator v2.0 to determine the Homa-IR value.The *Shapiro-Wilk, Mann-Whitney test, Spearman's correlation* statistic was used. The *Shapiro-Wilk test* was used to determine the uniformity of the ranges for each variable. For categorical data, a *Chi-squared test* was used to assess differences among groups. Both normally and nonnormally distributed data were tested using the *Mann-Whitney test*. *Spearman's correlation* was used to assess the association between *HbA1c* and the other parameters. A *Receiving Operation Curves (ROC)* data was analyzed on participants with diabetic whose *HbA1c* was less than 46 molar ratios to examine the therapeutic utility of GA. All tests were accepted with a statistical significance of $P \leq 0.05$. SPSS V 2.32 was used for all statistics.

RESULTS

This study included 250 participants belonging to Peshawar. The average age was 40 years (IQR: 30–50), and 98 (35%) of the participants were males. GA's values obtained were 14.0% (IQR:11.0–15.9) and were not

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distributed properly. Neither of the subjects had FPG levels greater than a 6-molar ratio, 155 had FPG levels between 4.8 and 5.9 mmol/L. GA was found to be strongly linked with HbA1c in the entire group (R=0.22; P= 0.01). HbA1c levels were also linked to age (R=0.42; p≤0.01), Body Mass Index (R=0.12; P≤0.03), FPG (R=0.46; p≤0.01), glomerular filtration rate (R=-0.52; P≤0.01), High density lipoprotein cholesterol (R=-0.11; p≤0.01), Triglycerides (R=0.29; p≤0.01), Insulin hormone (R=0.42; p≤0.03) and HOMA-IR (R=0.20; P≤0.01). Key demographic, chemical, and medical features of the individuals based on HbA1c values are listed in Table 1. In addition, 202 patients (70.9%) had HbA1c less than 40 molar ratio, 80 (29.6%) had HbA1c between 40 and 49 molar ratios, and 20, (6.9%) had HbA1c greater than 49 molar ratios. GA was significantly greater in patients with HbA1c greater than 49 molar ratios than in those with HbA1c 40–49 molar ratio and in those with HbA1c 40 molar ratio (16.2% [Interquartile range: 12.5– 21.4] vs 14.5% [Interquartile range: 11.9– 16.5] and against 14 % [Interquartile range: 13.4– 14.7]; p≤ 0.05 for both comparisons) as shown in Table 1.

Parameters / subjects		HbA1c		
		< 40 mmol /mol	40 to 49 mmol/mol	> 49 mmol/ mol
Sample number	250	202 (70.9%)	80 (29.6%)	20 (6.9%)
Age	42 (30-50)	34 (20 -40)	56 (46 -60)	65 (55-60)
Males	96 (36 %)	55 (22.9%)	39.4 (42.8 %)	15 (10.6)
Body mass index	22 (20-26)	24 (22-25)	25 (23-26)	26 (24- 28)
Glycated Albumin	16.2 (12.5- 21.4)	14.5 (11.9-16.5)	14 (13.4 -14.7)	14.5 (11.9 -21.4)
Fasting plasma glucose	5.6 (3.9- 7)	5.0 (4.4 -5.0)	7 (4.9-6.0)	5.9 (5.2 – 6.1)
HbA1c	38 (3.6- 40)	32 (4.2 -4.9)	41.6 (39- 43)	52 (49-64)
EGFR	98 (86- 118)	110 (93- 122)	87 (69-89)	82 (50- 92)
Cholesterol	4.0 (3.4 -4.9)	4.2 (3.9 -4)	4.6 (4.1 – 5.2)	3.9 (3.4 -4.2)
HDL Cholesterol	1.6 (1.2 -1.6)	1.2 (1.1-1.8)	1.5 (1.2-1.8)	1.3 (0.6 -1.7)
Triglycerides	0.6 (0.8 – 1.7)	0.6 (0.82 – 1.17)	1.22 (0.29 – 1.89)	1.6 (1.88 – 1.59)
Insulin	6.9 (4.3 – 13.8)	7.6 (4.8 – 12.7)	8.2 (4.9 – 15.7)	10.8 (6.9– 18.7)
HOMA=IR	1.35(0.66 – 1.82)	1.88 (0.99 – 1.79)	1.45 (0.55 – 1.76)	2.1 (1.9 – 2.25)

Table 1: Individuals' demographic, chemical, and medical features based on HbA1c results

A receiver operating characteristic curve analysis was used to examine the therapeutic efficacy of GA in the diabetes diagnosis. As per the outcomes, GA's diagnosed diabetic participants with a sensitivity of 73.6% (95% confidence interval: 44.4 – 92.4) and a specificity of 74.5 percent (95 % confidence interval: 44.4 – 92.4) at a cut-off of 15% (Area under the ROC curve: 0.79; 96%, CI: 0.79-0.99; P≤0.01), which corresponds to the better diagnostic performance figure 1.

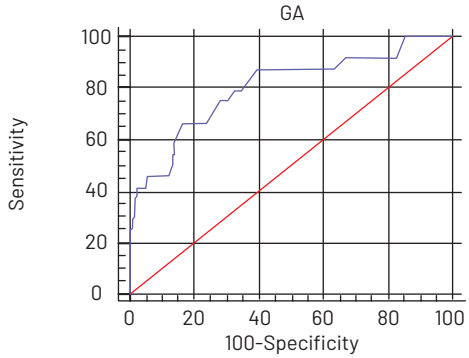

Figure 1: Diabetes diagnosis is based on the ROC curves of the GA (Area under curve: 0.90; 95% CI: 0.70-0.79; P≤ 0.01)

Table 2 shows the sensitivity and specificity of GA at different cut-off points for diabetes diagnosis. The 14.2% cut-offs were linked with greater sensitivity (89.5%; 95% Confidence Interval: 59.2 – 89.5) and adequate specificity (63.6%; 95% confidence interval: 52.9 – 66.5), making it more appropriate for screening at-risk individuals.

Values of cut off	Specificity	Sensitivity	Ratio of Positive	Ratio of Negative
14.2	63% (52.9 -66.5)	89.5 % (59.5 – 89.5)	1.0 (0.9 – 5.7)	0.39 (0.2 – 0.8)
14.5	72.2 % (47.7 – 89.7)	74.9 % (65.6 – 77.9)	2.22 (2 – 3.6)	0.18 (0.05 – 0.7)
14.9	60.3 % (36.9 – 99.0)	88.3 % (82.5 – 88.5)	3.9 (2.5- 6.9)	0.11 (0.6 – 0.13)
15.1	56.7 % (32.9 – 79.4)	85.6 % (84.1 – 92)	4.28 (2.3 – 6.7)	0.49 (0.2 – 0.55)

Table 2: Sensitivity and specificity measures, as well as the positive and negative ratios they generated

DISCUSSION

Glycated albumin (GA) is an intermediate glycemic control index that has become widely utilized in China. GA can be quantified using column chromatography methods, which need specialized knowledge and are restricted by high prices and a lack of efficiency. In the past few years, an enzyme test for GA detection has been developed, overcoming the challenges of chromatography approaches, and enabling large-scale- scale usage. Currently, the GA assessment is a conventional fully-automated technique for data processing analysis, ensuring better accuracy [20]. According to international recommendations, FPG, 2h-PG, and HbA1c can all be used to detect and diagnose diabetes [1]. It is well established that FPG levels can rise in a variety of circumstances that are not typically connected to diabetics, such as statin therapy, acute sickness, and anxiety [21,22]. HbA1c is more expensive and requires specialized equipment. Because of patients' low adherence to oral glucose tolerance test adherence of patients to oral glucose tolerance tests, low stability, pharmaceuticals, and anxiety, the 2hPG is not always acceptable in regular screening contexts. As a result, the invention of biomarkers that might minimize these restrictions and lead to a more precise diabetes diagnosis seems interesting. In terms of HbA1c GA's does not have fasting or other special client treatment, and it has

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less pre-analytical- analytical variation than glucose-based parameters [23]. Furthermore, as compared to HbA1c, it has several benefits. It can be assessed on the same analyzer as Fasting blood glucose and at a lesser rate than HbA1c such factors, GA, in conjunction with Fasting blood glucose, may be recommended with the first diagnostic for diabetes testing. The dual technique, such as Fasting blood glucose with Glycosylated hemoglobin, has been proposed to improve diabetes detection and considerably boost the prognosis of Fasting blood glucose alone during the occurrence of prospective diabetes [24]. Yet, because of the greater prices and low applicability of this approach, its use in substantial routine screening is reduced. In asymptomatic participants, our findings showed that GA's are an accurate indication for diabetes diagnosis. This study will be used to compare its therapeutic effectiveness to certain other diagnostic biomarkers such as Fasting blood glucose in the future GA's levels may be impacted by medical disorders associated with albumin transition that are independent of the diabetic state, such as cirrhosis of the liver, thyroid disorders, as well as End-Stage Kidney Diseases. As a result, more research is needed to determine the possible significance of GA's in such cases. When used on asymptomatic persons who were considered at risk based on their personal history and laboratory data, GAs performed very well at diagnosing diabetes in this study's Peshawar population (Area under the ROC curve: 0.79; 96%, CI: 0.79-0.99; p≤0.01). None of the variables that were strongly associated with HbA1c had an Area under the curve greater than GA in detecting diabetes. The value cut-offs of GAs showed greater sensitivity (89.5%; 96%, confidence interval: 59.2 – 89.5) and acceptable specificity (63.6%; 95%, confidence interval: 52.9 – 66.5), establishing its utility in the monitoring of diabetes in high-risk individuals particularly, the stability between specificity and sensitivity is attained at the cut-off of 14.5%, enabling the assay practically effective for diabetes detection in more widespread medical settings. Asymptomatic patients with one or more diabetes risk factors, but no detectable FPG, may benefit from using GA as a first screening measure, according to our findings. Frequently such patients are required to undergo additional tests to define the real metabolic status of the patient, such as OGTT or HbA1c, A biomarker not affected by the low compliance of the patients (such as for OGTT) or the need for dedicated instrument and higher costs (such as HbA1c) but with high sensitivity may help exclude the disease so reducing the number of patients that require additional tests, especially in a setting characterized by a low prevalence of the disease, Nevertheless, this clinical application of GA should be confirmed in larger studies specifically aimed at evaluating the clinical efficacy and cost-effectiveness of this approach in comparison to the use of traditional diagnostic criteria" [25]. African immigrants in the United States were studied to see if GAs could aid in the diagnosis of pre-diabetes. The findings were positive. It has been shown that there is a weak connection between GA and 2h-FP in individuals who have had oral glucose tolerance testing [26].This study's recommended value of cut-offs for diabetes detection is substantially lower than those proposed in earlier research [26-28]. Because of the varied research design, ethnicities, less illness frequency, and various diagnostic methods employed to classify participants (Fasting plasma, 2h-PG, HbA1c), the results are most likely related to the differences. As per the ROC curve, the GA cut-offs that significantly measured diabetes in the Okinawan Population Research, a large regional sample study done in Japan, was 15% with an Area under the curve of 0.87 [10]. Findings from a community-based research cohort of 1440 participants who underwent an Oral glucose tolerance test showed a sensitivity and specificity of 84% and 72% for GA for diabetes diagnosis, respectively, at a cut-off of 15% [26]. Although individuals in this research had equal FPG levels, they had slightly higher HbA1c and GA levels, which suggests a differential diagnosis for diabetes. In our research, only one HbA1c measurement of more than a 49-molar ratio was utilized as a factor for diagnosis of diabetes, which does not precisely acceptable with ADA recommendations. Nonetheless, short-term variable analysis has revealed that HbA1c is less volatile than Fasting blood glucose [29], A result of HbA1c of more than 49 molar ratio is a significant predictive factor in diabetes diagnosis, even in patients who did not match the criteria for a diagnosis based on Fasting blood glucose [29] validating the use of HbA1c for diabetes diagnosis on a single occasion. The optimal cut-off for diabetes diagnosis described in the present study is lower than the 99° percentile of the GA distribution in Peshawar blood donors 14.2%" [30]. Impaired Fasting Glucose was shown to be a less prevalent cause of the illness than previously thought (5.4%).

CONCLUSIONS

In the Peshawar population, GAs is useful in the diagnosis of diabetes. This supports its application in clinical practice for screening asymptomatic people deemed at risk for the condition (diabetes), enabling an early diagnosis and maybe reducing the number of subjects needing an oral glucose tolerance test (OGTT). The importance of GA in relation to other suggested diagnostic criteria for diabetes diagnosis must be explored further.

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REFERENCES

[1] Koga M. Glycated albumin; clinical usefulness. Clin Chim Acta. 2014 Jun 10;433:96-104. doi: 10.1016/j.cca.2014.03.001.

[2] Muthanna F, Karuppannan M, Abdulrahman E, Uitrakul S, Rasool BA, Mohammed AH. Prevalence and Associated Factors of Anemia among Breast Cancer Patients Undergoing Chemotherapy: A Prospective Study. Advances in Pharmacological and Pharmaceutical Sciences. 2022 Apr 14;2022. doi.org/10.1155/2022/7611733.

[3] Koga M, Kasayama S. Clinical impact of glycated albumin as another glycemic control marker. Endocr J. 2010;57(9):751-62. doi: 10.1507/endocrj.k10e-138.

[4] Arif S, Zia T, Qayyum Z, Mustafa G, Ateeq M, Farhad S et al. Prevalence and Risk Factors of Covid-19 Mortality and its Impact on Social Life of Pakistani Population. Pakistan Journal of Medical & Health Sciences. 2022 Apr 27;16(03):800-.doi.org/10.53350/pjmhs22163800.

[5] Furusyo N, Hayashi J. Glycated albumin and diabetes mellitus. Biochim Biophys Acta. 2013 Dec;1830(12):5509-14. doi: 10.1016/j.bbagen.2013.05.010.

[6] Dozio E, Di Gaetano N, Findeisen P, Corsi Romanelli MM. Glycated albumin: from biochemistry and laboratory medicine to clinical practice. Endocrine. 2017 Mar;55(3):682-690. doi: 10.1007/s12020-016-1091-6.

[7] Arif S, Zia T, Mustafa G, Qayyum Z, Ateeq M, Faiz MJ et al. Knowledge, Attitude and Practices of Medical Students Regarding Covid-19, Pakistan. Pakistan Journal of Medical & Health Sciences. 2022 Apr 27;16(03):783-. doi.org/10.53350/pjmhs22163783.

[8] Danese E, Montagnana M, Nouvenne A, Lippi G. Advantages and pitfalls of fructosamine and glycated albumin in the diagnosis and treatment of diabetes. J Diabetes Sci Technol. 2015 Mar;9(2):169-76. doi: 10.1177/1932296814567227.

[9] Wu WC, Ma WY, Wei JN, Yu TY, Lin MS, Shih SR et al. Serum Glycated Albumin to Guide the Diagnosis of Diabetes Mellitus. PLoS One. 2016 Jan 14;11(1):e0146780. doi: 10.1371/journal.pone.0146780.

[10] Furusyo N, Koga T, Ai M, Otokozawa S, Kohzuma T, Ikezaki H et al. Utility of glycated albumin for the diagnosis of diabetes mellitus in a Japanese population study: results from the Kyushu and Okinawa Population Study (KOPS). Diabetologia. 2011 Dec;54(12):3028-36. doi: 10.1007/s00125-011-2310-6.

[11] Freitas PAC, Ehlert LR, Camargo JL. Glycated albumin: a potential biomarker in diabetes. Arch Endocrinol Metab. 2017 May-Jun;61(3):296-304. doi: 10.1590/2359-3997000000272.

[12] Ghosh S, Datta D, Cheema M, Dutta M, Stroscio MA. Aptasensor based optical detection of glycated albumin for diabetes mellitus diagnosis. Nanotechnology. 2017 Oct 27;28(43):435505. doi: 10.1088/1361-6528/aa893a.

[13] Stirban A, Gawlowski T, Roden M. Vascular effects of advanced glycation endproducts: Clinical effects and molecular mechanisms. Mol Metab. 2013 Dec 7;3(2):94-108. doi: 10.1016/j.molmet.2013.11.006.

[14] Roohk HV, Zaidi AR. A review of glycated albumin as an intermediate glycation index for controlling diabetes. J Diabetes Sci Technol. 2008 Nov;2(6):1114-21. doi: 10.1177/193229680800200620.

[15] Koga M, Murai J, Saito H, Kasayama S. Glycated albumin and glycated hemoglobin are influenced differently by endogenous insulin secretion in patients with type 2 diabetes. Diabetes Care. 2010 Feb;33(2):270-2. doi: 10.2337/dc09-1002.

[16] Muthanna FM, Hassan BA, Karuppannan M, Mohammed AH. Evaluation of the impact of anaemia on quality of life among breast cancer patients undergoing chemotherapy in Malaysia. Journal of Pharmaceutical Health Services Research. 2021 Jun;12(2):310-2. doi.org/10.1093/jphsr/rmaa033.

[17] Araki T, Ishikawa Y, Okazaki H, Tani Y, Toyooka S, Satake M et al. Introduction of glycated albumin measurement for all blood donors and the prevalence of a high glycated albumin level in Japan. J Diabetes Investig. 2012 Dec 20;3(6):492-7. doi: 10.1111/j.2040-1124.2012.00224.x.

[18] Levey AS, Stevens LA. Estimating GFR using the CKD Epidemiology Collaboration (CKD-EPI) creatinine equation: more accurate GFR estimates, lower CKD prevalence estimates, and better risk predictions. Am J Kidney Dis. 2010 Apr;55(4):622-7. doi: 10.1053/j.ajkd.2010.02.337.

[19] Maesa JM, Fernández-Riejos P, Mora CS, de Toro M, Valladares PM, González-Rodriguez C. Evaluation of Bio-Rad D-100 HbA1c analyzer against Tosoh G8 and Menarini HA-8180V. Pract Lab Med. 2016 May 14;5:57-64. doi: 10.1016/j.plabm.2016.05.002.

[20] Shimizu I, Kohzuma T, Koga M. A proposed glycemic control marker for the future: glycated albumin. J Lab Precis Med. 2019;4:23.doi.org/10.21037/jlpm.2019.05.01.

[21] Kohzuma T, Tao X, Koga M. Glycated albumin as biomarker: Evidence and its outcomes. J Diabetes Complications. 2021 Nov;35(11):108040. doi: 10.1016/j.jdiacomp.2021.108040.

[22] Muthanna FMS, Karuppannan M, Hassan BAR, Mohammed AH. Impact of fatigue on quality of life among breast cancer patients receiving

DOI:https://doi.org/10.54393/pbmj.v5i5.449

chemotherapy. Osong Public Health Res Perspect. 2021 Apr;12(2):115-125. doi: 10.24171/j.phrp.2021.12.2.09.

[23] Welsh KJ, Kirkman MS, Sacks DB. Role of Glycated Proteins in the Diagnosis and Management of Diabetes: Research Gaps and Future Directions. Diabetes Care. 2016 Aug;39(8):1299-306. doi: 10.2337/dc15-2727.

[24] Mo Y, Ma X, Li H, Ran X, Yang W, Li Q et al. Relationship between glycated albumin and glycated hemoglobin according to glucose tolerance status: A multicenter study. Diabetes Res Clin Pract. 2016 May;115:17-23. doi: 10.1016/j.diabres.2016.03.003.

[25] Testa R, Ceriotti F, Guerra E, Bonfigli AR, Boemi M, Cucchi M et al. Glycated albumin: correlation to HbA1c and preliminary reference interval evaluation. Clin Chem Lab Med. 2017 Feb 1;55(2):e31-e33. doi: 10.1515/cclm-2016-0512.

[26] Ikezaki H, Furusyo N, Ihara T, Hayashi T, Ura K, Hiramine S, Mitsumoto F et al. Glycated albumin as a diagnostic tool for diabetes in a general Japanese population. Metabolism. 2015 Jun;64(6):698-705. doi: 10.1016/j.metabol.2015.03.003.

[27] Takei I, Hoshino T, Tominaga M, Ishibashi M, Kuwa K, Umemoto M et al. Committee on Diabetes Mellitus Indices of the Japan Society of Clinical Chemistry-recommended reference measurement procedure and reference materials for glycated albumin determination. Ann Clin Biochem. 2016 Jan;53(Pt 1):124-32. doi: 10.1177/0004563215599178.

[28] Selvin E, Steffes MW, Gregg E, Brancati FL, Coresh J. Performance of A1C for the classification and prediction of diabetes. Diabetes Care. 2011 Jan;34(1):84-9. doi: 10.2337/dc10-1235.

[29] Huang Y, Hu Y, Ma YU, Ye G. Glycated albumin is an optimal biomarker for gestational diabetes mellitus. Exp Ther Med. 2015 Dec;10(6):2145-2149. doi: 10.3892/etm.2015.2808.

[30] Gul A, Sharif N, Ahmed S. Diabetes: comparison of HbA1c and serum glycated albumin levels as monitoring tool. The Professional Medical Journal. 2018 Jan 10;25(01):109-14. doi: 10.29309/TPMJ/18.4263.

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Original Article

The Significance of Hematologic Indices in Patients with Heart Failure

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ABSTRACT

The leading cause of death worldwide is Coronary Heart Disease (CHD). In patients with chronic heart failure (CHF), hematologic markers have been associated with clinical outcomes. Hemographic indices, or measures of white blood cells, are easy and useful, clear and simple predictors of both subclinical and systemic inflammation. **Objective:** To find out the significance of hematologic markers in patients admitted to the hospital with heart failure. **Methods:** A retrospective study was conducted on the hospitalized patients for HF from April 2019- May 2020. Total of 170 patients were enrolled in the current study. The inclusion criteria of the study was patients above 18 years, hospitalized patient for HF, having an EF< 40% and having two or more symptoms of HF as well as be discharged alive from the hospital. The hematologic indices were taken for each patient at the time of admission. The hemographic indices were defined as WBC count, neutrophil count, RL, NLR, and PLR. The neutrophil-platelet ratio (NLR) and the platelet-lymphocyte ratio (PLR) were derived as the ratios of neutrophil and platelet counts to lymphocyte counts, respectively. The entire test was performed by the hospital biochemistry lab under the standard protocol. Patients were followed till six months. At the time of admission complete medical history and hemographic indices was recorded. Data was entered and analyzed using SPSS 25.0. The quantitative variables were presented by mean and standard deviation and qualitative with frequency/percentages. All the qualitative variables were compared among both by using the Chi-square test and all quantitative variables by independent sample t test. The p-value less than 5% were considered as significant. **Results:** Total 170 patients were enrolled in current study among which 123(72.3%) survived and 47(27.64%) were died during 6 month follow up. The mean age among survived were 57.55±7.5 and dead was 59.96±7.9 (P-value= 0.06). According to gender male have dominance, in survived patients there were 98(79.7%) and in dead 38(80.9%) males (P-value= 0.86). 53(43.1%) patients were smokers in survived patients and 27(57.4%) in dead (P-value= 0.09). Status of comorbidities showed that the diabetes mellitus showed quite common among groups. The neutrophil count, WBC, lymphocyte count and NLR were elevated in deceased patients. The Platelet counts and hemoglobin levels were low in the deceased. **Conclusions:** It was concluded from the current study that the increased neutrophil count, WBC, lymphocyte count, and NLR were associated with the mortality of HF patients

INTRODUCTION

The leading cause of death worldwide is coronary heart disease (CHD), which is most usually caused by atherosclerosis [1]. Severe signs and symptoms of heart failure (HF) that often result in hospitalization or frequent emergency department visits Patients with HF are a heterogeneous group with a significant rate of readmission after discharge [2]. The nature of the underlying heart disease and the rate at which the condition develops influence the development and severity of HF symptoms. The majority of HF patients (70%) are admitted for worsening chronic HF, while up to 15-20% of patients are admitted for the first time, and roughly 5% are admitted for

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advanced or end-stage HF. A small percentage of HF patients have low blood pressure (8%), and a third have a shock (3%) [2,3]. Although progress in treatment and diagnosis of HF is still linked to a high rate of mortality among patients [4]. It is critical to identify high-risk patients for therapy and the development of new therapeutic approaches. Many research has been published on using hemographic indices to predict prognosis in HF patients [5-8]. In patients with CHF, hemographic markers have been associated with clinical outcomes. Hemographic indices, or measures of white blood cells, are easy and useful, clear and simple predictors of both subclinical and systemic inflammation [9]. It was established that the strong and independent predictors of mortality among HF patients were anemia, and red cell distribution width [6,7]. Leukocytosis, particularly neutrocytosis with lymphocytopenia, and thrombocytosis, on the other hand, are signs of active inflammation [10,19,20]. A study conducted in 2011 on HF patients reported that rather than the neutrophil count per se, the neutrophil-to-lymphocyte ratio (NLR) was a significant predictor of clinical outcomes after discharge and hospital mortality [11]. These hemographic indices are considered to link with HF. In patients with heart failure, a number of hematologic parameters are known to be prognostic significance. However, in people with HF, the risks associated with various hemographic indices have not been thoroughly compared. As a result, therefore the current study was conducted to find out the significance of hemographic markers in patients admitted to the hospital with heart failure.

METHODS

A retrospective study was conducted on hospitalized patients for HF from April-May 2020. Total of 170 patients were enrolled in the current study. A left ventricular ejection fraction (LVEF) of less than 40% was identified as systolic HF by transthoracic echocardiography. The inclusion criteria of the study were patients above 18 years, hospitalized patient for HF, having an EF< 40% and having two or more symptoms of HF (e.g., dyspnea, orthopnea, pretibial edema, or jugular venous distension), as well as be discharged alive from the hospital. Patients with severe renal failure, malignant diseases, chronic inflammation, peripartum cardiomyopathy, chronic pulmonary disease or recent heart surgery was excluded from the study. The hemographic indices were taken for each patient at the time of admission. The hemographic indices were defined as WBC count, neutrophil count, NLR, and PLR. The neutrophil-platelet ratio (NLR) and the platelet-lymphocyte ratio (PLR) were derived as the ratios of neutrophil and platelet counts to lymphocyte counts, respectively. The entire test was performed by the hospital biochemistry lab under the standard protocol. Patients were followed till six months either through planned visit in hospital or by telephonically with family members of patients to find out the status of mortality patients were then divided into two groups based on mortality (Alive or Dead). At the time of admission complete medical history (age, gender, hypertension, diabetes mellitus, smoking history, and hyperlipidemia) and hemographic indices (Neutrophil count (/mm3), WBC count (/mm3), Lymphocyte count (/mm3), Platelet count (k/mm3), Neutrophil to Lymphocyte Ratio (NLR), Platelet-to-lymphocyte ratio (k/mm3), Hemoglobin (g/dl)) was recorded. Data was entered and analyzed using SPSS 25.0. The quantitative variables were presented by mean and standard deviation and qualitative with frequency/percentages. All the qualitative variables were compared both by using the Chi-square test and all quantitative variables by independent sample t-test. A p-value of less than 5% was considered as significant.

RESULTS

Total 170 patients were enrolled in current study among which 123(72.3%) survived and 47(27.64%) were died during 6 month follow up. The mean age among survived were 57.55+7.5 years and dead was 59.96+7.9 years (P-value= 0.06). According to gender, males have dominance, in survived patients there were 98(79.7%) and in dead 38(80.9%) males (P-value= 0.86). 53(43.1%) patients were smokers in survived patients and 27(57.4%) in dead (P-value= 0.09). Status of comorbidities showed that the diabetes mellitus showed quite common among groups (Survived= 78(63.4%) Vs. Dead= 13(27.7%), P-value= 0.000), Hypertension (Survived= 112(91.1%) Vs. Dead= 6(12.8%), P-value= 0.000), Hyperlipidemia (Survived= 61(49.6%) Vs. Dead= 14(29.8%) P-value= 0.02) and Coronary Artery disease (Survived= 99(80.5%) Vs. Dead= 33(70.2%) P-value= 0.02).

Variables	Survived(n=123)	Dead (n=47)	P-value
Age (Mean + SD)	57.55±7.5	59.96±7.9	0.06
Gender (Male)	98(79.7%)	38(80.9%)	0.86
Smoking History	53(43.1%)	27(57.4%)	0.09
Diabetes Mellitus	78(63.4%)	13(27.7%)	0.000
Hypertension	112(91.1%)	6(12.8%)	0.000
Hyperlipidemia	61(49.6%)	14(29.8%)	0.02
Coronary Artery disease	99(80.5%)	33(70.2%)	0.150

Table 1: Baseline history of patients

Table 2 shows that hemographic indices among survivors and deceased. The hemographic indices showed that the neutrophil count (Survived= 4231.2±0.57 Vs. Dead= 5321.10±1.23, P-value= 0.000**), WBC (Survived=

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6864.41±2.54Vs. Dead= 7285.89±2.03, P-value= 0.000**), lymphocyte count (Survived= 1540.93±1.34 Vs. Dead= 7285.89±1.01, P-value= 0.03*) and NLR (Survived= 3.99±1.58 Vs. Dead= 5.591±0.81, P-value= 0.00**) were elevated in deceased patients. The Platelet counts (Survived= 207.19±0.75 Vs. Dead= 202.60±0.82, P-value= 0.43) and hemoglobin levels (Survived= 11.13±1.5 Vs. Dead= 10.21±1.81, P-value= 0.43) were low in deceased. The neutrophil count, WBC, lymphocyte count and NLR were elevated in deceased patients. The Platelet counts and hemoglobin levels were low in deceased.

Variables	Survived(n=123)	Dead (n=47)	P-value
Neutrophil count (/mm3)	4231.2±0.57	5321.10±1.23	0.000**
WBC count (/mm3)	6864.41±2.54	7285.89±2.03	0.000**
Lymphocyte count (/mm3)	1540.93±1.34	7285.89±1.01	0.03*
Platelet count (k/mm3)	207.19±0.75	202.60±0.82	0.43
Neutrophil to Lymphocyte Ratio (NLR)	3.99±1.58	5.591±0.81	0.000**
Platelet-to-lymphocyte ratio (k/mm3)	199.32±2.17	217.11±0.51	0.000**
Hemoglobin (g/dl)	11.13±1.5	10.21±1.81	0.107

Table 2: Comparison of Hemographic Indices among Groups Independent sample t-test ** strong significant results

DISCUSSION

Heart failure (HF) is a clinical disorder characterized by hemodynamic abnormalities that can lead to stress organ damage. HF symptoms are severe enough to require hospitalization or repeated visits to the emergency room. Patients with heart failure are a diverse group with a high rate of readmission following discharge [12]. These hemographic indices are considered to link with heart failure. In patients with heart failure, a number of hematologic parameters are known to be prognostic significance. Although laboratory parameter changes are crucial within hours of HF patients, they must also be analyzed within the first few days. Therefore the current study was conducted to find out the significance of hemographic markers in patients admitted to the hospital with heart failure. The results of the current study revealed that total of 170 patients were enrolled in the current study among which 123(72.3%) survived and 47(27.64%) died during a 6-month follow-up. The mean age among survived was 57.55+7.5 and the dead was 59.96+7.9 (P-value= 0.06). According to gender males have dominance, and status of comorbidities showed that the diabetes mellitus showed quite common among groups, Hypertension was also present followed by hyperlipidemia and Coronary Artery disease. The hemographic indices showed that the neutrophil count, WBC, lymphocyte count, and NLR were elevated in deceased patients. The Platelet counts and hemoglobin levels were low in the deceased. A study conducted in 2011 on HF patients reported that rather than the neutrophil count per se, the neutrophil-to-lymphocyte ratio (NLR) was a significant predictor of clinical outcomes after discharge and hospital mortality [11]. Among patients with acute heart failure, a higher WBC count was demonstrated to represent a significant risk of mortality throughout the first 30 days and 6 months after the myocardial infarction Furthermore, a higher WBC level was linked to a more advanced CAD as well as epicardial and myocardial perfusion problems [13]. The neutrophil and lymphocyte combination indices have a stronger prognostic value than the individual measures. NLR has been associated with the progression of coronary atherosclerosis. It is a significant and independent predictor of future coronary events, according to a study [14]. At the time of admission, the NLR was reported as a predictor of in-hospital and 6-month mortality in patients who have PCI in research by Tamhane and colleagues [15]. In literature, reduction in platelet count without thrombocytopenia has been linked to an increased risk of death in some studies, particularly in critically ill patients. It was also reported that the decline in platelet count is an independent predictor of mortality among severe cases. It was also suggested that the decrease in platelet counts can be used to predict prognosis [16,17]. Anemia or low hemoglobin levels are common in people with heart failure for a variety of causes. Anemia was shown to be prevalent in 37.2 % of patients with HF, which was linked to an elevated reported mortality rate [18].

CONCLUSIONS

It was concluded that the increased neutrophil count, WBC, lymphocyte count, and NLR were associated with the mortality of HF patients. Hematological indicators have the main advantage of being reasonably affordable and thus widely and easily available in daily clinical practice. They've also been shown to be diagnostic and prognostic in a variety of cardiovascular diseases.

REFERENCES

[1] Falk E, Nakano M, Bentzon JF, Finn AV, Virmani R. Update on acute coronary syndromes: the pathologists' view. Eur Heart J. 2013 Mar;34(10):719-28. doi: 10.1093/eurheartj/ehs411.

[2] Gheorghiade M, Zannad F, Sopko G, Klein L, Piña IL, Konstam MA et al. Acute heart failure syndromes: current state and framework for future research. Circulation. 2005 Dec 20;112(25):3958-68. doi: 10.1161/CIRCULATIONAHA.105.590091.

[3] Joseph SM, Cedars AM, Ewald GA, Geltman EM, Mann DL. Acute decompensated heart failure:

DOI: https://doi.org/10.54393/pbmj.v5i5.421

contemporary medical management. Tex Heart Inst J. 2009;36(6):510-20.

[4] Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DE Jr, Drazner MH et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/ American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2013 Oct 15;62(16):e147-239. doi: 10.1016/j.jacc.2013.05.019.

[5] Núñez J, Núñez E, Miñana G, Sanchis J, Bodí V, Rumiz E et al. Effectiveness of the relative lymphocyte count to predict one-year mortality in patients with acute heart failure. Am J Cardiol. 2011 Apr 1;107(7):1034-9. doi: 10.1016/j.amjcard.2010.11.029.

[6] Groenveld HF, Januzzi JL, Damman K, van Wijngaarden J, Hillege HL, van Veldhuisen DJ et al. Anemia and mortality in heart failure patients a systematic review and meta-analysis. J Am Coll Cardiol. 2008 Sep 2;52(10):818-27. doi: 10.1016/j.jacc.2008.04.061.

[7] Pascual-Figal DA, Bonaque JC, Redondo B, Caro C, Manzano-Fernandez S, Sánchez-Mas J et al. Red blood cell distribution width predicts long-term outcome regardless of anaemia status in acute heart failure patients. Eur J Heart Fail. 2009 Sep;11(9):840-6. doi: 10.1093/eurjhf/hfp109.

[8] Cikrikcioglu MA, Soysal P, Dikerdem D, Cakirca M, Kazancioglu R, Yolbas S et al. Absolute blood eosinophil count and 1-year mortality risk following hospitalization with acute heart failure. Eur J Emerg Med. 2012 Aug;19(4):257-63. doi: 10.1097/MEJ.0b013e32834c67eb.

[9] Yao Y, Simard AR, Shi FD, Hao J. IL-10-producing lymphocytes in inflammatory disease. Int Rev Immunol. 2013 Jun;32(3):324-36. doi: 10.3109/08830185.2012.762361.

[10] Ghaffari S, Nadiri M, Pourafkari L, Sepehrvand N, Movasagpoor A, Rahmatvand N et al. The predictive Value of Total Neutrophil Count and Neutrophil/ Lymphocyte Ratio in Predicting In-hospital Mortality and Complications after STEMI. J Cardiovasc Thorac Res. 2014;6(1):35-41. doi: 10.5681/jcvtr.2014.007.

[11] Uthamalingam S, Patvardhan EA, Subramanian S, Ahmed W, Martin W, Daley M et al. Utility of the neutrophil to lymphocyte ratio in predicting long-term outcomes in acute decompensated heart failure. Am J Cardiol. 2011 Feb 1;107(3):433-8. doi: 10.1016/j.amjcard.2010.09.039.

[12] Nikolaou M, Parissis J, Yilmaz MB, Seronde MF, Kivikko M, Laribi S et al. Liver function abnormalities, clinical profile, and outcome in acute decompensated heart failure. Eur Heart J. 2013 Mar;34(10):742-9. doi: 10.1093/eurheartj/ehs332.

[13] Sabatine MS, Morrow DA, Cannon CP, Murphy SA, Demopoulos LA, DiBattiste PM et al. Relationship between baseline white blood cell count and degree of coronary artery disease and mortality in patients with acute coronary syndromes: a TACTICS-TIMI 18 (Treat Angina with Aggrastat and determine Cost of Therapy with an Invasive or Conservative Strategy-Thrombolysis in Myocardial Infarction 18 trial) substudy. J Am Coll Cardiol. 2002 Nov 20;40(10):1761-8. doi: 10.1016/s0735-1097(02)02484-1..

[14] Kalay N, Dogdu O, Koc F, Yarlioglues M, Ardic I, Akpek M et al. Hematologic parameters and angiographic progression of coronary atherosclerosis. Angiology. 2012 Apr;63(3):213-7. doi: 10.1177/0003319711412763.

[15] Tamhane UU, Aneja S, Montgomery D, Rogers EK, Eagle KA, Gurm HS. Association between admission neutrophil to lymphocyte ratio and outcomes in patients with acute coronary syndrome. Am J Cardiol. 2008 Sep 15;102(6):653-7. doi: 10.1016/j.amjcard.2008.05.006.

[16] Moreau D, Timsit JF, Vesin A, Garrouste-Orgeas M, de Lassence A, Zahar JR et al. Platelet count decline: an early prognostic marker in critically ill patients with prolonged ICU stays. Chest. 2007 Jun;131(6):1735-41. doi: 10.1378/chest.06-2233.

[17] Westenbrink BD, Voors AA, de Boer RA, Schuringa JJ, Klinkenberg T, van der Harst P et al. Bone marrow dysfunction in chronic heart failure patients. Eur J Heart Fail. 2010 Jul;12(7):676-84. doi: 10.1093/eurjhf/hfq061.

[18] Groenveld HF, Januzzi JL, Damman K, van Wijngaarden J, Hillege HL, van Veldhuisen DJ et al. Anemia and mortality in heart failure patients a systematic review and meta-analysis. J Am Coll Cardiol. 2008 Sep 2;52(10):818-27. doi: 10.1016/j.jacc.2008.04.061.

[19] Yoon GS, Choi SH, Woo SI, Baek YS, Park SD, Shin SH et al. Neutrophil-to-Lymphocyte Ratio at Emergency Room Predicts Mechanical Complications of ST-segment Elevation Myocardial Infarction. J Korean Med Sci. 2021 May 17;36(19):e131. doi: 10.3346/jkms.2021.36.e131.

[20] Gul U, Kayani AM, Munir R, Hussain S. Neutrophil Lymphocyte Ratio: APrognostic Marker in Acute ST Elevation Myocardial Infarction. J Coll Physicians Surg Pak. 2017 Jan;27(1):4-7.

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Original Article

Sonographic Evaluation, Prevalence and Differential Diagnosis of Renal Cyst

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ABSTRACT

Renal cysts are a common finding on routine ultrasound scans. Renal cysts are easily detected with ultrasound, with its low cost, non-invasiveness and no exposure to radiation, ultrasound is an exceptional method for primary evaluation of patients with cystic lesions. Most cysts detected by chance and are benign, but they can become complex if infection, bleeding, or ischemia occur. **Objective:** To assess the prevalence of renal cysts and find relationship with age and sex in the study group and to outline the differential diagnosis of renal cyst by ultrasonography. **Methods:** This was a cross-sectional descriptive study. An ultrasound examination was performed on 109 patients who were diagnosed with renal cysts. Cystic wall thickness, form, number of cysts, and acoustic enhancement were employed as sonographic criteria for evaluating renal cysts. **Results:** The incidence of renal cysts were more in females than in male s(52.3% *vs.* 47.7%). The majority of the cysts were solitary than multiple (69.7% vs. 30.3%). Most of the cysts were at lower pole cortical cysts (22.9%). Simple cyst was the most common type (90.8%), autosomal-dominant polycystic kidney disease (ADPKD) was 6.4%. 59 patients were asymptomatic and 50 patients were symptomatic with flank pain as the most common symptom. **Conclusions:** Simple cysts are the most frequently found kidney cysts on ultrasound. Aging and hypertension were common risk factors related with renal cysts. End-stage renal failure is caused by ADPKD, which is the most prevalent genetic cause. Diagnosis and early detection of renal cyst is important, routine ultrasound scans for adults is advisable prior to getting any serious complication.

INTRODUCTION

Renal cysts are one of the most common ultrasonographic finding in kidneys [1]. It might be sporadic, hereditary, associated with advanced acquired cystic kidney disease (ACKD), or even malignant in rare cases [2]. Renal cyst is a pocket full of fluid collection in or on the kidneys. It is a fluid-filled sac that arises from the cortex and may distort the renal contour [3]. Even though, nearly all renal cysts are picked incidentally and without any symptoms, sometimes they become large enough to cause subtle flank pain and discomfort. Occurrence of renal cyst between birth and 20 years is rare but prevalence of renal cysts vary in accordance to sex and increases with age. It is more common in males than in females [4]. Renal cyst is classified as "simple" or "complex", sonographic features of simple cyst include, thin wall, no internal septations or debris, absence of internal echoes, anechoic lumen, oval or spherical shaped with posterior wall enhancement. Wall thickening, uneven form, septations, calcifications, and nodularity are all signs of complexity [4,5]. Renal cysts are easily detected with ultrasound, most important strengths of ultrasound are to differentiate benign vs complex cyst and cysts vs solid lesions. With its low cost, noninvasiveness, and lesser radiation exposure with ultrasound it is an ideal method for primary evaluation of patients with cystic lesions [6]. Autosomal-dominant polycystic kidney disease (ADPKD) manifests in the third

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decade of life, detection and assessment is necessary since it develops silently and may cause hypertension and renal failure [7]. On ultrasound, kidneys are bilaterally enlarged due to the development of thousands of cysts of varying sizes. The development of bilateral, multiple fluid-filled cysts is a primary feature of ADPKD [6,8]. By the age of 60 years, approximately half of the people with ADPKD have developed end-stage renal disease [9]. Acquired cystic disease can be easily differentiated from ADPKD by size of the kidneys which is smaller than normal among those with ACD whereas it could be extremely large in case of ADPKD [10]. Present study is to assess the prevalence of renal cysts and find its relationship with age and sex in the study group.

METHODS

This was a Cross-sectional descriptive study, patients who had gone through abdominal ultrasound scan and diagnosed with renal cysts were used for the study. Sample size was calculated at 95% level of confidence and 5 % margin of error. Following formula was used to calculate sample size. Total 109 individuals fulfilling the inclusion criteria was scanned. All adults from the age of 21 to old-age up to 90 years, population, with diagnosed renal cysts were considered as candidates for the study. Exclusion criteria were nephrectomy, unilateral kidney, congenital anomalies related to kidney. Toshiba ultrasound machines model number Xario – XG were used to scan patients in supine position, 3-5 MHz with curve-linear probe. It may be necessary to adjust the patient's position to obtain an acceptable acoustic window, depending on their body type and the location of the kidney cyst. Due to the possibility of bowel gas interfering with the scan, decubitus positioning is frequently essential. The imaging parameters were changed, as well as the machine settings (depth, overall gain and focus). The focal zone was centered on the region of interest and the highest achievable frequency was chosen. Coronal, transverse and sagittal planes were used to scan the kidneys to the complete shape and size. The probe was angled to capture the cyst and measure longitudinal and transverse diameters (in mm). A prepared data collecting sheet was used to collect demographic and clinical information, as well as the presence and criteria of the cyst. The number of cysts, site (lower, middle or upper pole of the kidney) and cyst size were recorded. In this study, SPSS software program version 21 was used to record and analyze the data. Qualitative variables like gender, symptomatic and asymptomatic, sign and symptoms, location of renal cyst was represented as frequencies and percentages. Quantitative variables like age and size of cyst and wall thickness were given in mean ± standard deviation. The study was approved by the hospital ethical committee and institutional Review Board of the university of Lahore. Patients gave informed consent after learning about the significance of the study and agreed to have their data used for research reasons. There were no names or IDs given, and all personal information was kept classified.

RESULTS

The study group consisted of 109 patients who were all diagnosed with renal cysts after being evaluated with ultrasonography. It was discovered that the frequency distribution of sex was as follows: female was higher than male, female 52.3% (n = 57) and male 47.7% (n = 52) with mean age of 49.95 years. Most of the patients were asymptomatic 59 (54.1%) and 50 patients (45.9%) were symptomatic, flank pain was seen in (33.0%), abdominal pain (4.6%), epigastric pain and lumbar pain (1.8%), back pain, melena, chest pain, burning micturition, drowsiness (0.9%). Table 1 summarizes the location of renal cyst, most of the cyst were lower pole cortical cyst (22.9%). Simple cyst was the most common type (90.8%). Majority of cysts were solitary (69.7%) whereas (30.3%) were multiple. Total number of simple cysts was (78.0%), incidence of polycystic kidney was (6.4%). Table 2 is a cross tabulation between age and sex which shows the prevalence of renal cysts by sex and age group. 3D bar chart shows the differential diagnosis and cyst criteria in males and females.

Variables	Frequency (%)
Lower pole cortical cyst	25(22.9)
Middle pole cortical cyst	14(12.8)
Upper pole cortical cyst	21(19.3)
Upper pole medullary cyst	10(9.2)
Lower pole medullary cyst	7(6.4)
Middle pole medullary cyst	7(6.4)
Middle pole milk of calcium cyst	1(0.9)
Bilateral renal cyst	17(15.6)
Polycystic kidney	7(6.4)
Total	109(100.0)

Table 1: Frequency distribution of location of renal cyst in the study population

Age of patients	Gender		Total
	Male	Female	
21 - 40	25	13	38
41 - 60	24	20	44
61 - 80	8	17	25
>81	0	2	2
Total	57	52	109

Table 2: Cross tabulation between age and sex

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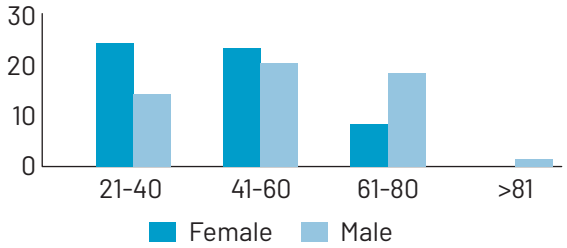

Figure 1: Graph showing cross tabulation between age and sex

Figure 2: Simple cyst measuring 51.4 mm x 48.8 mm in a patient of 60 years at the lower pole of left kidney

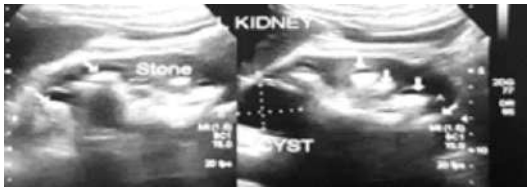

Figure 3: Showing renal stones with renal cyst in a patient of 62 years old

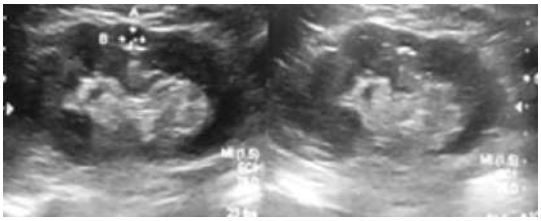

Figure 4: Showing milk of calcium cyst measuring 6.1 mm x 6.9 mm at the middle pole left kidney in a patient of 65 years old.

DISCUSSION

Renal cyst was evaluated and classified on their sonographic appearance by using ultrasound. The findings of this study demonstrated that cysts were prevalent among patients aged 41 to 60. This outcome is agreeing with Chang et al., who reported that the prevalence of renal cyst increases with age and it is common in 60s or later ages of life. This indicates that aging is a major risk factor for renal cyst development. Females were found to be more afflicted by renal cysts than males, according to the findings of this study (52.3% vs. 47.7%). The results contradict Chang et al findings, who figured out that a male-female ratio of 2.81(15.14% vs. 5.38%)[11]. Ozveren et al., also concluded that kidney cysts were more common in men and the elderly, and that they were associated with diabetes [12]. Renal cysts elicited more from the cortex than the medulla, according to the research. (55% vs. 22%) and the incidence of bilateral cyst is lesser than unilateral cyst (15.6% vs. 77.9%). Hong et al., studied the effect of simple renal cysts on hypertension and found that the location, size, and number of cysts were all critical factors in hypertension [13,14]. Hypertension has been associated to the presence of simple renal cysts [15]. The occurrence of solitary cysts were more than multiple cysts (69.7% vs. 30.3%). This finding supports Chang et al findings that the majority of renal cysts (82.3%) are solitary [11]. Cysts increases in size as the age advances, the prevalence of cysts is known to correspond with demographic factors, cysts are detected more in number and larger in size in older individuals [12]. Terada et al., found that cysts grow quicker in patients under 50 years old than in those 50 years or older, at 3.94 and 1.84 mm per year, respectively [16]. In the current study, simple cysts were more common 78%, complex cyst 3.7%. The incidence of Acquired dominant polycystic kidney disease (ADPKD) was 6.4%. These cysts are important because there is a significant link between hypertension and flank discomfort, which is a typical symptom in individuals with ADPKD, which is often detected late and difficult to control and manage [17]. Hypertension is a prevalent symptom in most cases with ADPKD, according to Chapman et al [18]. According to Miskulin et al [19], the initial indication of ADPKD is flank pain. This confirms our findings that flank pain was a common symptom. Cyst development and renal hypertrophy cause considerable flank pain. Early detection is important since renal failure is a common cause of death. The pathologies that associated with renal cysts included renal stones (4.6%), hydronephrosis (1.8%), medical renal disease (1.8%). Vascular abnormalities like aneurysms, pseudoaneurysms (PSAs), and arteriovenous malformations (AVMs) should also be reviewed in the differential diagnosis of cystic renal lesions. Arterial pathologies and renovascular connection with simple renal cyst can be coincident to age-related changes in renal ducts and tubules[12,20].

CONCLUSION

Simple cysts are the most frequent type of renal cysts, with cortical cysts accounting for the majority of the cysts. Females were more likely than males to have kidney cysts. Incidence of solitary cysts were found to be more common than multiple cysts. Renal cysts were linked to ageing and hypertension as prevalent risk factors. With more than half of patients requiring dialysis by the age of 60, ADPKD is the most common hereditary cause of end-stage renal failure. Ultrasound plays a significant role in evaluating and

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classifying renal cysts, which helps in management and follow-up. Hence, the diagnosis and early detection of renal cyst is important, routine ultrasound scans for adults is advisable prior to getting any serious complications.

REFERENCES

[1] Withey SJ, Verma H, Prezzi D. Multimodality Assessment of Cystic Renal Masses. Paper presented at: Seminars in Ultrasound, CT and MRI2020. doi.org/10.1053/j.sult.2020.05.001

[2] Niyyar VD, O'Neill WC. Point-of-care ultrasound in the practice of nephrology. Kidney International. 2018;93(5):1052-1059.doi.org/10.1016/j.kint.2017.11.032

[3] Sigmon DF, Shikhman R, JI N. Renal cyst. 2017.

[4] Garfield K, Leslie SW. Simple renal cyst. StatPearls [Internet]. 2020.

[5] Burgan CM, Sanyal R, Lockhart ME. Ultrasound of renal masses. Radiologic Clinics. 2019;57(3):585-600.doi.org/10.1016/j.rcl.2019.01.009

[6] Ugwuanyi D, Chiegwu H, Anakwue A-M, Eze E. Ultrasonography Evaluation of Renal Cyst Disease in Nnewi Urban, South East Nigeria. Asian Journal of Science and Technology. 2017;08:5417-5421.

[7] Gameraddin MB, Babiker MS. Renal cysts: Sonographic evaluation and classification in Sudanese adults. Journal of Health Research and Reviews. 2016;3(3):111. doi.org/10.4103/2394-2010.193181

[8] Shiza ST, Guttikonda J. Exceptionally Large Kidneys in Autosomal Dominant Polycystic Disease in India. Cureus. 2021;13(3).doi.org/10.7759/cureus.13905

[9] Harris PC, Torres VE. Polycystic kidney disease, autosomal dominant. GeneReviews®[Internet]2018.

[10] Chapman AB, Rahbari-Oskoui FF, Bennett W. Acquired cystic disease of the kidney in adults. UpToDate version. 2011;15.

[11] Chang C-C, Kuo J-Y, Chan W-L, Chen K-K, Chang LS. Prevalence and clinical characteristics of simple renal cyst. Journal of the Chinese Medical Association. 2007;70(11):486-491.doi.org/10.1016/S1726-4901(08)70046-7

[12] Ozveren B, Onganer E, Türkeri LN. Simple renal cysts: prevalence, associated risk factors and follow-up in a health screening cohort. Urology journal. 2016;13(1):2569-2575.

[13] Chin HJ, Ro H, Lee HJ, Na KY, Chae D-W. The clinical significances of simple renal cyst: Is it related to hypertension or renal dysfunction? Kidney international.2006;70(8):1468-1473.doi.org/10.1038/sj.ki.5001784

[14] Hong S, Lim J, Jeong I, Choe J, Kim C, Hong J. What association exists between hypertension and simple renal cyst in a screened population? Journal of human hypertension. 2013;27(9):539-544.doi.org/10.1038/jhh.2013.12

[15] Kong X, Ma X, Zhang C, Su H, Gong X, Xu D. Increased risk of kidney damage among Chinese adults with simple renal cyst. International urology and nephrology. 2018;50(9):1687-1694.doi.org/10.1007/s11255-018-1880-3

[16] Terada N, Ichioka K, Matsuta Y, Okubo K, Yoshimura K, Arai Y. The natural history of simple renal cysts. The Journal of urology. 2002;167(1):21-23. doi.org/10.1016/S0022-5347(05)65373-6

[17] Tellman MW, Bahler CD, Shumate AM, Bacallao RL, Sundaram CP. Management of pain in autosomal dominant polycystic kidney disease and anatomy of renal innervation. The Journal of urology. 2015;193(5):1470-1478. doi.org/10.1016/j.juro.2014.10.124

[18] Chapman AB, Stepniakowski K, Rahbari-Oskoui F. Hypertension in autosomal dominant polycystic kidney disease. Advances in chronic kidney disease. 2010;17(2):153-163.doi.org/10.1053/j.ackd.2010.01.001

[19] Miskulin DC, Abebe KZ, Chapman AB, et al. Health-related quality of life in patients with autosomal dominant polycystic kidney disease and CKD stages 1-4: a cross-sectional study. American journal of kidney diseases. 2014;63(2):214-226. doi.org/10.1053/j.ajkd.2013.08.017

[20] Ziganshin BA, Theodoropoulos P, Salloum MN, et al. Simple renal cysts as markers of thoracic aortic disease. Journal of the American Heart Association. 2016;5(1):e002248.doi.org/10.1161/JAHA.115.002248.

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Original Article

Comparison between Static Stretching Exercises and Eccentric Muscle Energy Techniques in Upper Cross Syndrome: Randomized Control Trial

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ABSTRACT

Neck pain is the most common complaint and Cervical pain is more common in middle-aged women than in males. The most prevalent reason for patients to seek medical attention is neck pain. **Objective:** To identify the effectiveness of stretching and muscle energy techniques along with mobilization of cervical segment in the management of upper cross syndrome.**Methods:** The randomized controlled experiment took place from August 2018 to January 2019 at Benazir Bhutto Orthopedic and Rehabilitation Centre in Pakistan(Rawalpindi)and included patients with upper cross syndrome that were randomly consigned to two equal groups using a lottery system. The Group-A patients management is eccentric muscular energy therapy with cervical segmental mobilization, although Group-B patients treatment protocol is static stretching exercises accompanied by segmental mobilization of cervical spine . Each patient received two sessions each week for three weeks, during which their visual analogue scale, and neck disability index were measured. An inclinometer was used to measure the cervical passive range of motion. Data was collected at the commencement of the study and again after three weeks of treatment. SPSS 21 was used to analyze the data. **Results:** Twenty (20%) of the 40 individuals were in each of the two groups. The average age in Group-A was 42.7511.13 years. It remained 40.509.14 years in Group-B. On all metrics, the eccentric muscular energy technique and static stretching approach equally demonstrated substantial results that is P Value is less than 0.05.**Conclusion:** Both approaches were shown to be equally successful in lowering neck impairment, enhancing cervical range of motion, and decreasing pain.

INTRODUCTION

In developed countries, neck pain is the most common complaint. Neck pain affects around 10-15% of the population. Cervical pain is more common in middle-aged women than in males, according to statistics. The most prevalent reason for patients to seek medical attention is neck pain [1]. Upper cross syndrome (UCS) is a type of neck pain caused by poor posture. This syndrome can create muscle imbalances in the head, neck, and shoulder region, as well as disordered posture [2]. According to research, 6-48% of UCS patients experience pain in the shoulder region [3]. According to Janda, postural disorders revealed motor components of asymmetries in the frontal plane (sagittal axis) consequential in difficulty in recovering since long-lasting functional pain patterns. Muscle discrepancy is the major opponent of UCS[4]. While the deep cervical flexors, weakening and lengthening of the central and inferior trapezius are to blame [5]. Postural disfunctions causes stress on muscles and joints surfaces that induces pain limited ROM [6]. Because diagnostic approaches are based on individual opinion, early detection and categorization

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are frequently impossible. Quantification and detection of UCS at an early stage is achievable with the use of diagnostic processes, allowing for proper UCS prevention. Patients with muscular dystrophy can be helped in a more effective way if a thorough rehab plan is developed on a regular basis [7]. Different techniques such as muscular re-education, mobilization, strain-counter strain, relaxation of Soft Tissues, self-stretching, active isolated stretching (AIS), and various energy Techniques are nearly of the maximum conjoint management techniques for the management of spine impairments which reduces the ranges and postural dysfunctions [8]. MET has recently gained favor as a treatment modality for increasing the suppleness of contractile and non-contractile tissues [9]. Stretching exercises and manual therapy procedures, according to Cunha et al., both have a substantial effect on refining ranges of spine in individuals with stubborn neck discomfort [10]. Cervical mobilization is frequently used in conjunction along with physiotherapy and has been shown to be useful for the cure of neck pain and impairment in chronic patients with mechanical pain by lowering pain and improving neck ROM [11-13].

METHODS

The Randomized Controlled trial was conducted in Benazir Bhutto Orthopedic and Rehabilitation Department from August 2018 to January 2019. After receiving Institutional Review Board approval, sample size was estimated using Open Epi version 312 with a 95% confidence interval. The Visual Analogue Scale's mean values were calculated. A non-probability sampling strategy was utilised to increase the sample size. The lottery approach was used to assign patients to the control or interventional groups. Ages of UCS patients ranges between 30-65 years age, included both genders. Excluded patients which were suffered from trauma, tumors and degenerative changes. Informed patients consent was taken. Every individual gain 45 minutes of conventional physiotherapy sessions thrice a week for three weeks. In Group-A, standard TENS transcutaneous electrical nerve stimulation was utilised for 15-25 minutes with high-frequency (50-100 Hz), low-intensity (paresthesia), and small pulse width (50-100s) (interventional) [14]. Soft tissue techniques and pain were treated for 10-15 minutes with both TENS or a heating pad [15]. Cervical spine was managed with muscle energy technique. Patients were dictated to turn their heads in opposite manner. The therapist directed isometric resistance for 5 to 7 seconds ,before the patients utterly relaxed their muscles and joint surfaces after the completion of stretch techniques by the therapist. Repetitions were ranged from four to five [16,17]. Slowly, with varying rhythm and pace, cervical segmental mobilization was conducted. In the resting posture, grade I-II mobilization for pain relief (2-3 sets) approximately 3-4 minutes were given . Conventional physiotherapy treatment heating pack and mobilization of cervical spine as well as stretching techniques of upper ,middle and lower fibres of trapezius muscles remained given in group B(contro), just as they were in the Group-A(interventional group). Slow stretching was used for 10-60 seconds [18]. To increase the stretch of lateral fibres of muscles, one arm leaning headside to the side opposite and pushing the head in sitting position. The muscle was stretched for 15-30 seconds with 2-4 repeats due to the change in ROM and flexibility [19].

Variables	Experimental Group-A n(%)	Control Group-El n(%)	Together Groups n(%)
Matrimonial status			
Wedded	15(75)	16(80)	31(77)
Single	3(15)	4(20)	7(17)
Others	2(10)	0	2(5)
Occupation			
Businessman	3(15)	2(10)	5(12)
Executive	5(25)	5(25)	10(25)
Government Job	2(10)	2(10)	4(10)
Housewife	7(35)	11(55)	18(45)
Retired	1(5)	0	1(25)
Others	2(10)	0	2(5)
Duty Hours			
<6 hours	2(10)	0	2(5)
<12 hours	8(40)	8(40)	16(40)
<18 hours	0	1(5)	1(2)
No job	10(50)	11(55)	21(52)
Onset of pain			
Sudden	5(25)	7(35)	12(30)
Gradual	15(75)	13(65)	28(70)
Duration of pain			
3month before	4(20)	8(40)	12(30)
6month before	5(25)	4(20)	9(22)
9month before	2 00	3(15)	5 02)
12month before	3 05)	3 05)	6 05)
More than a year	8(30)	2(10)	8(20)
Previous Treatment			
No treatment	3(15)	3(15)	6 05)
Self medication	5(25)	4(20)	9(22)
General Practitioner	1(5)	3(15)	4(10)
Orthopaedic 6(30)	6(30)	12(30)	
Physiotherapy	5(25)	4(20)	9(22)

Table 1: Demographic Data Of Patients

Variable	Cluster	Middle IQ	P-value
Mann Whitney II -Assessment through Clusters A & B (Post Interference)			
neck Flexion	Trial	42.00 ± 24.75	0.602
	Control	40.00 ± 18.75	
Right Side Rotation	Experimental	60.00 ± 10.00	0.554
	Control	55.00 ± 12.50	
Visual analogue	Trial	4 ± 1.75	0.092
	Mechanism	5. ± 2.00	
Wilcoxon test pre and post comparison in Group-A (Eccentric MET)			
Variables	**Pre Mean ± SD**	**Post Mean ± SD**	**P - Value**
Neck bending	33.50 ± 23.75	42 ± 24.75	0.001
Right Cross Revolution	50 ± 13.75	6± 10.00	0.001
Visual Analogue	7 ± 1.00	4 ± 1.75	0.001

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Wilcoxon examination pre and support contrast in Group-B (Still extending)			
Variables	**Pre Mean ± SD**	**Post Mean ± SD**	**P - Value**
Neck Bending	35.0 ± 20.00	40.0± 18.75	0.001
Right cross spin	50.0 ± 8.75	55.0 ± 12.50	0.001
VAS	7.0 ± 2.00	5.0 ± 2.00	0.001

Table 2: Within the Group analysis/ between the group ,data was normally distribued

Autonomous Trial T trial among Clusters				
Variables	**Cluster**	**Pre Mean ± SD**	**Post Mean ± SD**	**P - Value**
Frontward Skull Position	Trial	16.65± 2.37	13.90± 2.53	0.08
	Control	16.55± 2.11	15.20± 2.01	
Cervical Extension	Experimental	35.25± 4.72	43.25± 5.14	0.817
	Control	39.50± 7.59	43.75± 8.10	
Right Side Bending	Experimental	32.50± 8.03	40.35± 7.80	0.751
	Control	34.25± 7.48	39.60± 7.02	
Left Side Bending	Experimental	32.50± 8.66	39.80± 8.00	0.346
	Control	34.25± 4.38	37.85± 4.45	
Left Rotation	Experimental	53.00± 14.90	58.75± 13.85	0.543
	Control	53.75± 9.98	56.45± 9.40	
Neck Disability Index	Experimental	17.75± 5.41	13.90± 3.39	0.343
	Control	17.15± 4.79	15.10± 4.45	

Table 3: Parametric Examination for through cluster Study.

Patients were demanded to stand with 90 degree bent and lean towards forward along with upper trapezius and pectorals major stretch. Stretch is maintained for 10 to 25 seconds along with repetitions 3-4. To stretch or relax the levator scapulae stretch, the patients were recommended to sit in a chair with one hand and gently bring it down toward the armpit to sustain the depressed of shoulder and rotate opposite side of neck with the other hand on the back head. They were inculcated embrace the stretch for 10-30 seconds on each side with the 2 to 3 repts. Neck Disability Index and forward head posture analysis were used.Via Inclinometer the rom of spine was calculated from the 1st session before intervention to last rehabilitation session. SPSS 21 version was used to estimate the data.

RESULTS

After treatment strategy 3 of patients were skipped due to not capable of completing the treatment plan. Total sample was 41 in which 21 were allocated in two different groups. There were 7 Male patients and 13 females in Group A. On the other hand, 4 males and 16 female patients in another group B. Age of Patients was estimated as 43.7611.10 years. The most frequently affected females acquiring 55% of housewives, 25% administrators, 13% of businessman and 10% of employees and others are 5%. The popular of the subjects (70%) had a steady commencement of discomfort, whereas 30% had a rapid onset of pain. In Group A, 25% of people had quick pain and 75% had plodding onset, whereas in Group B, 35% had sudden pain and 65% had deliberate onset. In terms of cervical flexion, right-side rotation, and VAS, no statistically significant difference between the groups when post-treatment data were compared (p>0.05 each). Within-group analysis, however, revealed substantial differences in before and after intervention data (Table 2). The evaluation of after treatment outcomes through sets publicized no significant difference that is p value was less than 0.05. In both groups the difference was statistically significant before and after the treatments strategies.

DISCUSSION

The aim of this study was to see if employing static stretching and energy techniques in grouping with mobilization along with the TENS and heating pack may help patients with UCS improve their pain along with the cervical ranges. Because there is a severe lack of evidence for UCS, consequences are compared to impairments that is triggered by UCS. In this investigation, eccentric MET stayed originate to be similarly effectual for dropping pain and taming cervical ROM when compared to static stretching, as reported by another study [21]. MET improves stretch tolerance, which minimizes pain perception. Stretching and isometric contraction stimulate mechanic- and propio-receptors in muscles and joints [22]. Would lessen pain perception, making stretching more stress-free and acceptable. In addition, MET was found to be effective in relations of mobility for the cervical, thoracic, and lumbar spines in a study [19]. Stretching's effectiveness in falling neck pain and augmenting range of motion may be accredited to the effects of joint surfaces [23]. A study on the effects of stretching on neck discomfort and range of motion found that stretching can greatly improve pain and range of motion [24]. According to a recent study, stretching in combination with other therapies is useful in the management of pain and range of motion. Duration of four-week treatment procedure was used to examine the value of MET on patients in a study and to find out the effects of energy techniques of muscles on fit people as well. It involved 18 participants with limited cervical range of motion who were assigned to one of two groups: control or experimental. With MET, the results showed a considerably larger improvement in ROM. The findings showed that MET was a useful strategy for increasing cervical range of motion. This research backs up previous findings that MET improves ranges [6]. Both were shown to be similarly valuable in dropping neck pain and impairment. A study of 30 people indicated that both were beneficial in reducing aches and functional disorders in those with low back pain [25].

CONCLUSION

Both approaches were found to be effective therapy alternatives, according to the findings. Both strategies, however, were not used in isolation. TENS, IR, and mobility were used in conjunction with MET and stretching. Both

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Interventional strategies together with conventional physiotherapy and manual therapy mobilization of cervical spine were reassuring in dropping the symptoms of upper cross syndrome.

REFERENCES

[1] Ylinen J, Takala EP, Nykänen M, Häkkinen A, Mälkiä E, Pohjolainen T, et al. Active neck muscle training in the treatment of chronic neck pain in women: a randomized controlled trial. JAMA 2003;289: 250916.doi.org/10.1001/jama.289.19.2509

[2] Muscolino J. Upper crossed syndrome. J Aust Tradit-Med So 2015;21:80.

[3] Silva AG, Punt TD, Sharples P, Vilas-Boas JP, Johnson MI. Head posture and neck pain of chronic nontraumatic origin: a comparison between patients and pain-free persons. Arch Phys Med Rehabil 2009;90:66974.doi.org/10.1016/j.apmr.2008.10.018

[4] Morris CE, Bonnefin D, Darville C. The Torsional Upper Crossed Syndrome: A multi-planar update to Janda's model, with a case series introduction of the mid-pectoral fascial lesion as an associated etiological factor. J Bodyw Mov Ther 2015;19:681-9.doi.org/10.1016/j.jbmt.2015.08.008

[5] Phadke A, Bedekar N, Shyam A, Sancheti P. Effect of muscle energy technique and static stretching on pain and functional disability in patients with mechanical neck pain: A randomized controlled trial. Hong Kong Physiother J 2016;35:5-11.doi.org/10.1016/j.hkpj.2015.12.002

[6] Schenk R, Adelman K, Rousselle J. The effects of muscle energy technique on cervical range of motion. J Man Manip Ther 1994;2:14955.doi.org/10.1179/jmt.1994.2.4.149

[7] Andrews JR, Harrelson GL, Wilk KE. Physical Rehabilitation of the Injured Athlete, 4th ed. Philadelphia, PA: Saunders, Elsevier Inc; 2012.

[8] Treff M. An Investigation of Musculoskeletal Imbalances in the Thoracic and Cervical Regions, with Respect to an Improved Diagnostic Approach for Upper Crossed Syndrome.

[9] Szulc P, Wendt M, Waszak M, Tomczak M, Cie?lik K, Trzaska T. Impact of McKenzie method therapy enriched by muscular energy techniques on subjective and objective parameters related to spine function in patients with chronic low back pain. Med Sci Monit 2015;21:2918-doi.org/10.12659/MSM.89426132.

[10] Cunha AC, Burke TN, França FJ, Marques AP. Effect of global posture reeducation and of static stretching on pain, range of motion, and quality of life in women with chronic neck pain: a randomized clinical trial. Clinics (Sao Paulo) 2008;63:763-70.doi.org/10.1590/S1807-59322008000600010

[11] Farooq MN, Mohseni-Bandpei MA, Gilani SA, Ashfaq M, Mahmood Q. The effects of neck mobilization in patients with chronic neck pain: A randomized controlled trial. J Bodyw Mov Ther 2018;22:2431.doi.org/10.1016/j.jbmt.2017.03.007

[12] Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 3.01. [Online] 2013 [Cited 2017 May 15]. Available from URL: https://www.openepi.com/ Menu/OE_Menu.htm

[13] Kumari C, Sarkar B, Banerjee D, Alam S, Sharma R, Biswas A. Efficacy of muscle energy technique as compared to proprioceptive neuromuscular facilitation technique in chronic mechanical neck pain: a randomized controlled trial. Int J Health Sci Res 2016;6:15261.

[14] Johnson M. Transcutaneous electrical nerve stimulation: mechanisms, clinical application and evidence. Rev Pain 2007;1:7-11.

[15] Diab AA, Moustafa IM. The efficacy of forward head correction on nerve root function and pain in cervical spondylotic radiculopathy: a randomized trial. Clin Rehabil 2012;26:351-61.doi.org/10.1177/0269215511419536

[15] Burns DK, Wells MR. Gross range of motion in the cervical spine: the effects of osteopathic muscle energy technique in asymptomatic subjects. J Am Osteopath Assoc 2006;106:137-42.

[17] Kaltenborn FM. Orthopedic manual therapy for physical therapists Nordic system: OMT Kaltenborn-Evjenth concept. J Man Manip Ther 1993;1:47-51.doi.org/10.1179/jmt.1993.1.2.47

[18] Daneshmandi H, Atri AE, Ghasemi A, Rahmani P. The effects of PNF & static stretching on knee ROM of amputee athletes. Braz J Biomotricity 2011;5:255-62.

[19] Page P. Current concepts in muscle stretching for exercise and rehabilitation. Int J Sports Phys Ther 2012;7:109-19.

[20] Roddey TS, Olson SL, Grant SE. The effect of pectoralis muscle stretching on the resting position of the scapula in persons with varying degrees of forward head/rounded shoulder posture. J Man Manip Ther 2002;10:124-8.doi.org/10.1179/106698102790819247

[21] Mahajan R, Kataria C, Bansal K. Comparative effectiveness of muscle energy technique and static stretching for treatment of subacute mechanical neck pain. Int J Health Rehabil Sci 2012;1:16-

DOI:https://doi.org/10.54393/pbmj.v5i5.490

21.doi.org/10.5455/ijhrs.00000004
[22] Chaitow L. Integrated neuromuscular inhibition technique (INIT) and myofascial pain: Muscle Energy Techniques, 4th ed. London, UK: Elsevier Ltd, 2013; pp 303.
[23] Micheo W, Esquenazi A. Orthoses in the prevention and rehabilitation of injuries. In: Frontera WR, eds. Rehabilitation of sports injuries: scientific basis. Massachusetts, USA: Blackwell Science Inc, 2003; pp 301.doi.org/10.1002/9780470757178.ch15
[24] Häkkinen A, Salo P, Tarvainen U, Wiren K, Ylinen J. Effect of manual therapy and stretching on neck muscle strength and mobility in chronic neck pain. J Rehabil Med 2007;39:575-9.doi.org/10.2340/16501977-0094
[25] Ellythy MA. Efficacy of muscle energy technique versus strain counter strain on low back dysfunction. Bull Fac Ph Th Cairo Univ 2012;17:2935 Vol. 70, No. 3, March 2020

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Original Article

Comparative Effect of Muscle Energy Techniques and Mulligan Mobilization on Pain and Range of Motion in Patients with Mechanical Neck Pain

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ABSTRACT

Mechanical cervical pain starts at the back of the head and moves down the neck to the lower cervical spine and shoulders. Vertebral arrangements are interrupted with this condition, and the joints of the cervical spine and ribs perform abnormal biomechanical movements, resulting in diminished mobility and pain. **Objective:** To compare the effectiveness of Muscle Energy Techniques (METs, Post-isometric relaxation) with Mulligan Mobilization (Natural Apophyseal Glides, NAGs) in subjects with Mechanical Neck Pain **Methods**: It was a Randomized Controlled Clinical Trial. Sixty patients are allocated in 2 groups: A and B with 30 patients in each group with age limit from 25-50 years treated for 4 weeks on alternate days with METs and Mulligan mobilization with baseline exercise plan respectively. Intervention plan was divided into 2 phases. Outcome measures used in this study are Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI) and Goniometer for Neck range of motions. **Results:** Patients in group B showed marked improvement as compared to group A. *p-value* less than 0.05 is considered significant. Mean age of patients for Group A was 39.91±8.14 and in Group B was 42.39±8.01 respectively. **Conclusion:** It is concluded from the study that Mulligan Mobilization was more effective as compared to METs in progressing NPRS and NDI scales.

INTRODUCTION

Mechanical cervical pain starts at the back of the head and moves down the neck to the lower cervical spine and shoulders. Vertebral arrangements are interrupted with this condition, and the joints of the cervical spine and ribs perform abnormal biomechanical movements, resulting in diminished mobility and pain [1,2]. Generalized neck discomfort is induced by enhanced neck position, motion related to neck, or any type of pain on probing of cervical musculature without illnesses [3]. Muscle spasms, faintness, and generalized pain in the cervical area, shoulders, and arms are all signs and symptoms of neck discomfort, which can lead to movement restrictions. The epidermis, dermal tissue, articular apophyseal joint sheath, longitudinal ligaments, ligamentum flavum, and inter vertebral body ligaments are all examples of connective tissues and annulus fibrosis of the intervertebral disc may all be distorted in mechanical neck discomfort [4]. Neck discomfort, limited range of motion, and stiffness are common indications of mechanical neck pain. Tenderness in the neck and shoulder region is increased by neck movements or prolonged neck postures [5]. Personal and psychological factors (work satisfaction,

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stress level, anxiety, and depression) all have a part in the development of this condition [6]. Clinical examination is difficult to utilize to make a precise prediction because signs and symptoms are sometimes nonspecific [7]. Mechanical discomfort is widespread in persons who work with computers, clerical jobs, students, and people who live a sedentary lifestyle [8,9]. Work that requires uncomfortable occupational posture, hard lifting, and physical exertion During a long time of working with the head and neck in a forward position, the neck extensor muscles would be stretched excessively [10]. Variations of manual techniques include placement release technique, muscle energy technique, muscle energy technique, Cyriax methodology, NAGS and SNAGS, manual strain, proprioceptive neuromuscular facilitation, and ischemic compression [1,11]. MET is a quality of healthcare process in which the participants' muscles contract in a precise, controlled manner against a reactionary force. A common technique for achieving muscle tonus release is MET (inhibition). The Golgi tendon impairs the affected muscle's isometric contraction, resulting in after isometric relaxation [1]. With MET, you can reduce muscular tone, promote better circulation, enhance weak musculature, and loosen joint limitations [12]. MET is an active muscle-based therapy strategy in which a subject's muscle(s) are contracted in a carefully regulated manner against a counterforce generated by the therapist. Reduce discomfort, stretch tight muscles and fascia, reduce muscle tonus, increase local circulation, strengthen weak musculature, and mobilize joint limitations using the MET. The MET is used to achieve tonus release in a muscle prior to stretching by applying an isometric contraction to the afflicted muscle and then relaxing afterward [13]. A MET for relaxing and extending a hypertonic, shortened muscle is post isometric relaxation (PIR). On postural muscles, this form of moderate stretching is often used. When these muscles grow short and tight, muscular imbalances can ensue. This can make joint motion difficult and limit range of motion. The upper trapezius and levator scapulae are two muscles in the upper body that fall into this category. When these muscles shorten, they can limit range of motion in the head, neck, and shoulder, as well as cause pain. MNP therapy options have lately developed from a passive to an active treatment approach. The MET is a type of advanced stretching technique that has been employed in both clinical and subclinical people [4]. In the instance of NP, one of the mobilization approaches that can be used is the Mulligan. Mulligan mobilization techniques (MMTs) encompass many modalities such as sustained natural epiphyseal glides (SNAGs) and natural epiphyseal glides that target the spine and are employed by most manual physical therapists. The application of this therapy strategy results in an immediate improvement in pain-free range of motion (ROM) in the affected joints. The literature suggests combining the MMT idea with numerous other manual therapy modalities as a successful therapeutic approach for a variety of orthopedic dysfunctions [14]. NAGS are more helpful than Maitland grade I and II mobilizations in improving NPRS and NDI scores in patients with nonspecific neck discomfort, according to Hussain et al. [15]. Gross and colleagues determined in 2015 that manual mobilization combined with strengthening exercises is particularly beneficial in reducing neck discomfort and improving quality of life [16]. A study published in 2002 found that manual corrective procedures are the most effective treatment for mechanical neck pain [17].

METHODS

Allocation of patients in two groups were through simple random sampling method. The research was conducted in Physiotherapy ward of Mayo Hospital Lahore. A total of 60 patients suffering from Neck Pain were randomized and divided into two groups. 30 patients undergone muscle energy technique (post isometric relaxation) and 30 patients undergone mulligan mobilization (natural apophyseal glides) were administered. Treatment frequency was for 4 times a week. The duration of treatment was 4 weeks in both groups. Data collected on the first day before the application of interventions and after four weeks, the end day of the application of intervention. Subjects were randomly assigned to 2 groups: Group A (the control group) received Muscle energy technique (Post-isometric relaxation) and Group B (the experimental group) received Natural Apophyseal Glides (NAGs).

Group A
(the control group)

Group A (the control group) received the METs for neck region. MET's was performed for three group of muscles.

1.For Upper Trapezius

Patient position- supine lying, Therapist position: supported the affected side's shoulder with one hand while placing the other hand at the affected side's ear and mastoid area. towards affected side. The stabilised shoulder was moved towards the ear (a shrug action) and the ear towards the shoulder with a small resisted effort (20% of available strength). 7-10 seconds of isometric contraction with proper breathing. For 30 seconds, this orientation was retained (post isometric relaxation)

2.For Levator Scapulae

Subject - supine lying, one hand supports the head, while

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the other rests on the shoulder on the affected side. The individual was then requested to take the head backwards towards the table against the therapist's unchanging resistance, while simultaneously doing a small (20 percent of available strength) shoulder shrug on the unaffected side. With proper breathing, an isometric contraction was held for 7-10 seconds. This position was hold for 30 seconds (post isometric relaxation)

3.For Sternocleidomastoid

The therapist put his contact hand on the ipsilateral mastoid on the temporal region, which was the SCM muscle's insertion site, and his stabilising hand on the sternum, which was the muscle's point of origin. The patient was instructed to rotate his head to the ipsilateral side, lift his head, and hold the contraction for 10 seconds before fully relaxing by inhaling and exhaling deeply. The clinician allowed for the barrier to dissolve before gently guiding the muscle to lengthen while keeping the upper cervical spine bent for 30 seconds.

Group B(the experimental group)

Group B (the experimental group) received the Natural apophyseal Glides (NAGs) for neck region. PT stride stance at side facing posteriorly with hip blocking seated patient shoulder. Patient's neck slightly flexed without any rotation or side bend. PT cradled head with forearm (using top arm) and chest, with other hand on back of head/neck. Middle phalanx of 5th finger (of top arm) hooked under SP with other thenar eminence (bottom arm) obliquely under 5th finger in position to mobilize parallel to facet plane. Taken up slack then oscillated (2-3/sec) mid to end range using bottom hand pushing through top hand in direction of eyeballs. Oscillated for 5-10 seconds and reassess.

RESULTS

Table 1 shows the demographic data of study. Group A having 9(40.9%) males and 13(59.1%) females while 16(69.6%) male and 7(30.4%) females enrolled in group B. *Man Whitney U test* was performed for assessing the intensity of pain between 2 groups. Mean of pain intensity was 8.27 in group A and 8.26 in group B pretreatment, mean of NDI was 41.36 in group A and 41.3 in group B pretreatment and mean of flexion was 36.23, extension mean was 21.30 in group A and flexion mean was 35.74, extension was 21.30 in group B. After the session intensity of pain was reduce in both groups, it was 4.00 in Group A and 2.43 in Group B, NDI scores were 20.00 in Group A and 12.17 in Group B while ROM was increased in both groups, mean of flexion was 44.68, extension mean was 42.95 in Group A and in Group B flexion mean was 68.48, and extension mean was 62.17. p-value was <0.01 which shows that both techniques were effective for managing the patients but group B patients show more remarkable results as compared to group A.

Variables	Control Group		Experimental Group		P-value
	At Baseline	After	At Baseline	After	
NPRS	8.27± 0.45	4.00± 0.69	8.26± 0.44	2.43± 0.501	0.00
NDI	41.36± 2.27	20.00± 3.45	41.30± 2.24	12.17± 2.53	0.00
ROM (Flexion)	36.23± 3.71	44.68± 4.90	35.74± 3.75	68.48± 4.87	0.00
ROM (Extension)	21.14± 6.15	42.95± 3.33	21.30± 6.25	62.17± 5.99	0.00

Table 1: Mean values of Experimental group and the control group

Variables	Control Group		Intervention Group		P-value
	Before	After	Before	After	
Pain	8.27± 0.45	4.00± 0.69	8.27± 0.45	4.00± 0.69	<0.01
NDI	41.36± 2.27	20.00± 3.45	41.36± 2.27	20.00± 3.45	
ROM(Flexion)	36.23± 3.71	44.68± 4.90	36.23± 3.71	44.68± 4.90	
ROM(Extension)	21.14± 6.15	42.95± 3.33	21.14± 6.15	42.95± 3.33	

Table 2: Mean values within Experimental group and the control group

DISCUSSION

Both of these strategies were utilized as interventions in the current study to treat patients with mechanical neck discomfort. Sedentary lifestyles have a higher number of cases than active lifestyles, hence life styles are important in developing neck illnesses with discomfort. The NPRS scale is used to assess changes in pain intensity and has proven to be a useful instrument for data gathering and analysis [18]. The Mulligan idea involves a variety of mobilising therapy strategies for the spine, including 'NAGs' (natural apophyseal glides), 'SNAGs' (sustained natural apophyseal glides), and 'SMWLMs' (sustained natural apophyseal glides) (spinal mobilizations with limb movements). In terms of pain intensity and neck functional status, group B exhibited substantial improvement, while in terms of ROM, both groups showed significant improvement. In comparison to the MET group, group B demonstrated greater outcomes after just one week in terms of rotation ROM and two weeks in terms of extension, while maximum range improved after the third week for side-bending and flexion. The advantages of Mulligan mobilization were demonstrated by a significant decrease in NDI and NPRS scores, confirming previous findings. The medical usefulness of Mulligan's mobilization techniques for increasing joint function has been proved, according to the research, with a number of theories for its action and reaction. Additional techniques, such as hypo algesic and sympathetic nervous system excitation effects, have been established in more recent studies.

The current study found that combining MET in the form of PIR with MM in the form of NAGs increased the therapy effect on pain, cervical ROM, and function in individuals with MNP. In terms of lowering pain and impairment and enhancing cervical ROM, NAGs with PIR were more

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successful than regular physical therapy. The biological principles that underpin MET are PIR and reciprocal inhibition. PIR refers to the effect of a muscle's or group of muscles' reduced tone after a brief interval following an isometric contraction. Pain alleviation following PIR may be due to the inhibitory Golgi tendon reflex, which is triggered during isometric contraction and leads to muscle reflex relaxation. Sympatho stimulation produced by somatic efferent is also caused by the activation of muscle and joint mechanoreceptors, as well as targeted stimulation of periaqueductal grey matter, which helps in lowering pain. As a result of the available research and statistical findings of data received following therapy, Mulligan mobilization technique NAGS was found to be more effective than MET in reducing pain and improving neck disability index modulation[19].

CONCLUSION

It is concluded that both Muscle Energy Technique and Mulligan Mobilization have found to be effective in reducing Neck Pain, Improving range of motion and reducing neck functional disability. However, the subjects treated with Mulligan Mobilization showed an additional benefit in terms of reduction of pain on NPRS and improving functional ability in terms of NDI. Hence it can be concluded that Mulligan Mobilization is an effective therapeutic option in the treatment of patients with Mechanical Neck Pain.

REFERENCES

[1] Nitsure P, Welling A. Effect of gross myofascial release of upper limb and neck on pain and function in subjects with mechanical neck pain with upper limb radiculopathy: A clinical trial. Int J Dental Med Res. 2014;1(3):8-16.

[2] Waqas S, Shah SHA, Zafar U, Akhtar MF. Comparison of Mulligan Sustained Natural Apophyseal Glides Versus Mulligan Natural Apophyseal Glides in Mechanical Neck Pain. Annals of King Edward Medical University. 2017;23(3).

[3] Classification of chronic pain. Descriptions of chronic pain syndromes and definitions of pain terms. Prepared by the International Association for the Study of Pain, Subcommittee on Taxonomy. Pain Suppl. 1986;3:S1-226.

[4] Gupta S, Jaiswal P, Chhabra D. A comparative study between postisometric relaxation and isometric exercises in non-specific neck pain. Journal of exercise science and physiotherapy. 2008;4(2):88-94.doi.org/10.18376//2012/v8i2/67588

[5] Falla D, Jull G, Russell T, Vicenzino B, Hodges P. Effect of neck exercise on sitting posture in patients with chronic neck pain. Physical therapy. 2007;87(4):408-17. doi.org/10.2522/ptj.20060009

[6] Genebra CVDS, Maciel NM, Bento TPF, Simeão SFAP, De Vitta A. Prevalence and factors associated with neck pain: a population-based study. Brazilian journal of physical therapy. 2017;21(4):274-80.doi.org/10.1016/j.bjpt.2017.05.005

[7] Panjabi MM, Cholewicki J, Nibu K, Grauer J, Babat LB, Dvorak J. Critical load of the human cervical spine: an in vitro experimental study. Clinical biomechanics. 1998;13(1):11-7. doi.org/10.1016/S0268-0033(97)00057-0

[8] Barton PM, Hayes KC. Neck flexor muscle strength, efficiency, and relaxation times in normal subjects and subjects with unilateral neck pain and headache. Archives of physical medicine and rehabilitation. 1996;77(7):680-7.doi.org/10.1016/S0003-9993(96)90008-8

[9] Kirupa K, Mary SD, Nithyanisha R, Vaishnavi G, Pavithralochini V, Jaiganesh G. A comparative study of posture alteration and stretching program to reduce neck pain in teachers. Biomedicine. 2020;40(1):99-101.

[10] Mahajan R, Kataria C, Bansal K. Comparative effectiveness of muscle energy technique and static stretching for treatment of subacute mechanical neck pain. Int J Health Rehabil Sci. 2012;1(1):16-21.doi.org/10.5455/ijhrs.00000004

[11] Croft P. Diagnosing regional pain: the view from primary care. Best Practice & Research Clinical Rheumatology.1999;13(2):231-42.doi.org/10.1053/berh.1999.0018.

[12] O'Leary S, Falla D, Jull G. The relationship between superficial muscle activity during the cranio-cervical flexion test and clinical features in patients with chronic neck pain. Manual therapy. 2011;16(5):452-5.doi.org/10.1016/j.math.2011.02.008

[13] Fryer G, Ruszkowski W. The influence of contraction duration in muscle energy technique applied to the atlanto-axial joint. Journal of osteopathic medicine. 2004;7(2):79-84. doi.org/10.1016/S1443-8461(04)80016-9

[14] Exelby L. The Mulligan concept: its application in the management of spinal conditions. Manual therapy. 2002;7(2):64-70.doi.org/10.1054/math.2001.0435

[15] Hussain SI, Ahmad A, Amjad F, Shafi T, Shahid HA. Effectiveness of natural apophyseal glides versus grade I and II Maitland mobilization in non specific neck pain. Annals of King Edward Medical University. 2016;22(1):23.doi.org/10.21649/akemu.v22i1.792

[16] Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P,

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Christie T, et al. Exercises for mechanical neck disorders. Cochrane Database of Systematic Reviews. 2015;(1): doi.org/10.1002/14651858.CD004250.pub5

[17] Hurley L, Yardley K, Gross A, Hendry L, McLaughlin L. A survey to examine attitudes and patterns of practice of physiotherapists who perform cervical spine manipulation. Manual Therapy. 2002;7(1):10-8.

[18] Wibault J, Öberg B, Dedering Å, Löfgren H, Zsigmond P, Persson L, et al. Individual factors associated with neck disability in patients with cervical radiculopathy scheduled for surgery: a study on physical impairments, psychosocial factors, and life style habits. European spine journal. 2014;23(3):599-605.doi.org/10.1007/s00586-013-3066-0

[19] Chaitow L, Crenshaw K. Muscle energy techniques: Elsevier Health Sciences; 2006

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Original Article

Factors Responsible for Non Participation in Sports Among Transgender: A Cross Sectional Approach

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ABSTRACT

Transgenders are not actively participating in sports in Pakistan. There may be many factors and barriers involved for their non-participation **Objective:** To investigate the factors responsible for the non -participation of transgender in sports. **Methods:** Cross-sectional approach was applied for the collection of required data. Snowball sampling technique for the selection of purposive sampling was applied. Appropriate questionnaire was prepared and used for data collection from a sample of (n=118) individuals with mean age 16 years. Feasibility of the questionnaire was obtained with the help of pilot testing by selecting 30 individuals. **Results**: The analyzed data have shown that almost all transgender have agreed upon the importance of sports in their lives. At the same time, the results have shown that different factors such as governmental, societal and personal significantly contributing for their non-participation in sports ($0.024 < 0.05$, $007 < 0.05$ & $0.009 < 0.05$). **Conclusion:** The results of the study indicated a viewpoint of the transgender that describes sports as one of the important means for getting recreation and satisfaction. Given this stance, one might expect that transgender would experience discomfort while participation in sports. However, the research findings do not reveal any deleterious effect of sports participation in light of the views of transgender.

INTRODUCTION

Transgender" describes an individual whose gender identity (one's internal psychological identification as a boy/man or girl/woman) does not match the person's sex at birth. For example, a male-to-female (MTF) transgender person is someone who was born with a male body, but who identifies as a girl or a woman. A female-to-male (FTM) transgender person is someone who was born with a female body, but who identifies as a boy or a man. Some transgender people choose to share the fact that they are transgender while others keep it confidential. Anybody who deviates from any of the normative beliefs about sex/gender is considered to be a deviant [1,2]. These deviants start finding outlets for expressing deviant behavior, desires or impulses as family, friends and society try to find the ways to forcibly culminate that. This may lead in forming small organized support groups where he/she find acceptance and appreciation for deviant behaviors/identities. Such groups exist all over the world under different titles [3]. In some cultures, they are considered as neither men nor women and not necessarily be considered as deviant as they occupy respectable social position. While, in some cultures people believe that they are blessed with some divine power [2]. Around the globe, proper consideration has been giving to the transgender in term of providing facilities for sports and other physical activities [4]. Fitness sports in a gym can be important

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outlet to participate in sports and other physical activities among transgender. As a result, it is imperative to establish to provide conducive environment in which the transgender can benefits physical as well as mental health of these activities. Research studies indicated that transgender population has been reported a high risk of anxiety and depression, therefore; their psychological problems could be managed with the help of sports and other physical activities. Furthermore, research in the area of transgender people revealed that sports and other physical activity are considered important means of maintaining appropriate weight compulsory to suffer gender-confirming surgery [5]. Research has acknowledged that no single person amongst the transgender will intend to undergo gender-confirming surgery [6]. Evidences reveals that participation of transgender in competitive sport is believed as harmful for them [7]. Participation in sports of transgender people has been the topic of debate among sports personnel, sports organizations and even among the general masses [8]. It is generally believed that an androgenic hormone converse the outcomes gained through participation in sports and athletic activities. Consequently, the transgender female individuals are supposed to grasp an advantage in sport. Meanwhile, transgender men are not thought to possess an athletic advantage, despite being injected with testosterone if they chose to medically transition with cross-sex hormones. To ensure the participation of transgender in sports, the International Olympic Committee (IOC, 2004) decided that transgender people could be provided an opportunity in the coming Olympic Games. Although, the policy formulated in 2004 has been significantly influential for those organization who constitute policies. The policy recommended by (IOC) will be displayed afterwards [9]. To address the present problem, this research has focused upon two main objectives. Firstly, the researcher has disclosed the viewpoint of transgender regarding the benefits of sports' participation. Secondly, to investigate the factors causing for non-sports participation among transgender in the jurisdiction of Punjab, Pakistan.

METHODS

A quantitative research design was applied for the systematic investigation of the issue. All the trans-gender masses of Punjab (Pakistan) were selected as subjects to investigate. Snowball sampling method was used. A self-developed questionnaire in the light of related literature was used. Every possible effort to develop the items of the questionnaires considering the difficulty level of the respondents were done. Pilot survey was conducted by selecting 30 transgenders in order to assess the difficulty, ambiguity and complications in the items of the questionnaire. The questions were then used for validity and reliability. The collected responses of the respondents were analyzed with the help of computer software SPSS, version 24. Frequency and percentage was used for demographics information. For hypothesis testing Chi-square and multiple regression were used for most effected barrier responsible for Non-participation in sports among transgender.

RESULTS

Table 1 shows frequencies and percentages of Shemale and Hemale in the sample. There were total 15 Shemale and 103 Hemale in the sample. The percentage of Shemale was 12.7% and Hemale was 87.3%. total Shemale and Hemale were 118 and percentage was 100%.

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
She male	15	12.7	12.7	12.7
He male	103	87.3	87.3	100.0
Total	118	100.0	100.0	

Table 1: Shemale and Hemale frequencies and percentages of the sample

Age of Transgenders				
Gender	**Frequency**	**Percentage%**	**Valid %**	**Cumulative %**
11 to 20	30	25.4	25.4	25.4
21 to 25	25	21.2	21.2	46.6
26 to 30	34	28.8	28.8	75.4
31 to 35	15	12.7	12.7	88.1
35 to 40	12	10.2	10.2	98.3
41 & Above	2	1.7	1.7	100.0
Total	118	100.0	100.0	
Level of Education				
Class 0 to 05	50	42.4	42.4	42.4
Class 6 to 8	34	28.8	28.8	71.2
under Matric to Matric	26	22.0	22.0	93.2
FA	6	5.1	5.1	98.3
BA	2	1.7	1.7	100.0
Total	118	100.0	100.0	
Time of Exposure as Transgender				
1 to 10 Years	58	49.2	49.2	49.2
11 to 15 Years	50	42.4	42.4	91.5
16 to Above Years	10	8.5	8.5	100.0
Total	118	100.0	100.0	
Transgender Accommodation				
With Family	9	7.6	7.6	7.6
With Friends	15	12.7	12.7	20.3
With Guru	92	78.0	78.0	98.3
Others.	2	1.7	1.7	100.0
Total	118	100.0	100.0	
Socioeconomic Status				
Dependent	23	28.0	28.0	28.0

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Independent	85	72.0	72.0	100.0
Total	118	100.0	100.0	
Average Income Per Month				
10000	23	19.5	19.5	19.5
11000 to 20000	64	54.2	54.2	73.7
21000 to 30000	27	22.9	22.9	96.6
31000 to 40000	4	3.4	3.4	100.0
Total	118	100.0	100.0	

Table 2: Sociodemographic features of participating transgenders

Table 2 showing the frequencies and percentages of transgender respondents in respect of their age. Total 11 years to 20 years transgender were 30 (25.4%), 21 years to 25 years were 25 (21.2%), 26 years to 30 years were 34 (28.8%), 31 years to 35 years were 15 (12.7%), 35 years to 40 years were 12 (10.2%) and 41 years and above were 2 (1.7%). The level of education frequencies and percentages of the transgender in the sample. The transgender educated from 0 to 5 class were 50 and percentage was 42.4%, Class 6 to 8 class were 34 and percentage was 28.8%, under matric and matric were 26 and percentage was 22%, transgender having qualification FA were 6 and percentage was 5.1%, and total Transgender having education BA were 2 and percentage was 1.7%. The frequencies and percentages of respondent's exposure as transgender, the Table shows that 1 to 10 years of exposure as transgender respondents were 58 and percentage was 49.2%, 11 to 15 years of exposure as transgender respondents were 50 and percentage was 42.4% and 16 years and above as transgender were 10 and percentage was 8.5% (Table 2).

The total transgender accommodation with families were 9 and percentage was 7.6%, total transgender accommodation with friends were 15 and percentage was 12.7%, total transgender accommodation with Guru were 92 and percentage was 78% and living with other places were 2 and the percentage was 2%. The frequencies and percentages of transgender respondents in respect of their socio-economic status. Total dependent transgender were 33 and percentage was 28% and total independent transgender were 85 and percentage was 72% (Table 2). The total transgender having average income per month 10000 were 23 and percentage was 19.5% in the sample, total transgender having average income per month 11000 to 20000 were 64 and percentage was 54.2%, total transgender having income 21000 to 30000 per month were 27 and percentage was 22.9% and total transgender having average monthly income 31000 to 40000 were 4 and percentage was 3.4% (Table 2).

Testing Variable	N	Mean	SD	Minimum	Maximum	Chi-Square	Sig.
Views of Transgender	118	3.6276	.23758	2.61	3.83	173.837	.000
Governmental Factor	118	3.2821	.27607	2.86	4.00	130.678	.000
Social Factor	118	3.5266	.26658	2.67	3.93	178.949	.000
Personal Interest	118	4.2729	.23044	3.00	4.60	114.881	.000

Table 3: Chi-Square test showing the Views of transgenders, Governmental factors responsible for non-participation of transgenders in sports, social factors and personal interests regarding non-participation in sports, =.05

According to the Table 3 the Chi-square is $\chi^2 = 173.837$ and p = .000 < =.05. Therefore, the formulated hypothesis that transgender have very positive views regarding participation in sports is hereby accepted. These results indicated that the transgender have agreed upon the benefits of sports participation. Table 3 is representing the perceived stance of transgender regarding governmental barriers causing for their non-sports participation. The above sketched table confirming that the Chi-Square χ^2 = 130.678 and p = .000 < =.05 that confirms the hypothetical assumption that governmental barriers causing for non-participation in sports among transgender. The confirmation of hypothesis means that the transgender have agreed that governmental barriers significantly contributing for non-participation in the way of their participation in sports. According to the above table 3, the Chi-Square $\chi^2 = 178.949$, p = .000 < =.05 that confirms the hypothetical assumption that social barriers causing for non- participation in sports among transgender. The Chi-Square $\chi^2 = 114.881$ while p = .000 < = .05 that accept the above alternate hypothesis. The acceptance of hypothesis means that the transgender has agreed that personal interest significantly contributing for non-participation in the way of their participation in sports (Table 3).

Model	R	R Square	Adjusted R Square	SE of the Eatimate
Governmental Barriers	.424	.180	.173	.19247
Social Barriers	.464	.216	.202	.18903
Personal Barriers	.512	.262	.243	.18416

Table 4: Multiple regression showing the most dominant factors causing for non- sports participation among transgender
a. Predictors: (Constant), Social Barriers
b. Predictors: (Constant), Social Barriers, Governmental Barriers
c. Predictors: (Constant), Social Barriers, Governmental Barriers, Personal Barriers

Table 4 is displaying the most dominant factors causing for non- sports participation among transgender. According to the analyzed data, the R was found 0.424, 0.464 & 0.512 respectively for governmental barriers, societal barriers and personal barriers. As a result, it is found that personal barriers were the dominant factors causing for non- sports participation among transgender.

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DISCUSSION

On the basis of data analysis, it was found that significantly government is a factor behind the non-participation of transgender in sports activities. The results of the present study in link and in line with previous researches [10]. The researcher also found that societal factor is the factor behind the non-participation of transgender in sports. The result of the study in link and in line with previous studies [11-13]. The personal interest was also a factor behind the non-participation of transgender in sports. The results of the study in link and in line the previous studies [14-16]. There was no any significant difference found between the transgender in respect of their demographic attributes (gender, age, locality, qualification, kind of physical activity, average time spend in physical activities, time of exposure as a transgender, accommodation, socio economic stats and average income per month) regarding factor behind the non-participation of transgender in sports [17-22]. The results of the study indicated a viewpoint of the transgender that describes sports as one of the important means for getting recreation and satisfaction. Given this stance, one might expect that transgender would experience discomfort while participation in sports. However, the research findings do not reveal any deleterious effect of sports participation in light of the views of transgender. Even though transgender have experienced complete ignorant, their participation in sports has apparently been sufficiently rewarding to counter the social costs of participation.

CONCLUSION

The results of the study revealed that factors like governmental, societal and personal significantly contributing for their non-participation in sports. Furthermore, with broadening of the transgender role, those who have developed sense of autonomy and positive self-esteem can better able to perform well in the society. This can be done if the transgender can equip with the basic right of provision of recreation in term of sports and other athletics activities.

REFERENCES

[1] Sharma S K. Hijras: The labelled deviance. New Delhi: Gyan Publishing House 2000.

[2] Winter S.Transgender Asia. Retrieved June 21, 2004 from http://web.hku.hk /~sjwinter/Transgender Asia/index.htm

[3] Conway L. How frequently does transsexualism occur. Retrieved May. 2002; 3:2009.

[4] Jones BA, Arcelus J, Bouman WP, Haycraft E. Sport and Transgender People: A Systematic Review of the Literature Relating to Sport Participation and Competitive Sport Policies. Sports Med. 2017 Apr;47(4):701-716. doi: 10.1007/s40279-016-0621-y.

[5] Coleman E, Bockting W, Botzer M, Cohen-Kettenis P, DeCuypere G, Feldman J, et al. Standards of care for the health of transsexual, transgender, and gender-nonconforming people, version 7. International journal of transgenderism. 2012 Aug 1;13(4): 165-232.doi.org/10.1080/15532739.2011.700873

[6] Bouman WP, Claes L, Brewin N, Crawford JR, Millet N, Fernandez-Aranda F, et al. Transgender and anxiety: A comparative study between transgender people and the general population. International Journal of Transgenderism. 2017 Jan 2;18(1):16-26. doi.org/10.1080/15532739.2016.1258352

[7] Denison E, Bevan N, Jeanes R. Reviewing evidence of LGBTQ+ discrimination and exclusion in sport. Sport Management Review. 2021 May 27;24(3): 389-409.doi.org/10.1016/j.smr.2020.09.003

[8] Jones BA, Arcelus J, Bouman WP, Haycraft E. Sport and Transgender People: A Systematic Review of the Literature Relating to Sport Participation and Competitive Sport Policies. Sports Med. 2017 Apr;47(4):701-716. doi: 10.1007/s40279-016-0621-y.

[9] Sykes H. Transsexual and transgender policies in sport. Women in Sport & Physical Activity Journal. 2006 Apr 1;15(1): 3.doi.org/10.1123/wspaj.15.1.3

[10] Storr R, Nicholas L, Robinson K, Davies C. 'Game to play?': barriers and facilitators to sexuality and gender diverse young people's participation in sport and physical activity. Sport, Education and Society. 2021 Mar 17:1-4. doi.org/10.1080/13573322.2021.1897561

[11] Hartmann-Tews I, Menzel T, Braumüller B. Homo-and transnegativity in sport in Europe: Experiences of LGBT+ individuals in various sport settings. International Review for the Sociology of Sport. 2021 Nov;56(7):997-1016. doi.org/10.1177/1012690220968108

[12] López-Cañada E, Devis-Devis J, Pereira-Garcia S, Perez-Samaniego V. Socio-ecological analysis of trans people's participation in physical activity and sport. International Review for the Sociology of Sport. 2021 Feb;56(1):62-80. doi.org/10.1177/1012690219887174

[13] Caudwell J. Queering Indoor Swimming in the UK: Transgender and Non-binary wellbeing. Journal of Sport and Social Issues. 2021 Nov 15: 01937235211043648.doi.org/10.1177/01937235211043648

DOI:https://doi.org/10.54393/pbmj.v5i5.409

[14] Tobias NN. Speaking out: Transgender experience in the gay community. California State University, Long Beach; 2003.
[15] Westbrook L, Schilt K. Doing gender, determining gender: Transgender people, gender panics, and the maintenance of the sex/gender/sexuality system. Gender & society. 2014 Feb;28(1):32-57.doi.org/10.1177/0891243213503203
[16] Kosciw JG, Greytak EA, Bartkiewicz MJ, Boesen MJ, Palmer NA. The 2011 National School Climate Survey: The experiences of lesbian, gay, bisexual and transgender youth in our nation's schools. Gay, Lesbian and Straight Education Network (GLSEN). 121 West 27th Street Suite 804, New York, NY 10001; 2012.
[17] Mason-Schrock D. Transsexuals' narrative construction of the" true self". Social Psychology Quarterly. 1996 Sep 1: 176-92.doi.org/10.2307/2787018
[18] Boyd NA. 2. Lesbian Space, Lesbian Territory: San Francisco's North Beach District, 1933–1954. In Wide-Open Town 2003 May 23 (pp. 68-101). University of California Press.doi.org/10.1525/9780520938748
[19] Butler J. Against proper objects: Introduction. Differences: A Journal of Feminist Cultural Studies. 1994;6(2): 3.doi.org/10.1215/10407391-6-2-3-1
[20] Denison E, Bevan N, Jeanes R. Reviewing evidence of LGBTQ+ discrimination and exclusion in sport. Sport Management Review. 2021 May 27;24(3): 389-409.doi.org/10.1016/j.smr.2020.09.003
[21] Melton E, Cunningham G. When identities collide. Journal for the Study of Sports and Athletes in Education. 2012 Apr 1;6(1):45-66. doi.org/10.1179/ssa.2012.6.1.45.
[22] Meyerowitz J. How sex changed: A history of transsexuality in the United States. Harvard University Press; 2004.

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Original Article

Diabetes Mellitus and its impact on Quality of life

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ABSTRACT

Objective: To narrate the characteristic of life of patients having type II Diabetes mellitus (DM2) & the factors influencing it. **Methods:** This was a cross-sectional study. Patients with diabetes mellitus type 2 (DM2) who were over the age of 18 were chosen. Age, gender, profession, matrimonial status, time of type two diabetes development, other diseases, depressive status were all evaluated as factors that affect quality of life (Beck Depression Inventory). A (HRQOL) scale was utilised to assess the quality of life by using the thirty-six-item short-form survey (SF-36). Based on their SF-36 patients were separated into three groups. **Results: O**ne thousand three hundred and ninty four sample had a middle phase of 62 years. An average score of 50.1 was assigned to the global HRQOL. According to bivariate analysis, phase, matrimonial status, gender, employment, comorbidities, DM2 duration, and other diseases all had an effect on HRQOL. In the regression model (logistic), age (OR 1.04) and depression (OR 4.4) were identified as independent factors that influenced overall quality of life. **Conclusion:** The HRQoL of DM2 patients is lower, which is associated to a higher risk of depression. The presence of depression and advanced age have a negative impact on the patient's HRQoL.

INTRODUCTION

Type 2 diabetes mellitus (DM2) is a well-known disease that cause tenacious hyperglycemia because of two conditions. It can be due to no generation of insulin or may be the body is getting resistant to use insulin efficiently [1,2]. Over weight leads to insulin resistance in peripheries which can be reason of developing DM2 progressively [3]. According to National Institute of Health survey, the incidence rate of Obesity in Mexico has been raised intensely since 2000, from 61.8% to 71.3%. [4, 5]. So consequently, from 2000 to 2012, the frequency of DM2 increased from 5.7% to 9.1% in people above age of 20 years [6]. More medical centers and treatment sessions needed due to more problems and complications, such as vascular problems which include hypertension. Acute Myocardial infarction, deep venous thrombosis, cerebrovascular disorder and heart failure [7]. CVA and AMI presented to be 2-4 x more in patients with DM2 [8]. Complications of vascular disease like retinopathy, neuropathy and nephropathy [9], Diabetic foot

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syndrome as well [10]. These problems lead patients to depression and stress. DM can trigger mood swings and hurt the self-esteem, make others frustrated [11, 12]. Life style has been highlighted as chief health care factor in these years. The aim of medical should be to recover health of patient [13]. Hence, it impacts not only the quantity but also QOL as well. This term QOL comprise the mentally, physically, social and spiritually well-being of a person. [14]. Stress due to diabetes, medication adherence, prolong duration, use of insulin, and comorbidities are including in QOL because of their impact on people with DM2 [15-19]. To make the diabetes treatment effective, there should be emotional coherence between family and patient. And blood glucose level in blood must be regulated. [20]. In few developing countries where sociocultural factors can affect quality of life and significant no of contributors and features connected to QOL can be measured, in spite of the fact that there have been various researches conducted on QOL on diabetic patients.

METHODS

Patients were selected from five Institutes of twin cities hospitals situated in Rawalpindi or Islamabad. [21]. All consecutive outpatients over the age of 18 years who were diagnosed with DM2 according to the (ADA) criteria were included in the cohort. Patients who had ability to read and write, physically active and have no disability and can fill a self-administrated questionnaire were eligible to participate. Participants with depression, dementia and schizophrenia and other psychological problems were not included. All these variables effect the QOL. In a research conducted by Zhang et al., he stated that numerous factors linked to QOL in patients with DM2, such as gender, age, marital status, duration of disorder, underlying pathologis and depression; hence, depressions had minor proportion 27.9% depression in patients with DM2 [19], previously, Only 1540 of the 1894 participants of sample that were eligible to participate met the inclusion requirements, with 146 being rejected.13 individuals had dementia and 48 participants were having depression and waiting for specialist's assessment before beginning. Questionnaires were distributed to 1540 patients, and once completed; they were examined to ensure that they were completed accurately. Patients were given the option of filling out any incomplete surveys. Age, gender, profession, married status, DM2 duration, additional comorbidities, for instance obesity, hypertension, vascular and cardiac disorders and stress were also considered. A scale called Health- related quality of life was used to measure the perceived quality of life by utilizing 36 factors survey (SF-36). Physically active, discomfort, general health,

syndrome as well [10]. These problems lead patients to depression and stress. DM can trigger mood swings and hurt the self-esteem, make others frustrated [11, 12]. Life style has been highlighted as chief health care factor in these years. The aim of medical should be to recover health of patient [13]. Hence, it impacts not only the quantity but also QOL as well. This term QOL comprise the mentally, physically, social and spiritually well-being of a person. [14]. Stress due to diabetes, medication adherence, prolong duration, use of insulin, and comorbidities are including in QOL because of their impact on people with DM2 [15-19]. To make the diabetes treatment effective, there should be emotional coherence between family and patient. And blood glucose level in blood must be regulated. [20]. In few developing countries where sociocultural factors can affect quality of life and significant no of contributors and features connected to QOL can be measured, in spite of the fact that there have been various researches conducted on QOL on diabetic patients.

RESULTS

Median of age of 1394 participants studied was 62 years, and there was no gender majority (49.9% female, n = 696). Eighty-two percent of the participants 1143 were married, and 41.6% of all participants (n = 580) worked as housewives (Table 1).

Gender		Overall sample	Quality of Life			p
			< 50	51-74	> 75	
		n = 1394	n = 690	n = 682	n = 22	
		n (%)				
Female	696 (49.19)	323 (46.17)	365 (53.14)	10 (44.5)	0.0421	
Male	688 (41.01)	358 (52.3)	318 (46.6)	12 (53.5)		
Age		61 (28-77)	64 (37-77)	61 (28-76)	55 (27-78)	0.0001
Marital status	Married	1133 (81.8)	589 (84.9)	519 (76.6)	20 (94.5)	0.001
	Widower	108 (7.7)	51 (7.15)	56 (81.4)	-	
	Single	82 (5.9)	27 (3.9)	54 (7.9)	1 (4.6)	
	Divorced	44 (3.1)	16 (2.22)	28 (3.95)	-	
	Other	18 (1.3)	4 (0.5)	16 (2.4)		
Occupation	Housewives	582 (42.6)	300 (44.2)	276 (41.3)	8 (35.8)	0.0001
	Retired	450 (31.5)	295 (42.3)	150 (21.6)	1 (4.16)	
	Employee	204 (14.6)	36 (5.14)	154 (22.83)	10 (48)	
	Other	146 (10.6)	52 (7.17)	90 (13.14)	-	
	Unemployed	9 (0.6)	4 (0.6)	6 (0.9)	2 (10.6)	
Duration (months)		245 (0-320)	242 (0-320)	136 (0-320)	70 (0-214)	0.0001

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Comorbidities	0	218 (16.9)	64 (8.9)	144 (21.8)	5 (21.7)	0.0001
	1	756 (52.9)	359 (52.5)	380 (55.9)	9 (41.1)	
	2	189 (14.4)	89 (12.16)	99 (14.22)	3 (12.9)	
	3	216 (14.9)	163 (23.7)	46 (6.9)	5 (21.9)	
	4	15 (1.1)	8 (1.2)	7 (1)	-	
Depression	No	349 (24.9)	69 (10.1)	258 (38.16)	18 (85.19)	0.0001
	Mild	232 (16)	131 (18.7)	92 (13.8)	-	
	Moderate	719 (52.3)	428 (62.1)	292 (42.8)	3 (13.5)	
	Severe	95 (6.81)	63 (9.1)	32 (4.8)	-	

Table 1: Diabetic patients' demographic characteristics compared to their Quality of Life

In the case of DM2, the disease lasted an average of 240 months, with comorbidities affecting 85% (1186) of patients. The most prevalent pathology was hypertension, 1044 patients (74.9% was suffering with it.380 patients (27.2%) with dyslipidemia, Obese patients were 235(16.8%) and with cardiac disorder there were 201 patients. According to the survey, only 25.2 % (n = 352) of those polled were depressed (Table 1). The middle total HRQoL total stood 50.1 facts out of a potential 100 ideas, by an all-out of 75.5 then a least of 28.6 arguments representing the best QoL. By analyzing HRQol scale, emotional role, body ache, mental status, and physical function all variables had median lower than 50. Symptoms of depression, age and DM2 duration has negative impact on physical function, on the other hand, marital status has improved the score.; symptoms of depression have negative effect on mental stats and it aggravate the body pain. These symptoms of depressions significantly impact a negative effect on QOL across all the categories has been studied (Table 2). We found that probably half of subjects (49.5%, n = 690) had score QOL less than 50, indicating poor HRQOL, and just 1.5% (22) had a score of more than 75, indicating ideal HRQOL.

Factor	β	95% CI	p
CORPOREAL PURPOSE			
Depressing indications		-11.1 to -9.01	> 0.001
Gender	1.68	-0.81 to 4.2	NS
Age in years	-0.48	-0.61 to -0.313	< 0.001
EMOTIONAL ROLE			
Symptoms of depression	-12.1	-13.9 to -9.71	< 0.001
Age in years	-0.73	- 0.96 to - 0.51	< 0.001
No of co-diseases	-8.6	-10.5 to -6.7	< 0.001
PHYSIQUE DISCOMFORT			
Symptoms of depression	-4.8	-3.5 to -6.15	< 0.001
Gender	-2.57	-5.13 to 0.07	NS
Phase (time)*	0.23	-0.08 to 0.36	NS
Period of diabetes(months)	-0.011	-0.04 to 0.011	NS
Amount of diseases	-5.65	-4.45 to -6.9	< 0.001
INTELLECTUAL FITNESS			
Miserable indications	-0.85	- 0.18 to -1.58	0.014
gender	0.47	-0.82 to 1.81	NS
Era (time)*	0.07	-0.005 to 0.15	NS
Matrimonial rank	0.64	-0.038 to 1.28	NS

In determining a patient's HRQOL category, we discovered that variables like gender, age, married status, work, duration of DM2 and depression remained important. (Inadequate, acceptable, or optimum). Bench 1 demonstrations that those by an older were more likely to be retirees or housewives, and had a higher frequency of symptoms of depression than those with satisfactory HRQOL (notch better than 50). (Score greater than 50). (A score of at least 75 is required.) Logistic regression model involved all of these variables except age and symptoms of depression were present as independent factors affecting HRQOL. Depression had a greater influence on HRQOL than age (OR 1.04, 95 percent CI 1.0008 to 1.09) in this study (OR 4.4, 95 percent CI 2.03 to 9.9)(Table 3).

Features	Odds ratio	95%	P
Symptoms of depression	4.42	2.13-9.8	0.0001
Gender	0.76	0.3-1.96	NS
Stage (years)	1.05	1.0018-1.08	0.018
Matrimonial rank	2.07	0.94-4.14	NS
Profession/Job	1.12	0.78-1.62	NS
Diabetes period	0.98	0.98-1.0054	NS
Comorbidities	0.83	0.55-1.25	NS

Table 3: Sociodemographic features of DM2 patients

DISCUSSION

Diabetes type 2 had very poor HRQOL in terms as physical function, mental body ache especially mental and

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emotional health being most affected. Depression played a major role as contributor to HRQOL. This is one of few current researches that found a vast number of individuals with DM2 that exposed demographic factors also have impact on quality of life. It is also determined that gender had no effect on HRQOL, physical function, emotional and mental health status and body pain [16, 28]. The outcome that diabetic patients who have less HRQOL in line with previous research indicating DM2 has a negative impact on QOL, which has been arbitrated by aspects for example the necessity for a healthy food with full nutrition, exercise plan and special treatment plan [29, 30]. The literature on quality of life of diabetic patients and its relation with socio-demographic aspects has developed unpredictable outcomes. In previous studies, poor QOL has been linked to an illiterate and less income and female gender. [31]. Glycemic control is influenced by established factors that affect QOL like elder people, and stress can be another reason to aggravate the QOL deterioration [32]. One more essential factor is that diabetic patients are regularly faced by their situation and difficulties that come with it on a daily basis, which affects their quality of life [33]. A study of 2086 DM2 patients in the Netherlands, Wermeling et al., discovered that individuals with underlying pathologies had drastically poor health status than those patients who no other comorbidities. [34]. On the other hand, a study conducted in Singapore revealed no correlation. Despite the lack of impact, it is crucial that health care provider exercise extra vigilance when managing DM2 comorbidities, as previous research has shown that the no of comorbidities raise, QOL deteriorates and survival declines drastically. Besides, findings of this training reveal that unhappiness is widespread to the effects having DM2 and is connected to a poor perception of QOL; unhappiness must stand tested, particularly big effecters who are at higher risk for absence of incentive and expressive weariness. The analysis of DM2 produces grieving for the losing health that promotes the development of stress, and this depressed situation can enhance habits of poor eating. It is because the depression inhibits the ability to maintain a heathy life style and alleviate the risk at the onset of diabetes. It is critical to gain a better understanding of stress and challenge adhere to treatment and modification in lifestyle. In diabetes patients, depression treatment, both psychological and pharmacological, has been associated to significant therapeutic benefits. Such improvements can in mood enhancement and also in adherence to DM2 diet and treatment routines, which improves control of glycemic in blood, lowers prolong pathologies and complications, and improves QOL [35].

CONCLUSION

Over-all, Patients with DM2 have a low quality of life. One factor is depression that influences QOL, and the aged individuals which have depression had a poorer HRQOL. The outcome of this study is to demonstrate that providing integrated management techniques and support groups to DM2 patients is crucial

REFERENCES

[1] American Diabetes Association. Standards of medical care in diabetes-2016. Diabetes Care. 2016;39: S1–2. doi.org/10.2337/dci16-0003

[2] Zhang M, Hu T, Zhang S, Zhou L. Associations of Different Adipose Tissue Depots with Insulin Resistance: A Systematic Review and Meta-analysis of Observational Studies. Sci Rep. 2015 Dec 21; 5:18495. doi: 10.1038/srep18495.

[3] Verma S, Hussain ME. Obesity and diabetes: an update. Diabetes Metab Syndr Clin Res Rev. 2017;11(1):73–79.doi.org/10.1016/j.dsx.2016.06.017

[4] Barquera S, Campos-Nonato I, Hernández-Barrera L, Pedroza AR-DJ. Prevalence of obesity in Mexican adults 2000–2012. Salud Publica Mex 2013;55(2): S151–60. doi.org/10.21149/spm. v55s2.5111

[5] Córdova-Villalobos JA, Barriguete-Meléndez JA, Lara-Esqueda A, Barquera S, Rosas-Peralta M, Hernández-Avila M, et al. Chronic non-communicable diseases in Mexico: epidemiologic synopsis and integral prevention. Salud Publica Mex. 2008;50(5):419–27.doi.org/10.1590/S0036-36342008000500015

[6] Juan López M. El análisis de la ENSANUT 2012 como contribución para las políticas públicas [The analysis of ENSANUT 2012 as a contribution for public policy]. Salud Publica Mex. 2013;55 Suppl 2: S79-80. doi.org/10.21149/spm. v55s2.5100

[7] Rodríguez-Gutiérrez R, Montori VM. Glycemic control for patients with type 2 diabetes mellitus: our evolving faith in the face of evidence. Circ Cardiovasc Qual Outcomes. 2016;9(5):504-12.doi.org/10.1161/CIRCOUTCOMES.116.002901

[8] American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. Diabetes Care. 2013 Apr;36(4):1033-46. doi: 10.2337/dc12-2625.

[9] Action to Control Cardiovascular Risk in Diabetes Study Group, Gerstein HC, Miller ME, Byington RP, Goff DC Jr, Bigger JT, Buse JB, et al. Effects of intensive glucose lowering in type 2 diabetes. N Engl J Med. 2008 Jun 12;358(24):2545-59. doi: 0.1056/NEJMoa0802743.

DOI:https://doi.org/10.54393/pbmj.v5i5.404

[10] Vaidya V, Gangan N, Sheehan J. Impact of cardiovascular complications among patients with Type 2 diabetes mellitus: a systematic review. Expert Rev Pharmacoecon Outcomes Res. 2015 Jun;15(3):487-97.doi:10.1586/14737167.2015.1024661.

[11] Ambriz Murillo Y, Menor Almagro R, Campos-Gonzalez ID, Cardiel MH. Health related quality of life in rheumatoid arthritis, osteoarthritis, diabetes mellitus, end stage renal disease and geriatric subjects. Experience from a general Hospital in Mexico. Reumatol Clin. 2015;11(2):68-72. doi.org/10.1016/j.reuma.2014.03.006

[12] Gonzalez JS, Peyrot M, McCarl LA, Collins EM, Serpa L, Mimiaga MJ, et al. Depression and diabetes treatment nonadherence: a meta-analysis. Diabetes Care. 2008;31:2398-403.doi.org/10.2337/dc08-1341

[13] Bech P. Quality of life in psychosomatic research. A psychometric model. Psychopathology. 1987;20(3-4):169-79. doi: 10.1159/000284496.

[14] Ferrell BR, Dow KH, Grant M. Measurement of the quality of life in cancer survivors. Qual Life Res. 1995 Dec;4(6):523-31. doi: 10.1007/BF00634747.

[15] Slevin M, Plant H, Lynch D, Drinkwater J, Gregory W. Who should measure quality of life, the doctor or the patient? Br J Cancer. 1988;41:243-50.

[16] Altınok A, Marakoğlu KKN. Evaluation of quality of life and depression levels in individuals with type 2 diabetes. J Fam Med Prim Care. 2016;5(2):302-8. doi.org/10.4103/2249-4863.192358

[17] Jannoo Z, Wah YB, Lazim AMHM. Examining diabetes distress, medication adherence, diabetes self-care activities, diabetes-specific quality of life and health-related quality of life among type 2 diabetes mellitus patients. J Clin Transl Endocrinol. 2017;26(9):48-54. doi.org/10.1016/j.jcte.2017.07.003

[18] Koekkoek PS, Biessels GJ, Kooistra M, Janssen J, Kappelle LJRGC-I. Study group. Undiagnosed cognitive impairment, health status and depressive symptoms in patients with type 2 diabetes. J Diabetes Complicat. 2015;29(8):1217-22.doi.org/10.1016/j.jdiacomp.2015.07.010

[19] Zhang P, Lou P, Chang G, Chen P, Zhang L, Li T, et al. Combined effects of sleep quality and depression on quality of life in patients with type 2 diabetes. BMC Fam Pract. 2016;17(1):40.doi.org/10.1186/s12875-016-0435-x

[20] Lewko J, Zarzycki WK-KE. Relationship between the occurrence of symptoms of anxiety and depression, quality of life, and level of acceptance of illness in patients with type 2 diabetes. Saudi Med J. 2012;33(8):887-94.

[21] American Diabetes Association. 2. Classification and diagnosis of diabetes. Diabetes Care. 2015;38(Suppl 1):S8-16.doi.org/10.2337/dc15-S005

[22] Vilagut G, Ferrer M, Rajmil L, Rebollo P, Permanyer-Miralda G, Quintana JM, et al. The Spanish version of the short form 36 health survey: a decade of experience and new developments. Gac Sanit. 2005;19(2):135-50.doi.org/10.1157/13074369

[23] Martínez-Hernández LE, Segura-Méndez NH, Antonio-Ocampo A, Torres-Salazar AM-GE. Validation of the SF-36 questionnaire in adults with asthma and allergic rhinitis in Mexican population. Rev Med Inst Mex Seguro Soc. 2010;48:531-4.

[24] Vázquez CSJ. Fiabilidad, validez factorial y datos normativos del Inventario de Depresión de Beck. Psicothema. 1998;10(2):303-18.

[25] Lahoud R, Chongthammakun V, Wu Y, Hawwa N, Brennan DMCL. Comparing SF-36® scores versus biomarkers to predict mortality in primary cardiac prevention patients. Eur J Intern Med. 2017;46:47-55.doi.org/10.1016/j.ejim.2017.05.026

[26] Kav S, Yilmaz AA, Bulut YDN. Self-efficacy, depression and self-care activities of people with type 2 diabetes in Turkey. Collegian. 2017;24(1):27-35. doi.org/10.1016/j.colegn.2015.09.005

[27] Dos Santos MA, Ceretta LB, Reús GZ, Abelaira HM, Jornada LK, Scwalm MT, et al. Anxiety disorders are associated with quality of life impairment in patients with insulin-dependent type 2 diabetes: a case-control study. Rev Bras Psiquiatr. 2014;36(4):298-304.doi.org/10.1590/1516-4446-2013-1230

[28] Odili V, Ugboka L, Oparah A. Quality of life of people with diabetes in Benin City as measured with WHOQOL-BREF. Internet J Law Healthc Ethics. 2008;6(2):1-7.

[29] Golicki D, Dudzinska M, Zwolak ATJ. Quality of life in patients with type 2 diabetes in Poland - comparison with the general population using the EQ-5D questionnaire. Adv Clin Exp Med. 2015;24(1):139-46.doi.org/10.17219/acem/38137

[30] Lee H-J, Chapa D, Kao CW, Jones D, Kapustin J, Smith J, et al. Depression, quality of life, and glycemic control in individuals with type 2 diabetes. J Am Acad Nurse Pr. 2009;21:214-24.doi.org/10.1111/j.1745-7599.2009.00396.x

[31] Gönen S, Güngör K, Çili A, Kamis U, Akpinar Z, Kisakol G, et al. Comprehensive analysis of health related quality of life in patients with diabetes: a study from Konya, Turkey. Turkish J Endocrinol Metab.

DOI:https://doi.org/10.54393/pbmj.v5i5.404

2007;11:81-8.

[32] Wermeling PR, Gorter KJ, Van Stel HFRG. Both cardiovascular and non-cardiovascular comorbidity are related to health status in well-controlled type 2 diabetes patients: a cross-sectional analysis. Cardiovasc Diabetol.2012;11:121.doi.org/10.1186/1475-2840-11-121

[33] Shim YT, Lee JTM, et al. Health-related quality of life and glycaemic control in patients with type 2 diabetes mellitus in Singapore. Diabet Med. 2012;29:e241-8.doi.org/10.1111/j.1464-5491.2012.03689.x

[34] Bannier K, Lichtenauer M, Franz M, Fritzenwanger M, Kabisch B, Figulla HR, et al. Impact of diabetes mellitus and its complications: survival and quality-of-life in critically ill patients. J Diabetes Complications. 2015;29(8):1130-5.doi.org/10.1016/j.jdiacomp.2015.08.010

[35] Hasan SS, Thiruchelvam K, Ahmed SI, Clavarino AM, Mamun AA, Kairuz T. Psychological health and menopause-specific quality of life of Malaysian women with type 2 diabetes. Asian J Psychiatr. 2016;23:56-63.doi.org/10.1016/j.ajp.2016.07.005

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Original Article

Assessment of the Correlation Between Hand Grip Strength Test and Seated Medicine Ball Throw Test at 45° Angle Among Physiotherapy Students: An Observational Study

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ABSTRACT

Seated Medicine Ball Throw (SMBT)test at 45 degrees throw angle is used to measure the Upper body power. Measurement of grip strength, is an important component in body strength evaluation and can provide us with a quick assessment of an individual's upper limb strength**.** **Objective** To assess the relationship between handgrip strength and upper body power among physiotherapy students via Digital Handgrip Dynamometer and Seated Medicine Ball throw test respectively. **Methods:** A cross-sectional study was carried out at Shalamar School of Allied Health Sciences, Lahore. This study recruited 45 participants of both gender, age between 18 to 24 years. Peak grip strength of both hands was taken using digital handheld dynamometer in kg. Seated Medicine Ball Throw, also called the medicine ball chest pass was performed by the participants using 2 kg medicine ball. SPSS was used to calculate the correlation of all variables. When the ball is released at 45 degrees, this study found a high association between handgrip strength and Seated Medicine Ball throw distance. SMBT has a mean of 149.7837.14, Right Handgrip Strength has a mean of 21.26kg5.3, and Left Handgrip Strength has a mean of 20.53kg4.69. **Results:** Grip strength left (r=.0.899) and right (r=.871) were found to have a significant link with Seated Medicine Ball throw (SMBT) performance in Pearson product-moment analysis. The dependent variable, SMBT, and the independent variables, HGS and Height, had a strong positive linear association (r=0.908). **Conclusion:** A higher Handgrip strength leads to a longer Throw distance, implying that a stronger Handgrip signifies a stronger Upper body.

INTRODUCTION

Strength is a state of being physically strong. It is the ability to handle a significant amount of force or pressure. A strong physique helps you conduct powerful actions and activities without becoming exhausted [1]. Grip strength is the control of fingers to hold objects and is an important factor when assessing hand function. It is a good analyst of functional decline and disability. The ability to grip things depends highly on the shoulder stability as increased shoulder stability leads to increased handgrip strength [2]. Upper body strength plays a major role in day-to-day activities. It is the ability to perform various tasks, including lifting, pulling, pushing, reaching, and stabilizing. According to previous researches upper body strength can be determined by seated medicine ball throw test (SMBT). The SMBT test only requires a weighted medicine ball and a measuring tape. The distance at which the medicine ball lands indicate the upper body strength that the participant possess [3]. Physiotherapy profession is physically demanding. A therapist needs to engage in activities that require a good amount of upper body strength. While manually handling patients, good upper body strength prevents abnormal posture and injury. For students of physiotherapy, it is important to understand the demands of this profession and their own actual physical fitness.

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Physiotherapy students are future professionals whose attitudes and beliefs should convince their patients to maintain a healthy lifestyle [4]. Many tools are available to measure the handgrip strength. The most commonly used tools include the digital handgrip dynamometer. It is a simple and a practical test that is highly reliable. The use of a digital handgrip dynamometer is a standard approach for determining grip strength and also upper body strength [5]. Researches concluded that medicine ball throw test is easy to learn and master. Medicine ball throw isn't just for sports. It can be used on a wide range of people, including kindergarten children, healthy adults and the elderly [6]. The use of distance thrown in SMBT, is a solid indicator of upper body strength. This test is inexpensive and easy to administer in both indoor and outdoor settings. While various approaches, like motion capture, force plates with motion capture, and a medicine ball with an incorporated accelerometer, can be used to assess SMBT performance and variations, these methods are often more expensive and need more technical expertise. It is crucial to throw the medicine ball at a certain angle to achieve maximum horizontal distance [7]. Several factors influence grip strength and upper body strength which include age, gender, muscle strength, pain, restricted movement, nutritional status, fatigue and anthropometric measures. Hand and upper body strength measurements are used to assess appropriate clinical data designed to utilize in rehabilitation process [8]. Upper limb function is fully reliant on distal functional movement and proximal stability. The proximal stability is provided by parascapular muscles while distal movement depends upon hand musculature. A launch angle of 45° is important to maintain while throwing a certain object as it is considered to produce maximum horizontal throw distance. In this study launch angle of 45° was controlled via videography. Also, there was a need to find applicability of SMBT as an alternate to handgrip strength test to assess physiotherapy students' strength in order to measure where their upper body strength lies and whether they were prepared to meet the professional physical fitness demands that they would face in the employment settings in the near future [9].

METHODS

The study included 46 undergraduate physiotherapy students from the Shalamar Medical and Dental College in Lahore, ranging in age from first to final year. There are 32 female students and 14 male students in the sample. Subjects between the ages of 18 and 25, with a normal BMI and no recent upper-body injuries, were chosen. Subjects who had engaged in strenuous upper body exercise within 48 hours after testing were eliminated, as were those with bodily pain greater than 3 on a numeric pain rating scale. After being instructed verbally on the study protocols, the volunteers were asked to sign a consent form. First, both hands' grip strength was measured. The second test was to throw a medicine ball from a seated position. The individual was seated with his feet flat on the ground and his hips and knees at a 90° angle. The participant was put to the test while holding the dynamometer. The shoulder was kept in adduction with the elbow flexed 90-120°, the wrist extended 0-30 degrees, and the ulnar deviation 0-15°. The dynamometer's base was on the heel of the palm, and the grip was on the middle four fingers. When the person was ready, he or she squeezed the dynamometer maximally isometrically. The value was recorded after the isometric contraction was maintained for 5 seconds. For each hand, three recordings were made [10]. Medicine ball throw test was then carried out. The subject was on the floor in long sitting position, with his back against a wall. The chart paper illustrating the 45° angle was placed on a wall right next to participant. The subject kept his arms parallel to the 45° angle illustrated on the chart while doing a chest pass with the medicine ball held in both hands. The subject threw the medicine ball as vigorously, far and straight forward as he/she could. The subject tossed the medicine ball as hard as he could, as far as he could, and as straight as he could. The entire time, the back was against the wall. It was measured the distance between the heel of the foot and the landing point of the medicine ball. The measurement was taken to the nearest 0.5ft (10cm) increment. A video camera was used to record the entire process. The best three throws result was recorded [3]. Numerical data like age, height and weight were represented in the form of Mean and Standard deviation whereas, qualitative data like gender and handedness were presented in the form of frequency tables (percentage). To determine the link between SMBT and grip strength factors, the Pearson/ Spearman's correlation was used. If the correlation coefficient is close to 1, the co-efficient correlation is good. There is statistically significant association if the p-value is less than 0.05, while there is no statistically significant correlation if the p-value is more than 0.05. For all statistical analysis, a 5% level of significance was used. For a more in-depth look at this association, a basic linear regression was used. A p-value of less than 0.05 is regarded significant, whereas a p-value of more than 0.05 is deemed inconsequential.

RESULTS

A total of 46 physiotherapy students (32 females and 14 males) between the ages of 18 and 25 years were recruited for this study, with an average mean age of 22.26 1.323 years and a standard deviation of 22.26 1.323 years. The

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descriptive statistics of physiotherapy students for SMBT and grip strength factors were determined, as shown in Table 1. The mean of the SMBT is 149.78 37.14. The Grip Strength Left having a mean of 20.53kg± 4.69 and Grip Strength Right having a mean 21.26kg± 5.35. As shown in Table 2, the Pearson's Correlation between Right Handgrip strength with SMBT test at 45° angle is 0.871 which indicates a strong positive correlation. Correlation of left handgrip strength with SMBT test is 0.899. Age in years and BMI have weak negative correlation with SMBT that is -0.387 and -0.492 respectively. As shown in Table 3, Correlation of Right Dominant hand grip strength with Left grip strength is 0.927 and with Seated Medicine Ball throw test is 0.924. This shows the correlation is significant. Correlation of Left Dominant hand grip strength with Right grip strength is 0.955 and with Seated Medicine Ball throw test is 0.857, which shows the correlation is significant.

As shown in Table 4, in Females with Right hand dominance, grip strength Right have a correlation of 0.701 with SMBT and with grip strength Left is 0.733 which shows a moderate correlation. In Males with Right hand dominance, grip strength Right had a correlation of 0.971 with SMBT and that with grip strength Left is 0.39. In Females with Left hand dominance, grip strength Left has a correlation of 0.216 with grip strength Right and that with SMBT is 0.437 which shows a weak correlation. In Males with Left hand dominance, grip strength Left has a correlation of 0.845 with Right grip strength and that with SMBT is 0.788 which shows moderate correlation. As shown in Table 5, there was strong positive linear relationship between dependent variable i.e., SMBT and independent variable i.e., HGS and Height (r=0.908). The equation explains 81.6% of the variation in SMBT by the dependent variables. The model is fit (p-value <0.001). The equation that was developed is as follows: SMBT test =-156.602 +3.937 Dominant Handgrip Strength +1.365 Height in cm. Keeping the effect of dominant handgrip strength and height in cm the SMBT test score would be -156.602. keeping the effect of other variables constant, the unit increase in dominant hand will increase the SMBT test score 3.93 times whereas keeping the effect of others constant, unit increase in height will increase the SMBT 1.365 times Table 1.

Variables	SD	Mean	N
Seated Medicine Ball throw (SMBT)	37.14770	149.7826	46
Right Handgrip Strength	5.35907	21.2652	46
Left Handgrip strength	4.69093	20.5304	46

Table 1: Mean values of SMBT, right and left handgrip strength

pearson Correlation	Body Mass Index	Right Handgrip Strength	Left Handgrip strength	Seated Medicine Ball throw at 45 degrees (SMBT)
Age in years	0.254	-0.516**	-0.299*	-0.387**
Body Mass Index		-0.652**	-0.585**	-0.492**
Right Handgrip Strength			0.656**	0.871**
Left Handgrip strength				0.899**

Table 2: Pearson's Correlation

Dominant Hand		Body Mass Index	Right Handgrip Strength	Left Handgrip strength	Seated Medicine Ball throw test (SMBT)
Right	Age in years	0.112	-0.640**	-0.434*	-0.553**
	Body Mass Index		-0.497**	-0.453*	-0.388*
	Right Handgrip Strength			0.927**	0.924**
	Left Handgrip strength				0.938**
Left	Age in years	0.34	-0.036	0.063	0.215
	Body Mass Index		-0.895**	-0.869**	-0.653**
	Right Handgrip Strength			0.955**	0.780**
	Left Handgrip strength				0.857**

Table 3: Comparison between Right and Left Dominant Hands

Dominant Hand	Gender		Body Mass Index	Right Handgrip Strength	Left Handgrip strength	Seated Medicine Ball throw test
Right	Female	Age in years	0.031	.586*	0.088	0.382
		Body Mass Index		-0.282	-0.011	0.06
		Right Handgrip Strength			0.733**	0.701**
		Left Handgrip strength				0.776**
	Male	Age in years	-0.452	-0.228	0.466	-0.08
		Body Mass Index		0.462	0.017	0.364
		Right Handgrip Strength			0.38	0.971**
		Left Handgrip strength				0.523
Left	Female	Age in years	0.840**	-0.411	0.202	0.373
		Body Mass Index		-0.881**	0.233	0.42
		Right Handgrip Strength			0.216	-0.2
		Left Handgrip strength				0.437
	Male	Age in years	0.728**	0.327**	0.743**	0.631**
		Body Mass Index		0.639**	0.784**	0.534**
		Right Handgrip Strength			0.845**	0.765**
		Left Handgrip strength				0.788**

Table 4: Comparison between Genders

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Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	21.346	11.239		1.899	0.064
	Right Handgrip Strength	6.040	0.513	0.871	11.776	0.000
2	(Constant)	-156.602	45.498		-3.442	0.001
	Right Handgrip Strength	3.937	0.687	0.568	5.730	0.000
	height in cm	1.365	0.341	0.397	4.003	0.000

a. Dependent Variable: Seated Medicine Ball throw test

Table 2: Pearson's Correlation

DISCUSSION

According to our knowledge, it is the first study which measures correlation of handgrip strength and SMBT test at 45° angle among physiotherapy students of Shalamar School of Allied Health Sciences, Lahore. Despite various studies looking at athletes' grip strength, the link between grip strength and upper body performance has remained a mystery. According to Wind et al., the handgrip strength test demonstrates overall muscle strength in a clinical setting [11]. The medicine ball throw test was created to evaluate upper-body strength [12]. According to Harris et al., the SMBT appears to be a very dependable test of upper body power for older persons. Tossing a medicine ball from a seated posture requires muscle strength and power in the shoulder flexors and elbow extensors, hence the SMBT looks to be a very reliable test of upper body power for older adults [3]. The SMBT is a low-cost, safe, and reliable assessment of upper-body strength for older people. Upper-body power did not alter with age because there was no significant association between mean throw distance and age [13] and [14] also found "that age has little bearing on young players' upper-body strength" The purpose of this study was to examine if there was a link between handgrip strength and physiotherapy students' sitting medicine ball throw test at a 45° angle. The findings of this study showed that using a medicine ball with a 45° launch angle, having a stronger handgrip resulted in a greater throw distance. The sitting medicine ball throws (SMBT) test successfully predicted upper body strength of physiotherapy students when the grip strength test was used as a standard test to measure upper body strength and handgrip strength of the participants. These results were consistent with some studies [11]. "Total muscle strength was substantially linked with grip strength, with correlation values ranging from 0.736 to 0.890 ($p < 0.01$)". In this study, the Model summary table reports the strength of the relationship between the Handgrip strength and SMBT (Adjusted R square = 0.839).According to our research it was concluded that restricting the angle of throw at 45° while performing the SMBT, produced much authentic throw distance as it eliminated any throwing errors and purely demonstrated the upper body strength, this result contradicts the study of [7], "Restricted release angle appears to be unnecessary, as some researches have produced reliable results without regulating release angle". Despite the fact that the total mean BMI was within the WHO's normal range, the acquired scores for handgrip strength and the Seated Medicine Ball toss test were below the average for age-adjusted values [15]. This is not surprising, given that a bigger proportion (52.5%) of the physiotherapists polled appear to be unaware of any appropriate physical fitness practice, despite their knowledge of its benefits. Shoulder girdle support trainings can be combined in the drill platform to progress grip strength as they have a constructive modest association [16]. HGS appears to be an quality of best sportspersons and a covariate of complete higher- and lower-body strength, imprudent skill [17]. The Basket ball Throw Test is a viable amount of upper-body well-developed strength in school-aged kids [18]. Advanced standards of physique mass index were related with deteriorations in bodily fitness, free of age [19]. Power in higher and inferior limbs are connected to judo-specific responsibilities in new judo sportspersons and can temperately forecast the enactment [20]. The current study is one of the few to look at the association between upper body strength and grip strength in physiotherapy students; however, more research is needed to validate or dispute this conclusion.

CONCLUSION

Left and Right Handgrip Strength showed strong positive correlation with Seated Medicine Ball throw test at 45°. On the other hand, BMI and age had moderate negative correlation with Handgrip strength and SMBT. In pair wise comparison, handgrip strength of females showed moderate correlation with SMBT and that of males showed strong correlation with SMBT. In conclusion, a higher Handgrip strength leads to a longer Throw distance, implying that a stronger Handgrip signifies a stronger Upper body. The importance of sex and age in relation to grip strength and upper body strength suggests that they could be viewed as useful variables to encourage physiotherapists to achieve physical fitness.

REFERENCES

[1] Suchomel TJ, Nimphius S, Bellon CR, Stone MH. The Importance of Muscular Strength: Training Considerations. Sports Med. 2018 Apr;48(4):765-785. doi: 10.1007/s40279-018-0862-z.

DOI:https://doi.org/10.54393/pbmj.v5i5.488

[2] Kobesova A, Dzvonik J, Kolar P, Sardina A, Andel R. Effects of shoulder girdle dynamic stabilization exercise on hand muscle strength. Isokinetics and exercise Science. 2015 Jan 1;23(1):21-32.

[3] Harris C, Wattles AP, DeBeliso M, Sevene-Adams PG, Berning JM, Adams KJ. The seated medicine ball throw as a test of upper body power in older adults. J Strength Cond Res. 2011 Aug;25(8):2344-8. doi: 10.1519/JSC.0b013e3181ecd27b.

[4] Kotwica A, Majcher P."Physical Fitness Level of 1 Year Medicine and Physiotherapy Students of Lublin Medical University %J Polish Journal of Sport and Tourism." 2013; 19(2): 107-112. doi.org/10.2478/v10197-012-0011-4

[5] Rodacki ALF, Boneti Moreira N, Pitta A, Wolf R, Melo Filho J, Rodacki CLN, et al. Is Handgrip Strength a Useful Measure to Evaluate Lower Limb Strength and Functional Performance in Older Women? Clin Interv Aging. 2020 Jun 30;15:1045-1056. doi: 10.2147/CIA.S253262.

[6] Sato K, Carroll KM, Wagle JP, Lang HM, Smith AP, Abbott JC, et al. Validation of inertial sensor to measure velocity of medicine balls. Journal of Trainology. 2018 Jun 16;7(1):16-20. doi.org/10.17338/trainology.7.1_16

[7] Beckham G, Lish S, Keebler L, Longaker C, Disney C, DeBeliso M, et al.The reliability of the seated medicine ball throw for distance. Journal of Physical Activity Research. 2019;4(2). doi.org/10.12691/jpar-4-2-9

[8] Alahmari KA, Kakaraparthi VN, Reddy RS, Silvian PS, Ahmad I, Rengaramanujam K. Percentage difference of hand dimensions and their correlation with hand grip and pinch strength among schoolchildren in Saudi Arabia. Niger J Clin Pract. 2019 Oct;22(10):1356-1364. doi: 10.4103/njcp.njcp_121_19.

[9] Raghavan P. Upper Limb Motor Impairment After Stroke. Phys Med Rehabil Clin N Am. 2015 Nov;26(4):599-610. doi: 10.1016/j.pmr.2015.06.008.

[10] Wang YC, Bohannon RW, Li X, Sindhu B, Kapellusch J. Hand-Grip Strength: Normative Reference Values and Equations for Individuals 18 to 85 Years of Age Residing in the United States. J Orthop Sports Phys Ther. 2018 Sep;48(9):685-693. doi: 10.2519/jospt.2018.7851.

[11] Wind AE, Takken T, Helders PJ, Engelbert RH. Is grip strength a predictor for total muscle strength in healthy children, adolescents, and young adults? Eur J Pediatr. 2010 Mar;169(3):281-7. doi: 10.1007/s00431-009-1010-4.

[12] Stockbrugger BA, Haennel RG. Validity and reliability of a medicine ball explosive power test. J Strength Cond Res. 2001 Nov;15(4):431-8..doi.org/10.1519/00124278-200111000-00006

[13] Mayhew JL WJ, Bemben MG, Wilt B, Ward TE, Farris B et al. The NFL-225 test as a measureof bench press strength in college football players." Journal of Strength and Conditioning Research. 13(130): 134.Morales, D. A. (2016). "Relationships between the optimum parameters of four projectile motions." Acta Mechanica 1999;227(6): 1593-1607. doi.org/10.1007/s00707-016-1579-4

[14] Viitasalo JT. Evaluation of explosive strength for young and adult athletes. Research quarterly for exercise and sport. 1988 Mar 1;59(1):9-13.doi.org/10.1080/02701367.1988.10605467

[15] Warburton DE, Nicol CW, Bredin SS. Prescribing exercise as preventive therapy. CMAJ. 2006 Mar 28;174(7):961-74. doi: 10.1503/cmaj.1040750.

[16] Desai RR, Desai PS, Kulkarni NR, Palekar TJ, Steven VJ. Does Shoulder Girdle Strengthening Exercises have an Effect on Grip Strength in Adolescent Recreational Tennis Players: A Randomised Controlled Trial. Journal of Clinical & Diagnostic Research. 2021 Dec 1;15(12). doi.org/10.7860/JCDR/2021/50314.15778

[17] Cronin J, Lawton T, Harris N, Kilding A, McMaster DT. A brief review of handgrip strength and sport performance. The Journal of Strength & Conditioning Research. 2017 Nov 1;31(11):3187-217. doi.org/10.1519/JSC.0000000000002149

[18] Belhaidas MB, Dahoune O, Eather N, Oukebdane MA. Objectivity, Reliability, and Validity of the Basketball Throw Test as a Health-related Measure of Upper-Body Muscular Strength in a Sample of Algerian Primary School Children. Measurement in Physical Education and Exercise Science. 2022 Jan 1:1-9.doi.org/10.1080/1091367X.2021.2021205

[19] Dumith SC, Ramires VV, Souza MA, Moraes DS, Petry FG, Oliveira ES, et al.Overweight/obesity and physical fitness among children and adolescents. Journal of Physical Activity and Health. 2010 Sep 1;7(5):641-8.doi.org/10.1123/jpah.7.5.641

[20] Kons RL, da Silva Athayde MS, da Silva Junior JN, Katcipis LF, Detanico D. Predictors Of Judo-Specific Tasks From Neuromuscular Performance In Young Athletes Aged 11–16 Years. International Journal of Sports Physical Therapy. 2020 May;15(3):365. doi.org/10.26603/ijspt20200365

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Original Article

Comparison of Effectiveness of Movement with Mobilization and Muscle Energy Technique in reducing Pain and improving Functional Status in patients with Frozen Shoulder

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ABSTRACT

Adhesive capsulitis, "popularly is a condition with an unclear etiology known as Frozen Shoulder (FS)". This disorder limits the range of motion of the shoulder joint. **Objective:** To compare the effectiveness of movement with mobilization and muscle energy technique (METs) in reducing pain and improving functional status in patients with frozen shoulder **Methods:** Study was conducted at Department of Physiotherapy, Mayo Hospital Lahore after obtaining the consent from 36 patients. Patients were divided into Two groups. For two weeks, Group 1 received Movement with Mobilization Protest movements (MMM) while Group 2 received METs. The data was processed into SPSS and evaluated using the *Independent Sample t test and Paired Sample t test*. **Results:** The outcome assessment instruments, "goniometer for ROM" and "shoulder pain, and disability index," revealed that "Motion by Mobility is more effective than Muscle Energy Technique in increasing ROM and operational condition" of the patient having frozen shoulder. **Conclusions:** There was a considerable improvement in pain and ROM from pre-treatment levels in both the study groups. Whereas "Movement with Mobilization is more effective than Muscle Energy Technique" in alleviating pain, enhancing range of motion, and enhancing functional capacity in "patients with shoulder pain."

INTRODUCTION

"Adhesive Capsulitis" is a self-limiting disorder characterised by pain and reduced direct and indirect strength and flexibility in the Glenohumeral joint. "Exterior movement is more restricted than flexion, which is followed by internal rotation in the capsular pattern' [1]. Frozen shoulder (FS) is another name for adhesive capsulitis, which has two types: active and passive [2]. Adhesive capsulitis is treated differently than other shoulder disorders, and it can be detrimental to sufferers if misdiagnosed [3]. Therapists should constantly be aware of the characteristics of adhesive capsulitis and the therapeutic stages associated with it [4,5]. The prevalence of frozen shoulder has been estimated to range between 2.4-26%. Intrinsic sticky capsulitis affects 2% to 5.3% of

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the total population. The prevalence of subsequent adhesive capsulitis linked to diabetes and thyroid disease has been estimated to be between 4.3 % and 38%. Milgram et al., likened 126 sick people (76 females; age, 55.0 50 males; age, 54.7) with idiopathic frozen shoulder to incidence metrics, then created a substantively higher number of diabetes in females (23.7 % against 4.7%) than males (38.0% against 6.5%) via shoulder pain [3,6]. Idiopathic frozen shoulder was found to cause a significantly higher prevalence of hypothyroidism in females (21.1% vs. 7.9%) when compared to the age-matched local residents [7,8]. In several additional studies, physiotherapist treatments have been used to treat frozen shoulder in serious illnesses, and they have proven to be impressive in reduction of hurting and increasing limiting strength and flexibility [9]. Different treatments, such as MMM and METs, have been shown to be useful in the care of frozen shoulder customers in different studies. These strategies have been contrasted to cautious treatment in several studies [10,11]. MMM when compared to METs in the Treatment of Adhesive Capsulitis was found to be more effective. This research found that MET is more successful in reducing discomfort [12-14]. The purpose of this study is to see how efficient mobility with mobilisation and muscle power methods are at reducing pain severity and improving functional ability in patients with adhesive capsulitis.

METHODS

A controlled trial experiment was conducted in Pakistan at the Physiotherapy Department of Mayo Hospital Lahore. A total of 36 participants were enrolled in this study were divided into two categories at random to use a Random Number Table. In both groups of patients (SPADI), the same parameters, Range of Motion and Shoulder Pain and Disability Index were assessed. The study included patients who had been afflicted with frozen shoulder. For two weeks, the patients were monitored. The participants were divided into two groups: Group A and Group B. Pre-test measurements were made through using Severity Index Measure, the Shoulder Pain intensity Score, and a goniometer to quantify strength and flexibility intervention period. The activation technique of MMM was employed on participants in Group 1. 12 glides per set, 30 seconds among glides, 5 sets total. So over course of two weeks, 12 sessions were held in total. Quiet sinusoidal movements were performed at a frequency of 2-3 per second. So over course of two weeks, Group 2 patients got muscle stimulation treatments for 12 sessions. 5 repetitions of 3-5 muscle contractions lasting 5-7 seconds each. Physical therapy was prescribed to people six days a week. All participants receive a moist hand warmer applied to the affected shoulder for 10 minutes, as well as a personal exercise plan. Patients were directed to repeat each activity 2-3 times per day for 10-15 repeats on the first day of treatment. Both groups received two weeks of counselling. On the first day and again at the end of the second week, subjects were evaluated. A questionnaire with a visual analogue scale (VAS) and a shoulder pain and disability score was used to collect all data. Range of motion (ROM), shoulder pain and disability index (SPADI) enhancements were evaluated. People over 40 years of age with restricted shoulder proactive and reactive planes of motion in the capsular region, shoulders pain persisting beyond a month, and diabetic patients with frozen shoulder were included in the study. Those with cancer, memory deficits or mental disabilities, neurologic dysfunction, or an injury were all ruled out of the study.

RESULTS

Results showed that there was significant difference between the pain before and after the treatment among both groups as p value is 0.00 (Table 1).

Paired Samples Statistics		Mean	N	SD	SE Mean	Sig. (2-tailed)
Group 1	"VAS Pre Treatment"	8.83	18	1.383	0.326	0.00
	"VAS Post Treatment"	3.39	18	0.916	0.216	
Group 2	"VAS Pre Treatment"	9.11	18	0.963	0.227	0.00
	"VAS Post Treatment"	2.67	18	0.686	0.162	

Table 1: Pain before and after the treatment among both groups

There was significant difference between the Shoulder pain and disability index before and after the treatment among both groups as p Value is 0.00 (Table 2).

Paired Samples Statistics		Mean	N	SD	SE Mean	Sig. (2-tailed)
Group 1	"SPADI Pre Treatment"	85.5189	18	10.5762	2.49283	0.00
	"SPADI Post Treatment"	28.0611	18	10.3333	2.43558	
Group 2	"SPADI Pre Treatment"	84.8444	18	9.62172	2.26786	0.00
	"SPADI Post Treatment"	42.7756	18	16.2838	3.83813	

Table 2: Shoulder pain and disability index before and after the treatment

There was significant difference between the Shoulder ROM including External rotation, abduction and Internal Rotation before and after the treatment among both groups as p value is 0.00 (Table 3).

Paired Samples Statistics		Mean	N	SD	SE Mean	Sig.
Group 1	"Pre Treatment External Rotation"	34.22	18	6.16	1.452	0.00
	"Post Treatment External Rotation"	69.72	18	4.127	0.973	
Group 2	"Pre Treatment External Rotation"	33.39	18	7.964	1.877	0.00
	"Post Treatment External Rotation"	47.78	18	8.987	2.118	
Group 1	"Pre Treatment Abduction"	76.22	18	14.086	3.32	0.00
	"Post Treatment Abduction"	139.56	18	15.194	3.581	
Group 2	"Pre Treatment Abduction"	83.11	18	8.138	1.918	0.00
	"Post Treatment Abduction"	110.94	18	6.966	1.642	

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Paired Samples Statistics		Mean	N	SD	SE Mean	Sig.
Group 1	"Pre Treatment Internal Rotation"	33.89	18	6.676	1.574	0.00
	"Post Treatment Internal Rotation"	59.83	18	5.618	1.324	
Group 2	"Pre Treatment Internal Rotation"	31.89	18	6.425	1.514	0.00
	"Post Treatment Internal Rotation"	44.61	18	6.844	1.613	

Table 3: Shoulder Range of Motion including External rotation, Abduction and Internal Rotation

The Visual Analogue Scale (VAS), SPADI and ROM including External Rotation, Abduction, and Internal Rotation across Team 1 and Group 2 were compared using an independent sample t test. The statistical information revealed that the mean value of VAS, SPADI and ROM encompassing External Rotation, Abduction, and Internal Rotation between the two groups was significantly different. MMM is more effective than MET at relieving pain, increasing scope of movement, and enhancing serviceable power in individuals with frozen shoulder(Table 4).

Group Statistics	Study Group	N	Mean	SD	P Value
VAS	Group 1	18	3.39	.916	.012
	Group 2	18	2.67	.686	
SPADI score	Group 1	18	42.7756	16.28381	.003
	Group 2	18	28.0611	10.33330	
External rotation	Group 1	18	69.72	4.127	.000
	Group 2	18	47.78	8.987	
Abduction	Group 1	18	139.56	15.194	.000
	Group 2	18	110.94	6.966	
Internal rotation	Group 1	18	59.83	5.618	.000
	Group 2	18	44.61	6.844	

Table 4: Independent Sample t test Results VAS, SPADI and Shoulder ROM

DISCUSSION

The purpose of the study was to compare the two procedures on patients with frozen shoulder. Motion with Activation and Muscular Power Method were the two strategies used. Interview for Frozen Shoulder and Impairment Score was used to gather data [15]. Shah Atika Suri et al., collected a survey in 2013. The goal of this study was to see how Motion by Activation and muscular power approach helped individuals with adhesive capsulitis. Both groups display significant changes in symptom and compass of motion before therapy, according to this study. The MMM group had a greater change in ROM and a greater reduction in pain than the MET category. Yet there is a substantial disparity values of the VAS, SPADI, and ROM including External Rotation, Abduction, and Internal Rotation between the two groups, according to our research. MMM is more effective than MET at relieving pain, increasing range of motion, and increasing effectiveness in individuals suffering frozen shoulder[12,13].

Arvind Kumar et al., did a study in 2015 to check the effectiveness of MMM with muscular power approach in individuals suffering frozen shoulder. MMM is more successful than MET in enhancing strength and flexibility and reducing operational impairment in patients with this illness[20]according to this study. In our investigation, we discovered substantial variations in pain and ROM which was before phases in both categories. Although the MMM Community showed higher ROM improvement and discomfort alleviation than the MET team. While there is a significant difference in mean score of the VAS, the SPADI, and the ROM including External Rotation, Abduction, and Internal Rotation between the two groups, according to our study [16,17]. MMM is more effective than MET at relieving pain, increasing range of motion, and increasing affective people with frozen shoulder[18,19].

CONCLUSION

In both categories, there was a considerable improvement in pain and ROM from pre-treatment levels. Although Movement with Mobilization is more effective than Muscle Energy Technique in reducing pain, enhancing strength and flexibility, and increasing physical function in individuals with shoulder pain.

REFERENCES

[1] Rookmoneea M, Dennis L, Brealey S, Rangan A, White B, McDaid C et al. The effectiveness of interventions in the management of patients with primary frozen shoulder. J Bone Joint Surg Br. 2010 Sep;92(9):1267-72. doi: 10.1302/0301-620X.92B9.24282.

[2] Kelley MJ, McClure PW, Leggin BG. Frozen shoulder: evidence and a proposed model guiding rehabilitation. J Orthop Sports Phys Ther. 2009 Feb;39(2):135-48. doi: 10.2519/jospt.2009.2916.

[3] Brue S, Valentin A, Forssblad M, Werner S, Mikkelsen C, Cerulli G. Idiopathic adhesive capsulitis of the shoulder: a review. Knee Surg Sports Traumatol Arthrosc. 2007 Aug;15(8):1048-54. doi: 10.1007/s00167-007-0291-2.

[4] Cleland J, Durall CJ. Physical therapy for adhesive capsulitis: systematic review. Physiotherapy. 2002;88(8):450-7. doi.org/10.1016/S0031-9406(05)60847-4.

[5] Bal A, Eksioglu E, Gulec B, Aydog E, Gurcay E, Cakci A. Effectiveness of corticosteroid injection in adhesive capsulitis. Clinical Rehabilitation. 2008;22(6):503-12. doi.org/10.1177/0269215508086179.

[6] Bussières AE, Peterson C, Taylor JA. Diagnostic imaging guideline for musculoskeletal complaints in adults-an evidence-based approach-part 2: upper extremity disorders. J Manipulative Physiol Ther.

DOI:https://doi.org/10.54393/pbmj.v5i5.474

2008 Jan;31(1):2-32. doi: 10.1016/j.jmpt.2007.11.002.
[7] Gaspar PD, Willis FB. Adhesive capsulitis and dynamic splinting: a controlled, cohort study. BMC Musculoskelet Disord. 2009 Sep 7;10:111. doi: 10.1186/1471-2474-10-111.
[8] Boyles RE, Flynn TW, Whitman JM. Manipulation following regional interscalene anesthetic block for shoulder adhesive capsulitis: a case series. Manual therapy. 2005 Feb 1;10(1):80-7. DOI: 10.1016/j.math.2004.05.002.
[9] Poser A, Casonato O. Posterior glenohumeral stiffness: capsular or muscular problem? A case report. Manual therapy. 2008;13(2):165-70. DOI: 10.1016/j.math.2007.07.002.
[10] Doner G, Guven Z, Atalay A, Celiker R. Evalution of Mulligan's technique for adhesive capsulitis of the shoulder. J Rehabil Med. 2013 Jan;45(1):87-91. doi: 10.2340/16501977-1064.
[11] Green S, Buchbinder R, Hetrick S. Physiotherapy interventions for shoulder pain. Cochrane Database Syst Rev. 2003;2003(2):CD004258. doi: 10.1002/14651858.CD004258.
[12] Suri SA, Anand M. Comparative study on the effectiveness of Maitland mobilization technique versus muscle energy technique in treatment of shoulder adhesive capsulitis. Indian Journal of Physiotherapy & Occupational Therapy-An International Journal. 2013;7(4):1-6.
[13] Kumar A. A comparative study on the efficacy of Movement with Mobilization's Mobilization and muscle energy technique on frozen shoulder. Website: www ijpot com. 2015;9(4):39. DOI: 10.5958/0973-5674.2015.00143.4.
[14] van der Windt DA, Koes BW, Devillé W, Boeke AJ, de Jong BA, Bouter LM. Effectiveness of corticosteroid injections versus physiotherapy for treatment of painful stiff shoulder in primary care: randomised trial. BMJ. 1998 Nov 7;317(7168):1292-6. doi: 10.1136/bmj.317.7168.1292.
[15] Vermeulen HM, Rozing PM, Obermann WR, le Cessie S, Vliet Vlieland TP. Comparison of high-grade and low-grade mobilization techniques in the management of adhesive capsulitis of the shoulder: randomized controlled trial. Phys Ther. 2006 Mar;86(3):355-68.
[16] Vermeulen HM, Stokdijk M, Eilers PH, Meskers CG, Rozing PM, Vliet Vlieland TP. Measurement of three dimensional shoulder movement patterns with an electromagnetic tracking device in patients with a frozen shoulder. Ann Rheum Dis. 2002 Feb;61(2):115-20. doi: 10.1136/ard.61.2.115.
[17] Warner JJ, Allen A, Marks PH, Wong P. Arthroscopic release for chronic, refractory adhesive capsulitis of the shoulder. J Bone Joint Surg Am. 1996 Dec;78(12):1808-16. doi:10.2106/00004623-199612000-00003.
[18] Woo SL, Buckwalter JA. AAOS/NIH/ORS workshop. Injury and repair of the musculoskeletal soft tissues. Savannah, Georgia, June 18-20, 1987. J Orthop Res. 1988;6(6):907-31. doi: 10.1002/jor.1100060615.
[19] Zuckerman JD, Rokito A. Frozen shoulder: a consensus definition. J Shoulder Elbow Surg. 2011 Mar;20(2):322-5. doi: 10.1016/j.jse.2010.07.008.
[20] Yang JL, Chang CW, Chen SY, Wang SF, Lin JJ. Mobilization techniques in subjects with frozen shoulder syndrome: randomized multiple-treatment trial. Physical therapy. 2007 Oct 1;87(10):1307-15. doi.org/10.2522/ptj.20060295

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Original Article

Effects of Myofascial Release versus Pelvic Floor Muscle Exercises in Women with Primary Dysmenorrhea

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ABSTRACT

Primary dysmenorrhea is also associated with significantly high economic burdens due to absenteeism, and 2-to-3-fold increased healthcare costs. **Objective:** To determine the effects of myofascial release versus pelvic floor muscle exercises in women with primary dysmenorrhea**. Methods:** The study design was Randomized Clinical Trial. The study was conducted at Gynae Department of Hamza Hospital Lahore and completed ten months after the approval of synopsis. Sample size is 22, calculated by Epitool. Nonprobability convenient sampling technique was used. Females with 17-30 years of age and who fulfilled five criteria to be considered for primary dysmenorrhea were included in the study. Visual Analogue Scale (VAS) and working ability, location, intensity, days of pain, dysmenorrhea (WaLIDD) Score was used as a tool. **Results:** Twenty-four participants with mean age of the participants was 21 ± 2.75 years while Body Mass Index (BMI) of participants was 26.23 ± 1.631. Normality of data was checked by *Shapiro wilk test* that showed that data was normally distributed with *p value ≤ 0.05. Parametric test, paired sample t test and an independent samples t-test* was conducted to compare the effects of Myofascial release and Pelvic floor muscle exercises group in between and within group. Total score of VAS and WaLIDD was measured before and after 12 weeks of intervention in between two groups. The mean difference was 5.82 in Myofascial release group and 4.3 in Pelvic floor muscle exercises group. Although there was a significant reduction in WaLIDD score in both groups after treatment, but the myofascial release group was superior to pelvic floor exercise group**. Conclusions:** It was concluded that myofascial release and Pelvic floor muscle exercises are effective for treatment for primary dysmenorrhea, but Myofascial release has greater effects on relieving primary dysmenorrhea Symptoms than the pelvic floor muscle Exercises after the treatment sessions.

INTRODUCTION

Dysmenorrhea is a disorder related to menstruation defined by the "presence of painful abdominal cramps originating from uterus and occur during menstrual cycle or menstruation. Dysmenorrhea is the most common cause of pelvic pain . Dysmenorrhea is classified into 2 types based on its pathophysiology i.e., Primary dysmenorrhea (PD) and secondary dysmenorrhea (SD). PD is menstrual pain that is due to normal ovulatory cycles, without any pelvic pathology, in young girls and is physiological in etiology . PD is most common in teenage and young girls [5]. While SD is pelvic pain due to menstrual cycle but associated with an organic identifiable cause or disease e.g. endometriosis, fibroids, pelvic adhesions, Adenomyosis, endometrial polyps, pelvic inflammatory disease and intrauterine contraceptive device. There are different treatment approaches of PD. There is a strong

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need for highlighting all available alternative methods of conservative approaches of treatment of PD as a non-invasive and non-pharmacological, easy & safe to use to relief from dysmenorrhea. They are acupuncture, yoga, Pilates , acupressure, biofeedback, transcutaneous electrical nerve stimulation, heat therapy , different types of therapeutic exercises and relaxation techniques. Exercises includes isometrics, stretching, strengthening, core stability and progressive resistance training. Literature also identifies the need of educating on self-care for management of menstrual pain . The positive effects of doing Pelvic floor muscle exercises, aerobic exercises, Pulsed Electromagnetic Field, Zumba exercises, and Resistance training, isometrics exercises, functional exercises, core strengthening exercises and Pilates have been observed in literature. Myofascial trigger points /MTrPs are tender points or tight bands in the pelvic areas are hard, hyperirritable that are palpable and tender on touch and compression, that can elicit referred distant pain . The mechanism is not clear, and one theory recommends that it can be caused by an irregular release of acetylcholine due to damage of motor endplate within muscle fiber, resulting in a sustained contractions of muscle leads to the development of MTrPs. Myofascial trigger points can cause allodynia and hyperalgesia via central sensitization. Myofascial release techniques consist of manual physical therapy with the aim of relieving muscular tension and associated pain by eliminating Myofascial trigger points, by the physiotherapist . Self myofascial release /SMFR is a comparatively a new technique of soft tissue mobilization. SMFR is a self-massage with the help of special tools, like foam rollers, trigger point wands, therapeutic balls, dilators and even the hands or fingers can also be used for Myofascial trigger points pressure release. The objective of the present study was to determine the effects of myofascial release versus pelvic floor muscle exercises in women with primary dysmenorrhea.

METHODS

The design of current study was Randomized Clinical Trial**.** The current study was conducted at Hamza Hospital Lahore. This study was completed in six months. Non-probability convenient sampling technique was used for this study after applying inclusion and exclusion criteria. The data collection tool used in this study was VAS Scale and WaLIDD Score. The VAS[1] is a validated and subjective tool to measure acute & chronic pain. Scores are documented by making a mark on 10 cm line. 10 cm line characterizes pain intensity from 0 "no pain" to 10 means "worst pain" [18]. WaLIDD Score is used to determine the diagnostic criteria for women with PD and predict their medical leave. It has 4 characteristic division in which we measure pain, Working ability, location/ sites of pain, days of pain. WaLIDD Score is abbreviated as working ability, location of pain, intensity of pain, days of pain, Scoring includes 0 means without dysmenorrhea, 1–4 score means mild dysmenorrhea, 5–7 total scores moderate dysmenorrhea, 8–12 score means severe dysmenorrhea [19]. Treatment was performed during one cycle, which was started at the third or fourth day of menstruation and continued till the onset of next menstruation. Assessments were performed before treatment (first menstruation), then after (third menstruation)[20].

Both interventional group: (Received 3 sessions/week for 12 weeks and each session included)

- Warm up (10 minutes)
- Stretching (10 minutes)

Data including demographics (age, body mass index), menstrual cycle (age at menarche, menstrual cycle duration), and menstrual pain characteristics (intensity and duration of pain, type and number of analgesics) were recorded[20].

Group A: Group A was received myofascial release (Traverses abdominis sacral, lumbar, last thoracic vertebrae-T12, and subcostal)

Myofascial release through myofascial relaxation technique 3 times a week for 12 weeks[14].

Group B: Pelvic floor exercises (Kegel, bridging, hold relax) each with 10 – 15 repetitions 3 times a week.

The data analysis was done by using SPSS version 25 for Windows software. Statistical significance was $p \leq 0.05$. Different tests were applied to analyze the collected data.

RESULTS

Twenty-two participants were included in this study. The mean age of the participants was 21± 2.75 years. There was mean BMI of participants was 26.23± 1.631. The mean length of cycle was 26.55± 3.30 days. Minimum or short cycle reported was 22 days and maximum length of cycle was 32 days. This mean age of menarche of participants that were included in this study was 11.23± .869 years (Figure 1). Only 4 girls were of 10 years old when they started to menstruate. Majority (50%) of participants were having 11 years of age when they experienced their 1st menstrual cycle. 5 girls started at 12 and only 2 out of 22 girls started their menstruation at age 13. Sixty eight percent (68 %) of females was having regular menstrual cycle and 32 % females having irregular cycle with primary dysmenorrhea. Means length of cycle was 26.55±3.30 days. Minimum or short cycle reported was 22 days and maximum length of cycle was 32 days.

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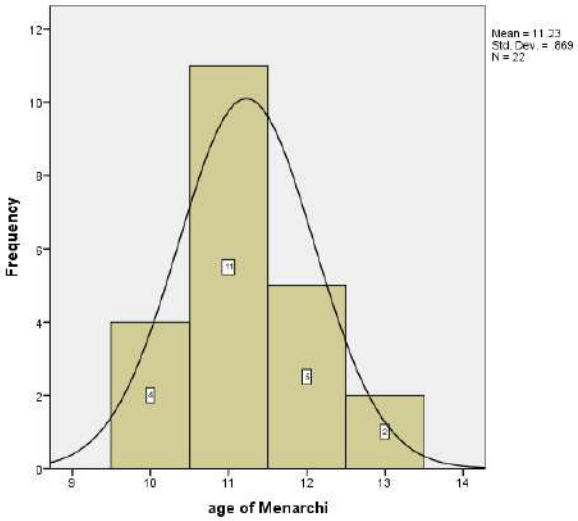

Figure 1: Histogram of Age at onset of menstruation / Menarche

Normality of data was checked by Shapiro wilk test that showed that data was normally distributed with p value ≤ 0.05. Total score of VAS and WaLIDD was measured before and after 12 weeks of intervention in between 2 groups. P value within groups pre and post intervention is significant for both groups(≤0.001)for VAS and WaLIDD scale(Table 1).

Test of Normality			
Shapiro-Wilk Test	**Statistic**	**df**	**Sig.**
Total VAS Score baseline	0.938	30	0.082
Total Walidd score baseline	0.876	30	0.079

Table 1: Shapiro-Wilk Test

The total VAS score of group 1 who performed myofascial release was (6.67± 1.07) at baseline and (2.80± 0.71) with significant mean difference of 3.87 and in group 2 i.e. pelvic floor muscle exercises VAS score was (6.30± 1.06) at baseline and (3.43± 0.63) after intervention with mean difference of 2.87 (Table 2). There was significant difference in both groups before and after treatment in VAS score, but difference was greater in group 1 that was with Myofascial release(Table 2).

VAS [2]	Before intervention	After intervention	Mean Diff	*p value*
Myofascial release	6.67± 1.07	2.80± 0.71	3.87	0.001
Pelvic floor muscle exercises	6.30± 1.06	3.43± 0.63	2.87	0.001

Table 2: Independent sample T test between group comparisons of VAS

That WaLIDD score before intervention in Myofascial release group was 9.65 ± 2.12 and in Pelvic floor muscle exercises group was 9.80 ± 1.90. After 12 weeks of intervention the total WaLIDD score reduced to 3.83± 1.02 in Myofascial release group and 5.50 ± 1.30 in Pelvic floor muscle exercises group(Table 3). The mean difference was 5.82 in Myofascial release group and 4.3 in Pelvic floor muscle exercises group. Although there was a significant reduction in WaLIDD score in both groups after treatment, but the myofascial release group was superior to pelvic floor exercise group(Table 3).

WaLIDD score	Before intervention	After intervention	Mean Diff	*p value*
Myofascial release	9.65± 2.12	3.83± 1.02	5.82	0.001
Pelvic floor muscle exercises	9.80±1.90	5.50±1.30	4.3	0.001

Table 3: Between Group comparison of WaLIDD score (Independent sample t test)

Table 4 showed that the total VAS score of groups 1 who performed myofascial release was 6.67 ± 1.07 at baseline and 2.80 ± 0.71 with significant mean difference of 3.87 pre and post value. Table 4 also showed paired sample t test that the total Baseline VAS in Pelvic floor exercises group was 6.30 ± 1.06 and Post treatment VAS in Pelvic floor exercises group was 3.43 ± 0.63 with significant mean difference of 2.87 pre and post value. p value was significant > 0.05 for Pelvic floor exercises group.

VAS Score in Myofascial release group before and after interventions					
Variables	**Mean ± SD**	**Df**	***t-value***	**Mean Diff**	***p value***
Baseline VAS in Myofascial release group	6.67± 1.07	10	21.466	3.87	.001
Post treatment VAS in Myofascial release group	2.80± 0.71				
Baseline VAS in Pelvic floor exercises group	6.30± 1.06	10	10.750	2.87	.001
Post treatment VAS in Pelvic floor exercises group	3.43± 0.63				
VAS Score in Pelvic floor exercises group before and after interventions					
Baseline VAS in Pelvic floor exercises group	6.30± 1.06	10	10.750	2.87	.001
Post treatment VAS in Pelvic floor exercises group	3.43± 0.63				

Table 4: VAS Score in Myofascial release and pelvic floor exercises group before and after interventions

Table 5 showed paired sample t test for WaLIDD score in group 1 i.e., Myofascial release group. Table showed that the floor exercises total Baseline VAS in Pelvic group was 6.30 ± 1.06 and Post treatment VAS in Pelvic floor exercises group was 3.43 ± 0.63 with significant mean difference of 2.87 pre and post value. p value was significant > 0.05 for Pelvic floor exercises group. The table 5 also showed that baseline WaLIDD score in Pelvic floor exercises group was 9.80 ± 1.90 and Post treatment WaLIDD score in Pelvic floor exercises group was 5.50 ± 1.30 with significant mean difference of 4.3 and p value also significant in this group less than 0.05.

WaLIDD score in Myofascial release group before and after interventions					
Variables	**Mean ± SD**	**Df**	**t-value**	**Mean Diff**	***p value***
Baseline WaLIDD score in Myofascial release group	9.65± 2.12	10	23.106	5.82	.001
Post treatment WaLIDD score in Myofascial release group	3.83± 1.02				
WaLIDD score in Pelvic floor exercises group before and after interventions					
Baseline WaLIDD score in Pelvic floor exercises group	9.80± 1.90	10	16.323	4.3	.001
Post treatment WaLIDD score in Pelvic floor exercises group	5.50± 1.30				

Table 5: WaLIDD score in Myofascial release and Pelvic floor exercises group before and after interventions

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DISCUSSION

The main aim of the study was to compare the effects of myofascial release versus pelvic floor muscle exercises in women with primary dysmenorrhea. The results of current study showed that myofascial release and Pelvic floor muscle exercises are effective for treatment for PD, but Myofascial release *(p ≤0.001)* has greater effects on relieving PD Symptoms than the pelvic floor muscle Exercises after the treatment sessions. There was a significant Mean difference in the WaLIDD score for Myofascial release group (5.82) and Pelvic floor muscle exercises group (4.3) after treatment. *p value* is significant for both group but there was greater difference with Myofascial release than PFME group. Similarly different studies from previous literature showed Myofascial release is very effective for PD a similar study was done by Jingyun Xu *et al.,* that adding myofascial release *(p ≤ 0.01)* with biofeedback & electrical stimulation showed superior outcomes when compared with those biofeedback & electrical stimulation alone in women with Myofascial Pelvic Pain [21]. In contrast to our result, several studies found from literature in which other exercises or techniques proved to more effective technique than any other in improving the PD. For example, in 2021, Çelik and Apay research results showed that progressive relaxation exercises proved as an effective method for treatment of PD if these exercises performed on a regular basis. Çelik and Apay's study compared to this study shares the same *p value (p ≤ 0.001)* as both are significantly effective [4]. In contrast to our result, several studies found from literature in which exercises other than myofascial release proved to more effective technique in improving the PD. For example treadmill based aerobics Exercises have significant effects on pain, functional activates and quality of life in PD[22]. In the research conducted by , S Zainab *et al.,* core strengthening exercises showed significant effects in phase I and II but in Phase I doing core strengthening was most effective [23]. Elbandrawy AM, showed that Regular isometric and aerobic exercises with p value <0.001 are safe effective, and non-invasive treatment modality to reduce menstrual pain and improve menstrual symptoms. Author said that females having PD can do these exercises at every place that even do not need any cost. In current study these exercises including Pelvic Floor Strengthening Exercises *(p≤0.001)* are also effective in pain reduction caused by PD by strengthening the Pelvic Floor muscles [20]. N Ayubi said that regular aerobic exercise showed significant good results with *p value* to reduce symptoms related to PD / PD due to increased levels of hormone progesterone. While Omega 3 supplementation also showed significant improvements in PD by inhibiting prostaglandin production that are responsible for pain and uterine contractions in PD. Author said that both Aerobic exercise & omega 3 supplementation are effective methods to reduce pain in PD[24].

In contrast to our result, several studies found from literature in which other exercises or techniques proved to more effective technique than any other in improving the PD. For example, Berkiye Kirmizigil said that the functional exercises therapy proved an effective treatment option to reduce menstrual symptoms in PD [25]. G Tharani found that aerobic dance showed an effective option to reduce the pain and menstrual symptoms of PD and also helps to manage stress associated with menstrual cycle. Therefore, aerobic dance may be incorporated in treatment regimen as one of the conservative and non-pharmacological method to treat women with PD [17]. Resistance training proved a practical method to reduce symptoms associated with PD [26] while in current study myofascial release has greater effects on relieving PD Symptoms than the pelvic floor muscle Exercises after the treatment sessions. In contrast to our result, several studies found from literature in which other exercises or techniques proved to more effective technique than any other in improving the PD. For example, Samy A said that Zumba exercises are effective method to reduce the pain severity and duration thus suggesting that performing regular Zumba exercises might be a complementary treatment option for girls with PD [27]. Kirmizigil B said that a combined exercise therapy have a significant positive effects on pain, sleep quality in women with PD. The relieving effects of combined exercises on PD symptoms, severity of pain, sleep quality may be detected even starting from the 1st cycle. Author also said that combined exercises have moderate & large effect sizes on severity of pain, menstrual symptoms & sleep quality in women in clinical terms [25]. Although a very large number of studies found from previous literature for PD but studies assessing the effectiveness of myofascial release on PD are very few. The main aim of the study was to compare the effects of myofascial release versus pelvic floor muscle exercises in women with PD. The results of current study showed that myofascial release and Pelvic floor muscle exercises are effective for treatment for PD, but Myofascial release has greater effects on relieving PD Symptoms than the pelvic floor muscle.

CONCLUSION

It was concluded that myofascial release and Pelvic floor muscle exercises were effective for treatment for primary dysmenorrhea, but Myofascial release has greater effects on relieving primary dysmenorrhea Symptoms than the

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pelvic floor muscle Exercises after the treatment sessions.

REFERENCES

[1] Ortiz MI, Cortés-Márquez SK, Romero-Quezada LC, Murguía-Cánovas G, Jaramillo-Díaz AP. Effect of a physiotherapy program in women with primary dysmenorrhea. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2015 Nov 1;194:24-9. doi.org/10.1016/j.ejogrb.2015.08.008.

[2] Armour M, Parry K, Manohar N, Holmes K, Ferfolja T, Curry C et al. The prevalence and academic impact of dysmenorrhea in 21,573 young women: a systematic review and meta-analysis. Journal of women's health. 2019 Aug 1;28(8):1161-71. doi.org/10.1089/jwh.2018.7615.

[3] Bernardi M, Lazzeri L, Perelli F, Reis FM, Petraglia F. Dysmenorrhea and related disorders. F1000Res. 2017 Sep 5;6:1645. doi: 10.12688/f1000research.11682.1.

[4] Çelik AS, Apay SE. Effect of progressive relaxation exercises on primary dysmenorrhea in Turkish students: A randomized prospective controlled trial. Complementary Therapies in Clinical Practice. 2021 Feb 1;42:101280. doi.org/10.1016/j.ctcp.2020.101280.

[5] Ramos-Pichardo JD, Ortega-Galán ÁM, Iglesias-López MT, Abreu-Sánchez A, Fernández-Martínez E. Why do some Spanish nursing students with menstrual pain fail to consult healthcare professionals?. International Journal of Environmental Research and Public Health. 2020 Jan;17(21):8173. doi.org/10.3390/ijerph17218173.

[6] Doğan H, Eroğlu S, Akbayrak T. The effect of kinesio taping and lifestyle changes on pain, body awareness and quality of life in primary dysmenorrhea. Complementary therapies in clinical practice. 2020 May 1;39:101120. doi.org/10.1016/j.ctcp.2020.101120.

[7] Ryan SA. The treatment of dysmenorrhea. Pediatric Clinics. 2017 Apr 1;64(2):331-42.

[8] Boguszewski D, Borowska J, Szymańska A, Adamczyk JG, Lewandowska M, Białoszewski D. Effectiveness of kinesiotaping for the treatment of menstrual pain. Physiotherapy Quarterly. 2020;28(4):20-4. doi.org/10.5114/pq.2020.96230.

[9] Parra-Fernández ML, Onieva-Zafra MD, Abreu-Sánchez A, Ramos-Pichardo JD, Iglesias-López MT, Fernández-Martínez E. Management of primary dysmenorrhea among university students in the South of Spain and family influence. International journal of environmental research and public health. 2020 Jan;17(15):5570.doi.org/10.3390/ijerph17155570

[10] Fernández-Martínez E, Onieva-Zafra MD, Parra-Fernández ML. The impact of dysmenorrhea on quality of life among Spanish female university students. International journal of environmental research and public health. 2019 Jan;16(5):713. doi.org/10.3390/ijerph16050713.

[11] Carroquino-Garcia P, Jiménez-Rejano JJ, Medrano-Sanchez E, de la Casa-Almeida M, Diaz-Mohedo E, Suarez-Serrano C. Therapeutic Exercise in the Treatment of Primary Dysmenorrhea: A Systematic Review and Meta-Analysis. Phys Ther. 2019 Oct 28;99(10):1371-1380. doi: 10.1093/ptj/pzz101.

[12] Kim SD. Yoga for menstrual pain in primary dysmenorrhea: A meta-analysis of randomized controlled trials. Complementary therapies in clinical practice. 2019 Aug 1;36:94-9. doi.org/10.1016/j.ctcp.2019.06.006.

[13] Arik MI, Kiloatar H, Aslan B, Icelli M. The effect of tens for pain relief in women with primary dysmenorrhea: A systematic review and meta-analysis. Explore. 2022 Jan 1;18(1):108-13. doi.org/10.1016/j.explore.2020.08.005.

[14] Sharghi M, Mansurkhani SM, Larky DA, Kooti W, Niksefat M, Firoozbakht M et al. An update and systematic review on the treatment of primary dysmenorrhea. JBRA Assist Reprod. 2019 Jan 31;23(1):51-57. doi: 10.5935/1518-0557.20180083.

[15] Yonglitthipagon P, Muansiangsai S, Wongkhumngern W, Donpunha W, Chanavirut R, Siritaratiwat W et al. Effect of yoga on the menstrual pain, physical fitness, and quality of life of young women with primary dysmenorrhea. Journal of bodywork and movement therapies. 2017 Oct 1;21(4):840-6. doi.org/10.1016/j.jbmt.2017.01.014.

[16] Xu J, Chen K, Ding B, Zhu M, Yao S, Ren M et al. Effectiveness of self-myofascial release combined with biofeedback and electrical stimulation for the management of myofascial pelvic pain: A randomized controlled trial. European Journal of Pain. 2022 Feb 1. doi.org/10.1002/ejp.1867.

[17] Tharani G, Dharshini E, Rajalaxmi V, Kamatchi K, Vaishnavi G. To compare the effects of stretching exercise versus aerobic dance in primary dysmenorrhea among collegiates. Drug Invention Today. 2018 Sep 2;10(Special Issue 1):2844-8.

[18] Dehnavi ZM, Jafarnejad F, Kamali Z. The Effect of aerobic exercise on primary dysmenorrhea: A clinical trial study. J Educ Health Promot. 2018 Jan 10;7:3. doi: 10.4103/jehp.jehp_79_17.

[19] Celenay ST, Kavalci B, Karakus A, Alkan A. Effects of kinesio tape application on pain, anxiety, and menstrual complaints in women with primary dysmenorrhea: A randomized sham-controlled trial.

DOI:https://doi.org/10.54393/pbmj.v5i5.471

Complementary therapies in clinical practice. 2020 May 1;39:101148. doi.org/10.1016/j.ctcp.2020.101148.

[20] Elbandrawy AM, Elhakk SM. Comparison between the effects of aerobic and isometric exercises on primary dysmenorrhea. Acta Gymnica. 2021 Jul 28. doi.org/10.5507/ag.2021.014.

[21] Xu J, Chen K, Ding B, Zhu M, Yao S, Ren M et al. Effectiveness of self-myofascial release combined with biofeedback and electrical stimulation for the management of myofascial pelvic pain: A randomized controlled trial. European Journal of Pain. 2022 Feb 1. doi.org/10.1002/ejp.1867.

[22] Kannan P, Chapple CM, Miller D, Claydon-Mueller L, Baxter GD. Effectiveness of a treadmill-based aerobic exercise intervention on pain, daily functioning, and quality of life in women with primary dysmenorrhea: A randomized controlled trial. Contemp Clin Trials. 2019 Jun;81:80-86. doi: 10.1016/j.cct.2019.05.004.

[23] Zainab S, Nithyashree P, Jumanah R, Kamalakannan M, Prathap S, Kumaresan A. A study to compare the effectiveness of core strengthening exercises for phase I and phase II of menstrual cycle in primary dysmenorrhea subjects. Biomedicine. 2021 Jul 7;41(2):315-7. doi.org/10.51248/.v41i2.804.

[24] Ayubi N, Sastika Putri DR. Aerobic Exercise and Omega 3 Supplementation to Reduce Primary Dysmenorrhea (Literature Review). Indian Journal of Forensic Medicine & Toxicology. 2021 Jul 1;15(3).

[25] Kirmizigil B, Demiralp C. Effectiveness of functional exercises on pain and sleep quality in patients with primary dysmenorrhea: a randomized clinical trial. Archives of gynecology and obstetrics. 2020 Jul;302(1):153-63. doi.org/10.1007/s00404-020-05579-2.

[26] Moradpour R. Resistance training improves primary dysmenorrhea symptoms in young girls: A randomized controlled trial. Journal of Physical Activity and Hormones. 2019 Sep 1;3(3):35-48.

[27] Samy A, Zaki SS, Metwally AA, Mahmoud DS, Elzahaby IM, Amin AH et al. The effect of Zumba exercise on reducing menstrual pain in young women with primary dysmenorrhea: a randomized controlled trial. Journal of pediatric and adolescent gynecology. 2019 Oct 1;32(5):541-5. doi.org/10.1016/j.jpag.2019.06.001

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Original Article

The Economic Burden of Viral hepatitis C Infection at Various Stages of the Disease in District Mardan, Pakistan

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ABSTRACT

Hepatitis C is a blood-borne, infectious disease caused by the Hepatitis C virus (HCV). It attacks hepatic cells, causing infection and inflammation in the liver, eventually leading to cirrhosis and hepatocellular cancer (HCC). Globally, around 200M people carry HCV with mortality rate of 350,000 due to chronic complications of the liver triggered by HCV. **Objective:** To assess the overall annual cost borne by chronic HCV patients at various stages of the disease in District Mardan, Pakistan. **Methods:** Out of total 160 patients, 135, 19 and 6 patients had Non-cirrhotic, compensated cirrhosis, decompensated cirrhosis and other complications respectively, Data were obtained from these identified patients trough well designed questions based on their social and economic burden in 2019. Descriptive and inferential statistical techniques were applied to estimate the direct and indirect medical costs of HCV in District Mardan. **Results:** This research discovered a significant link between direct and indirect costs and various phases of viral hepatitis C. The per patient annual indirect costs non-medical costs at different stage of HCV infection was found Rs. 10000 (66.57 $), Rs. 25700 (171.10 $) and Rs. 83200 (553.92 $) for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis patients where non-medical costs were estimated Rs. 2000 (13.31 $), Rs. 3235 (66.57 $), and Rs. 7540 (50.19 $), for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis patients and their average were estimated as Rs.51533 (343.09 $), and 4258.33 (28.35. whereas The estimated per patient direct cost for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis are Rs.51060 (339.94 $), 108650 (723.36 $) and 224370 (1493.80 $). **Conclusions:** It was concluded that indirect medical costs grew up with the progression of disease as productivity loss due to absenteism increases and traveling expenses increases with increased in number of hospital visits.

INTRODUCTION

Hepatitis C is a blood-borne infection caused by the Hepatitis C virus (HCV). It attacks hepatic cells, causing infection and inflammation in the liver, eventually leading to cirrhosis and hepatocellular cancer (HCC). Globally, around 200M people carry HCV with mortality rate of 350,000 due to chronic complications of the liver triggered by HCV [1,2]. The chronic infections including HCC depends upon the type of strain of HCV, environmental factors, host's age, gender, viral load and alcohol consumption. HCV belongs to Hepacivirus genus of Flaviviradae family. It consists of 9.6k genome packed in positive sense single stranded RNA, encoded a single polypeptide. The error prone RNA-dependent-RNA polymerase makes it severe heterogenic and cause approximately 10-2 mutations per nucleotide yearly [3,5]. On the basis of phylogenetic data, it has 7 main genotypes; that are further classified into 67 subtypes (recognized) and 20 subtypes (provincial). Worldwide, the prevalence of genotype 1 is (46%) and genotype is (30%), contributing the thick amount of HCV triggered liver diseases. Europe see the prevalence of genotype 1, 2 and 3, South Asia genotype 3 (70%), East Asia genotype 2 and 6, Middle East (Arab) genotype 1 and 4, (non Arab-countries) genotype 1, Southern and Eastern Africa genotype 5 [4]. One in every 20 individuals is infected by HCV in Pakistan securing the second largest infected population globally followed by Egypt. In Pakistan, genotype 3a is more prevalent, regionally genotype 3a and 3b holds most percentage in Sindh, Punjab and Khyber Pakhtunkhwa (KPK), followed by 1a and 2a in Baluchistan [7,8,11]. Apparently, the uncontrolled spread of HCV is through

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healthcare products, non-sterilized medical equipment, contamination with blood, shared synergies for intravenous drugs etc. The high morbidity and mortality rate caused by HCV effects the socio-economic growth of the country which will evidently increase in the next decade especially in Pakistan [7,8]. In this study, we aim to estimate the direct and indirect cost of HCV in the District Mardan in the province of KPK, Pakistan with a disease prevalence of 6.6 % approximately. By considering the increasing prevalence of HCV related disease burden in Pakistan a comprehensive economic analysis was important to carry out.

METHODS

This is an analytical, descriptive and cross-sectional study, conducted in 2019 on HCV infected patients with liver conditions such as; inflammation, liver cirrhosis and HCC, referred to the District Headquarter (DHQ) Hospital, Mardan and Billand Welfare Hospital Mardan, KPK. Table 1 indicated that Out of 1000, total of 160 patients were randomly selected and determined statistically on the basis of pilot sampling by using a standard questionnaire. There were 76 females (47.5%) and 84 (52.5%). Among them, 84.4 % were having non-cirrhotic liver, 11.9 % compensated cirrhotic, 3.75% decompensated cirrhotic. Patient's records and their billing details were used as a data source and standard questionnaire were designed accordingly. The inclusion criteria was; HCV positive, inflamed liver, HCC and liver cirrhosis.

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Non-cirrhotic	135	84.38	84.38	84.38
compensated cirrhosis	19	11.9	11.9	96.25
decompensated cirrhosis	6	3.75	3.75	100.00
Total	160	100.0	100.0	

Table 1: Staging of Liver Disease

Socioeconomic Burden Calculations

The socioeconomic burden of HCV in Pakistan has major differences with respect to the other countries of the world as per cost estimation of HCV infections in Pakistan.

The analysis of HCV infection sequel was done by following two steps.

A. Estimated Direct Cost of the Patients (medical cost and non-medical cost)[16,20]
B. Estimated Indirect Cost of the Patients (during the course of 12 months)[16,17,20]

Measurement of Direct Economic Cost

Medical records of the patients from January 15st to December 30th, 2019 were used by using specialist and patient's view point. Patients were placed in one group as the large percentage of non-cirrhotic patients in our data base were present as mentioned in table 1. The direct medical cost includes (inpatient and outpatient cost, cost of drugs purchased, and medical procedures). The annual medical cost of the patients was determined by using the following formula.

. DMC=AOE+AIE+AESM[14,15,16]

Where,

. AOE is (annual outpatient expenditure per patient)
. AIE is (annual inpatient expenditure per patient)

Here, AOE and AIE were collected as follows:

. Average outpatient expense at a visit × average rate of outpatient visit in three months × 4
. Average inpatient expense at a visit at certain hospital × proportion of inpatients at certain hospital × annual rate of hospital per patient

Measurement of Direct (non-medical) Cost

Self-reports of the patients were used to estimate the non-medical cost. As most of the patients being treated in before mentioned health care centers were living in the outskirts of Mardan and the travel cost, travel time and number of visits were considered the crucial items to add. Yearly average amount of direct non-medical cost could be calculated by using mean of the monthly cost consumption [16,18-20].

Measurement of Indirect Cost

Human capital approach was used to measure indirect cost; this technique measures the increase in productivity by improving health (decrease in the number of absentees from work, number of working hours on daily basis, and life expectancy). However, data was collected by repeated telephonic and one-to-one interviews with the patient referred to the health care centers as mentioned above. The income of the unemployed patients before the treatment and the dependent house wives were considered zero in the study.

Statistical Analysis

For descriptive analysis SPSS software (version 24) were used. Data was presented in the form of percentages, mean and range calculations, whereas, all costs were calculated on the basis of purchasing power parity PPP in USD.

RESULTS

The data included on the standard questionnaire includes the inpatient and outpatient services, their socio-economic status (age, sex, marital status, occupation, number of family members, insurance status, their disease status (liver stages, symptoms, elapsed time of diagnosis, followed up results, their medical expenses (number of physician visits, levels of facilities used, types of checkups, prescribed medicines etc.). Age of the patient ranged from 5-60 years (Table 2).

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Valid	Frequency	Percent	Valid Percent	Cumulative Percent
5-18 Years	13	8.1	8.1	8.1
19-32 Years	57	35.6	35.6	43.8
33-46 Years	45	28.1	28.1	71.9
47-60 Years	38	23.8	23.8	95.6
>60 Years	7	4.4	4.4	100.0
Total	160	100.0	100.0	

Table 2: Age of the Patient

The estimated per patient indirect costs and non-medical costs at different stage of the HCV is shown in Table 3 for the period 2019 at District Mardan. The per patient annual indirect costs non-medical costs at different stage of HCV infection was found Rs. 10000 (66.57 $), Rs. 25700 (171.10 $) and Rs. 83200 (553.92 $) for non- cirrhotic, compensated cirrhosis and decompensated cirrhosis patients where non-medical costs were estimated Rs. 2000 (13.31 $), Rs. 3235 (66.57 $), and Rs. 7540 (50.19 $), for non- cirrhotic, compensated cirrhosis and decompensated cirrhosis patients and their average were estimated as Rs.51533 (343.09 $), and 4258.33 (28.35 (one dollar is equal to 150.20 Rupees Average dollar to PKR exchange rate 2019)(Table 3).

Stage of the disease	Indirect cost Rs	Non-medical cost Rs
Non-cirrhotic	10000(8.41%)	2000(15.65%)
compensated cirrhosis	25700(21.65%)	3235(25.32%)
decompensated cirrhosis	83200(69.97%)	7540(59.02%)
Total	118900(100.00%)	12775(100.00%)
Average	51533.33	4258.33

Table 3: Estimated average per year indirect medical cost and non-medical costs at different stage of viral Hepatitis C disease in district Mardan in 2019

Figure 4 illustrate the estimated annual direct medical costs of HCV infection at different stages of disease. The estimated per patient direct cost for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis are Rs.51060 (339.94 $), 108650 (723.36 $) and 224370(1493.80 $).

Stage of the disease	Visit costs Rs	Diagnostic costs Rs	Drug costs Rs	Other medical procedures Rs	Total direct cost Rs.
Non-cirrhotic	8000 (15.66%)	21280 (41.67%)	18920 (37.05%)	2860 (5.61%)	2860 (5.61%)
compensated cirrhosis	15000 (13.81%)	31550 (25.32%)	51600 (29.05%)	10500 (9.66%)	10500 (9.66%)
decompensated cirrhosis	26600 (11.83%)	52890 (23.53%)	120640 (53.68%)	24600 (10.94%)	24600 (10.94%)
Total	49600	105720	191160	37960	37960

Table 4: Estimated average per year direct medical cost at different stage of viral Hepatitis C disease in district Mardan in 2019

In table 5 shows the total economic burden of HCV associated to per patient at different stage of the disease in District Mardan during 2019. Total economic burden of HCV infection was estimated to be RS.63060 (419.84 $), Rs. 137585 (916.01 $), and Rs 315470 (2100.33 $) for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis.

	Non-cirrhotic	compensated cirrhosis	decompensated cirrhosis	Total direct cost Rs.
Direct medical costs Rs	51060 (80.97%)	108650 (78.96%)	224730 (71.23%)	384440
Direct non-medical costs	2000 (3.18%)	3235 (2.51%)	7540 (2.39%)	12775
Rsln direct Costs Rs	10000 (15.85%)	25700 (18.54%)	83200 (26.38%)	118900
Total	63060 (100%)	137585 (100%)	315470 (100%)	516900

Table 5: Estimated economic burden of chronic Hepatitis C infection

DISCUSSION

The current study was the first study conducted to estimate direct and indirect costs associated to HCV at various stages of the disease. It measured direct medical cost in term of diagnostic expenses incurred during one year, medicine expenses and doctors clinic fee whereas indirect costs were estimated in term of productivity loss, traveling expenses, productivity loss of the attendant and special diet expenses. The direct medical cost of total 160 patients, 135, 19, and 6 patients had non-cirrhotic, compensated cirrhosis and decompensated cirrhosis, respectively with a mean (± SD) age of 32 (± 2.1) years (range 5-to 75 years). We found significant direct relationship between total direct annual medical cost and disease stage. Higher direct medical costs were found with advanced disease and vice versa. In the initial stage of the disease most of the direct medical costs were associated with diagnostic charges and medical services whereas the decompensated cirrhosis stage a large portion of direct medical costs were related to hospital admission and medication. Figure 2 illustrate the estimated annual direct medical costs of HCV infection at different stages of disease. The estimated per patient direct cost for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis are Rs.51060 (339.94 $), 108650 (723.36 $) and 224370(1493.80 $). In figure 3 shows the total economic burden of HCV associated to per patient at different stage of the disease in district Mardan during 2019. Total economic burden of HCV infection was estimated to be RS.63060 (419.84 $), Rs. 137585 (916.01 $), and Rs 315470 (2100.33 $) for non-cirrhotic, compensated cirrhosis and decompensated cirrhosis. This study also found indirect correlation between patient age and direct medical costs whereas direct correlation indirect costs. The correlation among sex and direct costs were found direct and significant (higher direct costs were found in women than men) whereas Indirect costs were found significantly higher in men than women because most of the women were housewives and not paid worker whereas men were

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found to be employed or engaged in some type of paid work.

CONCLUSIONS

We found significant economic burden of HCV infection at different stages of the disease. At the first stage of the diseases relatively low direct and indirect costs were found as compared to second and third stage. At the first stage direct costs were concluded higher and estimated 80.97 % of the total cost as compared to 78.96% and 71.23% in second and third stage where as indirect cost where higher in third and second stage 26.38% and 18.54% as compared to 15.85% at first stage and concluded that indirect medical costs grew up with the progression of disease as productivity loss due to absenteeism increases and traveling expenses increases with increased in number of hospital visits.

REFERENCES

[1] Brown RS Jr, Gaglio PJ. Scope of worldwide hepatitis C problem. Liver Transpl. 2003 Nov;9(11):S10-3. doi: 10.1053/jlts.2003.50244.

[2] Alavian SM. We need a new national approach to control hepatitis C: It is becoming too late. Hepat Mon. 2008;8(3):165–9.

[3] Malekzadeh R, Khatibian M, Rezvan H. Viral hepatitis in the world and Iran. Sci J Med Council Islam Republic Iran. 1997;15:183–200.

[4] World Health Organization. World health statistics 2018: monitoring health for the SDGs, sustainable development goals. World Health Organization; 2018 Jun 28.

[5] Regev A, Schiff ER. Clinical features of hepatitis. Viral Hepatitis. 3rd ed. Malden, MA: Blackwell Publishing. 2005 Jul 12:32-49.

[6] Kalboussi H, Kacem I, Aroui H, El Maalel O, Maoua M, Brahem A et al. Impact of Allergic Contact Dermatitis on the Quality of Life and Work Productivity. Dermatol Res Pract. 2019 Mar 3;2019:3797536. doi: 10.1155/2019/3797536.

[7] Kleinman NL, Cifaldi MA, Smeeding JE, Shaw JW, Brook RA. Annual incremental health benefit costs and absenteeism among employees with and without rheumatoid arthritis. J Occup Environ Med. 2013 Mar;55(3):240-4. doi: 10.1097/JOM.0b013e318282d310.

[8] Younossi ZM, Birerdinc A, Henry L. Hepatitis C infection: A multi-faceted systemic disease with clinical, patient reported and economic consequences. J Hepatol. 2016 Oct;65(1 Suppl):S109-S119. doi: 10.1016/j.jhep.2016.07.005.

[9] Younossi ZM, Stepanova M, Younossi I, Papatheodoridis G, Janssen HLA, Agarwal K et al. Patient-reported outcomes in patients chronic viral hepatitis without cirrhosis: The impact of hepatitis B and C viral replication. Liver Int. 2019 Oct;39(10):1837-1844. doi: 10.1111/liv.14171.

[10] DiBonaventura Md, Wagner JS, Yuan Y, L'Italien G, Langley P, Ray Kim W. The impact of hepatitis C on labor force participation, absenteeism, presenteeism and non-work activities. J Med Econ. 2011;14(2):253–261. doi:10.3111/13696 998.2011.566294.

[11] Sahakyan Y, Wong WW, Yi Q, Thein HH, Tomlinson GA, Krahn MD. Long-term morbidity and mortality in a Canadian post-transfusion hepatitis C cohort: Over 15 years of follow-up. J Viral Hepat. 2020 Mar;27(3):235-242. doi: 10.1111/jvh.13226.

[12] Sahakyan Y, Wong WW, Yi Q, Thein HH, Tomlinson GA, Krahn MD. Long-term morbidity and mortality in a Canadian post-transfusion hepatitis C cohort: Over 15 years of follow-up. J Viral Hepat. 2020 Mar;27(3):235-242. doi: 10.1111/jvh.13226.

[13] Saffar MJ, Abedian O, Ajami A, Abedian F, Mirabi AM, Khalilian AR et al. Age-specific seroprevalence of anti-hepatitis a antibody among 1-30 years old population of savadkuh, mazandaran, iran with literature review. Hepatitis monthly. 2012 May;12(5):326. doi: 10.5812/hepatmon.6035.

[14] Kavosi Z, Zare F, Jafari A, Fattahi MR. Economic burden of hepatitis B virus infection in different stages of disease; a report from southern iran. Middle East J Dig Dis. 2014 Jul;6(3):156-61.

[15] Zare F, Fattahi MR, Sepehrimanesh M, Safarpour AR. Economic Burden of Hepatitis C Virus Infection in Different Stages of Disease: A Report From Southern Iran. Hepat Mon. 2016 Mar 5;16(4):e32654. doi: 10.5812/hepatmon.32654.

[16] Hu M, Chen W. Assessment of total economic burden of chronic hepatitis B (CHB)-related diseases in Beijing and Guangzhou, China. Value Health. 2009 Nov-Dec;12 Suppl 3:S89-92. doi: 10.1111/j.1524-4733.2009.00636.x

[17] Alavian SM, Fallahian F, Lankarani KB. The changing epidemiology of viral hepatitis B in Iran. J Gastrointestin Liver Dis. 2007 Dec;16(4):403-6.

[18] Farzadegan H, Shamszad M, Noori-Arya K. Epidemiology of viral hepatitis among Iranian population—a viral marker study. Ann Acad Med Singap. 1980 Apr;9(2):144-8.

[19] Amini S, Mahmoodi MF, Andalibi S, Solati AA. Seroepidemiology of hepatitis B, delta and human immunodeficiency virus infections in Hamadan province, Iran: a population based study. J Trop Med Hyg. 1993 Oct;96(5):277-87.

[20] Tordrup D, Hutin Y, Stenberg K, Lauer JA, Hutton DW,

DOI: https://doi.org/10.54393/pbmj.v5i5.482

Toy M et al. Additional resource needs for viral hepatitis elimination through universal health coverage: projections in 67 low-income and middle-income countries, 2016-30. Lancet Glob Health. 2019 Sep;7(9):e1180-e1188. doi: 10.1016/S2214-109X(19)30272-4.

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Original Article

Assessment of Resting Heart Rate and Body Composition Among Exercise Performers

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ABSTRACT

Obesity is a global health issue and millions of people around the globe have obesity. **Objective:** To examine the effect of aerobic exercise on resting heart rate and various parameters of body composition. **Methods:** It was a randomized controlled trial. The participants of the study included forty (40) volunteer inter collegiate females of Punjab Pakistan. They were randomly categorized into two groups *i.e.* control group (CG) and experimental group (EG). It was conducted by following the prescribed exercise protocols of eight (08) weeks. A written informed consent was taken from each subject before participation in the study. After completion of the exercise protocols, the pre and post test data were processed through statistical package for social sciences (SPSS, version,25) **Results:** The RHR of the 40 participants in pretest was (76.37± 5.63) and in posttest was (73.55± 5.51). The HRR of the 40 participants in pretest was (116.70± 4.46) and in posttest was (110.77± 10.00). In respect of resting heart score of EGs in pretest and posttest the data indicate that the score of pretest of RHR (76.35± 3.85) and post of RHR (71.55± 3.45) were significantly different. In respect of resting heart score of control group in pretest and posttest the data indicate that the score of pretest of RHR (76.40± 7.09) and post of RHR (75.55± 6.48) were not significantly different. In the same way, significantly the pretest measurement of HRR (117.30± 5.74), of control group was not different from the posttest measurement of HRR (119.51± 4.65) t_{19}=-1.714, $p \leq 0.05$. However, the researcher concluded that before the treatment the EG and CG were balanced in body composition, RHR and HRR. Hence the researcher found that there is significant difference between EG and CG in body composition, RHR and HRR after the treatment.**Conclusion:** Based on analysis, the researcher concluded that aerobic exercise has significant impact on resting heart rate and various parameters of body composition among female exercise performers.

INTRODUCTION

Globally obesity is recognized as chronic health problem, facing majority of the people. Many factors are responsible for this global health problem but high energy intake is one among these leading factors [1-3]. Different health complications are associated with obesity. Cardiac syndromes that are the main cause of delayed heart rate recovery (HRR). Physical activities significantly influence heart rate such as heart rate decrease within a minute after the completion of physical work [4]. Heart recovery rate is a vital predictor of cardiovascular problems. It is closely linked with unexpected cardiac arrest in adults [5]. To avoid cardiac problems, exercise with different volumes and intensities such as walking, running, jogging and cycling etc., are suggested [6-8]. Normal or routine walk is a simple way of managing body weight and maintaining various physiological activities of the body [9,10]. Body mass index

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(BMI) is widely accepted for categorizing the people with obesity [11]. Walking incorporates all of the body's major muscular groups and may be superior than running. Adults have also been proven to benefit from walking in small sessions throughout the day rather than a single large continuous walk [12,13]. Cardiovascular stability is closely linked to how the heart beat frequency decrease after physical exertion [14]. Resting heart rate (RHR) helps to know about causes of mortality among the masses [15]. By measuring RHR, one can predict about the cardiovascular risks of a subject. During exercise more energy is required for HRR [16]. Exercise promotes the structural and functional abilities of the body. Similarly, it is well explained that aerobic exercises have a substantial influence upon heart recovery and body composition [17]. Exercise of moderate volume and intensity also has a major role in preventing heart disease, osteoporosis, diabetes, obesity, blood pressure, weakness, and depression, as well as the prevention and rehabilitation of cardiac vascular illnesses and body composition, according to research [18]. The primary goal of this study is to see how moderate intensity aerobic exercise affects the cardiac recovery rate and body composition of college female students.

METHODS

A randomized controlled trial was conducted. Comprised of forty (40) volunteer inter collegiate females of Punjab Pakistan. The participants of the study were randomly categorized into two groups i.e., control group (CG) and experimental group (EG). The trial was conducted by following the prescribed exercise protocols of eight (08) weeks developed by Speakman (2003). For the purpose of randomization of the subjects into groups the researcher took RHR and body composition data of subjects and arranged these RHR score into ascending order. The heart beat was calculated through Radial artery. After the process of collecting data of resting heart rate the data of 40 subjects than prepared on the basis of rank order. All the subjects who lay in odd number in rank order list were assigned to EG and all the subjects in even number in rank order list was assigned to CG. During the pretest there were total 47 subjects but 7 subjects were dropout in the light of inclusion criteria. The researcher measured 9 different components (Fat free mass, Fat mass, Fat percentage, Sum of skin fold measurements, Mid-calf circumference, Mid-thigh circumference, Mid-arm circumference, Waist Hip Ratio, Weight, Heart recovery rate) of the body to determine. After the completion of eight-week exercise protocol, the data of RHR and body composition, the data of pretest and posttest was recorded and analyzed using paired sample t test to see the difference between the RHR and body composition score of girls in pretest and posttest and independent sample t test was applied to measure the difference between the CG and EG in pretest and posttest with special reference to RHR and body composition of the girls at college level. The researcher also used ANOVA analysis of variance to measure the difference in RHR and body composition in demographic variables.

RESULTS

Figure 1 shows that total subjects having age 15-17 years in the sample were 25 (62.5%), 17-19 years were 11(27.5%) and subjects having age group 20 years and above were 4(10%).

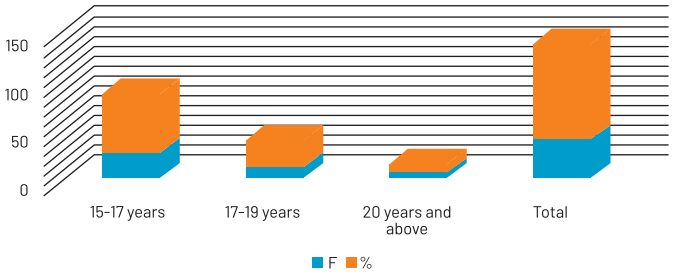

Table 3.1: Age-wise frequencies and percentages

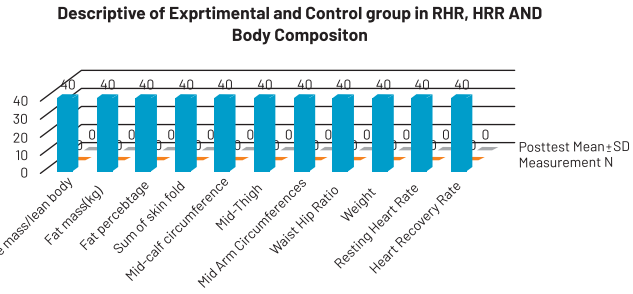

Figure 2: Descriptives of Experimental and Control group in RHR, HRR and Body Composition

Figure 2 showing the descriptives of EG and CG in RHR and body composition in pretest and posttest. The measurement of fat free mass/lean body mass (Kg) was (49.43± 1.27 Kg) in pretest and (49.13± 1.28 Kg) in posttest. In the same way the measurement of fat mass (kg) was (23.46± 1.26 Kg) in pretest and (22.05± 1.74 Kg) in posttest. Similarly, the measurement of fat percentage of 40 participants in pretest was (27.47± 3.55 Kg) and posttest was (25.96± 3.87 Kg). The Sum of skin fold measurements (mm) of the participant in pretest was (70.45± 5.63mm) and in posttest was (65.34± 7.41mm). The Mid-calf circumference (cm) of the participant in pretest was (28.58± 1.88cm) and in posttest was (27.02± 2.20cm). The Mid-thigh circumferences (cm) of the participant in pretest was (50.97± 1.93cm) and in posttest was (48.86± 2.69cm). The Mid Arm Circumferences (cm) of the participant in pretest was (29.03± 2.18cm) and in posttest was (27.93± 2.34cm). The Waist Hip Ratio of the participant in pretest

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was (0.68± 0.05cm) and in posttest was (0.67± 0.05cm). The Weight of the participant in pretest was (63.42± 3.75 Kg) and in posttest was (61.30± 4.38 Kg). The RHR of the 40 participants in pretest was (76.37± 5.63) and in posttest was (73.55± 5.51). The HRR of the 40 participants in pretest was (116.70± 4.46) and in posttest was (110.77± 10.00).

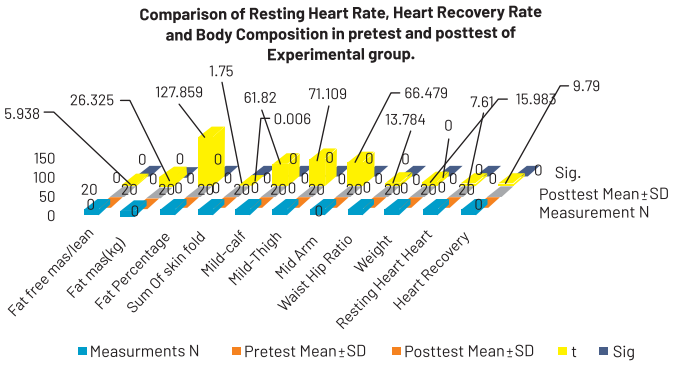

Table 3.4: Comparison of Resting Heart Rate, Heart Recovery Rate and Body Composition in pretest and posttest of Control group.

Figure 3 showing the treatment group difference between the measurement before and after the treatment in 9 components of body composition and RHR. The data shows that significantly the pretest measurement of fat free mass/lean body mass (kg) (49.23± 1.35 Kg), of EG was different from the posttest measurement of Fat free mass/lean body mass (Kg) (48.64± 1.20 Kg) t19= 5.983, p≤ 0.05. Similarly, significantly the pretest measurement of fat mass (kg) (23.57± 1.00), of EG was different from the posttest measurement of fat mass (Kg) (20.76± 0.732Kg) t19= 26.325, p≤ 0.05. In the same way significantly the pretest measurement of fat percentage (27.43± 3.58), of EG was different from the posttest measurement of fat percentage (24.43± 3.58) t19= 127.859, p≤ 0.05. In the same stance significantly the pretest measurement of sum of skin fold measurements (mm) (70.59± 3.77mm), of EG was different from the posttest measurement of sum of skin fold measurements (mm) (60.59± 5.77mm) t19= 1.750, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-calf circumference (cm) (28.86± 1.89cm), of EG was different from the posttest measurement of Mid-calf circumference (cm) (25.86± 1.89cm) t19= 61.820, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-Thigh Circumferences (cm) (51.01± 1.94cm), of experimental group was different from the posttest measurement of Mid-Thigh Circumferences (cm) (47.01± 1.94cm) t19= 71.109, p≤ 0.05. In the same way, significantly the pretest measurement of Mid Arm Circumferences (cm) (29.09± 2.23cm), of experimental group was different from the posttest measurement of Mid Arm Circumferences (cm) (27.09± 2.23cm) t19= 66.479, p≤ 0.05. Similarly, the data indicates that significantly the pretest measurement of Waist Hip Ratio (0.68± 0.057), of experimental group was different from the posttest measurement of Waist Hip Ratio (0.66± 0.057) t19= 13.784, p≤ 0.05. In the same way, significantly the pretest measurement of weight (63.45±3.32 Kg), of experimental group was different from the posttest measurement of weight (59.05±3.28 Kg) t19= 15.983, p≤ 0.05. In respect of resting heart score of EGs in pretest and posttest the data indicate that the score of pretest of RHR (76.35± 3.85) and post of RHR (71.55± 3.45) were significantly different (Figure 3).

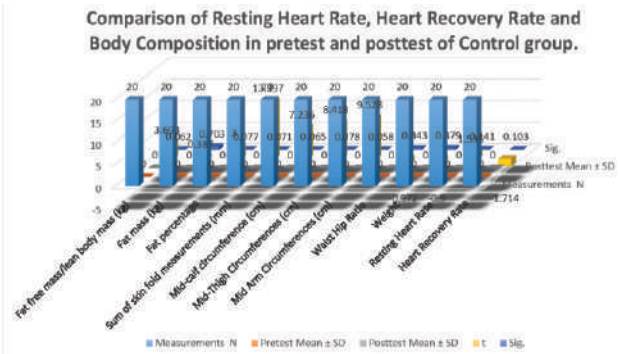

Table 3.5: Comparison of Experimental group and control group in pretest measurements of body composition, Resting Heart Rate and Heart Recovery Rate.

Figure 4 showing the CG difference between the measurement before and after the treatment in 9 components of body composition and RHR. The data shows that significantly the pretest measurement of Fat free mass/lean body mass (kg) (49.78± 1.33Kg), of control group was not different from the posttest measurement of Fat free mass/lean body mass (kg) (49.63± 1.18Kg) t19= 3.693, p≤ 0.05. Similarly, significantly the pretest measurement of Fat mass (kg) (23.35± 1.49Kg), of CG was not different from the posttest measurement of Fat mass (kg) (23.34± 1.4Kg) t19= 0.387, p≤ 0.05. In the same way significantly the pretest measurement of Fat percentage (27.51± 3.61), of control group was not different from the posttest measurement of Fat percentage (27.50± 3.61Kg) t19= 3.000, p≤ 0.05. In the same stance significantly the pretest measurement of Sum of skin fold measurements (mm) (70.33± 5.64mm), of control group was not different from the posttest measurement of Sum of skin fold measurements (mm) (70.10± 5.63mm) t19= 13.397, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-calf circumference (cm) (28.42± 1.86), of control group was not different from the posttest measurement of Mid-calf circumference (cm) (28.18± 1.89cm) t19= 7.236, p≤ 0.05. In the same way, significantly the pretest measurement of Mid-Thigh Circumferences (cm) (50.99± 1.95cm), of control

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group was not different from the posttest measurement of Mid-Thigh Circumferences (cm) (50.71± 1.97cm) t19= 8.418, p≤ 0.05. In the same way, significantly the pretest measurement of Mid Arm Circumferences (cm) (29.06± 2.22cm), of control group was not different from the posttest measurement of Mid Arm Circumferences (cm) (28.77± 2.20cm) t19= 9.528, p≤ 0.05. Similarly, the data indicates that significantly the pretest measurement of Waist Hip Ratio (0.68± 0.05), of control group was not different from the posttest measurement of Waist Hip Ratio (0.68± 0.058) t19= -0.972, p≤ 0.05. In the same way, significantly the pretest measurement of weight (63.40± 4.23Kg), of control group was not different from the posttest measurement of weight (63.55± 4.24Kg) t19= -0.900, p≤ 0.05. In respect of resting heart score of control group in pretest and posttest the data indicate that the score of pretest of RHR (76.40± 7.09) and post of RHR (75.55± 6.48) were not significantly different. In the same way, significantly the pretest measurement of HRR (117.30± 5.74), of control group was not different from the posttest measurement of HRR (119.51± 4.65) t19= -1.714, p≤ 0.05.

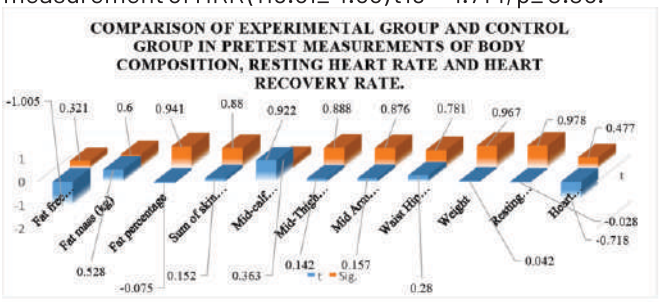

Table 3.6: Comparison of Experimental group and control group in posttest measurements of body composition, Resting Heart Rate and Heart Recovery Rate

Figure 5 showing the comparison of EG and CG after the randomization and before the treatment in nine selected determinants of body composition and RHR. The data indicates that there is no significant difference between the EG and CG in Fat free mass/lean body mass (kg) (t=-1.005, a=0.321 > 0.05), Fat mass (Kg) (t=0.528, a=0.600 > 0.05), Fat percentage (t= -0.075, a=0.941 >0 .05), Sum of skin fold measurements (mm) (t=.152, a=0.880 > 0.05), Mid-calf circumference (cm) (t=0.922, a=0.363 > 0.05), Mid-Thigh Circumferences (cm) (t=.142, a=0.888 > 0.05), Mid Arm Circumferences (cm) (t=0.157, a=0.876 >0 .05), Waist Hip Ratio (t=0.280, a=0.781 > 0.05), Weight, RHR (t= -0.028, a=0.978 >0.05) and HRR (t= -0.718, a=0.477 > 0.05) . However, the researcher concluded that before the treatment the EG and CG were balanced in body composition, RHR and HRR

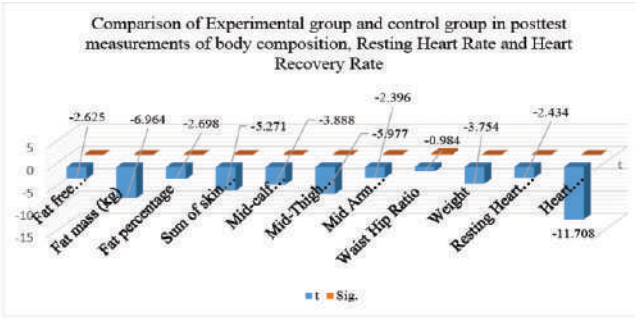

Figure 6: Comparison of Experimental group and control group in posttest measurements of body composition, Resting Heart Rate and Heart Recovery Rate

Figure 6 showing the comparison of EG and CG after treatment (8 Weeks Treatment Programme; Speakman, 2003), in nine selected determinants of body composition and RHR. The data indicates that there is significant difference between the EG (48.64± 1.20, n= 20) and CG (49.63± 1.18, n= 20) in Fat free mass/lean body mass (kg) (t38= -2.625, p≤ 0.05.). The data also indicates that there is significant difference between the EG (20.76± 0.732, n= 20) and CG(23.34± 1.4, n= 20) in Fat mass (kg) (t38= -6.964, p≤ 0.05). The data also indicates that there is significant difference between the EG (24.43± 3.58, n= 20) and CG (27.50± 3.61, n= 20) in Fat percentage (t38= -2.698, p≤ 0.05). The data also indicates that there is significant difference between the EG (60.59± 5.77, n= 20) and CG (70.10± 5.63, n= 20) in Sum of skin fold measurements (mm) (t38= -5.271, p≤ 0.05). The data also indicates that there is significant difference between the EG (25.86± 1.89, n= 20) and CG (28.18± 1.89, n= 20) in Mid-calf circumference (cm) (t38= -3.888, p≤ 0.05). The data also indicates that there is significant difference between the EG (47.01± 1.94, n= 20) and CG (50.71± 1.97, n= 20) in Mid-Thigh Circumferences (cm) (t38= -5.977, p≤ 0.05). The data also indicates that there is significant difference between the EG (27.09± 2.23, n= 20) and CG (28.77±2.20, n= 20) in Mid Arm Circumferences (cm) (t38= -2.396, p≤ 0.05). The data also indicates that there is significant difference between the EG (.66± 0.057, n= 20) and CG (0.68± 0.058±2.20, n= 20) in Waist Hip Ratio (t38=-0.984, p≤ 0.05). Similarly, the table shows that there is significant difference between the EG 59.05± 3.28, n= 20) and CG (63.55± 4.24, n= 20) in Weight (t38=-3.754, p≤ 0.05). The researcher also found that the second main variable resting heart rate was also significantly different in EG (71.55± 3.45, n= 20) and CG (75.55± 6.48, n= 20) after the treatment t38=-2.434, p≤ 0.05. The researcher also found that the third main variable HRR was also significantly different in EG (102.03± 4.74, n= 20)

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and CG (119.51± 6.3.66, n= 20) after the treatment t38=-11.708, p≤ 0.05. Hence the researcher concluded that EG produce better in results in nine selected body composition determinants, RHR and HRR than control group after the exercise protocol Speaksman 2003. Hence the researcher found that there is significant difference between EG and CG in body composition, RHR and HRR after the treatment

DISCUSSION

After the data analysis, the researcher found that there is significant effect of Moderate Intensity Aerobic Exercise upon the body composition, RHR and HRR. The results of the present study are supported by the study of Brandou et al., (2003), Regular exercise, such as walking, running, jogging, and cycling, is recommended as an effective strategy to treat obesity in children. Cycling, according [20,21,22] to Hamila et al., (2018), is a replacement activity for managing obesity [6]. Walking, according to the authors Wang et al., (2008), is also beneficial for elderly persons in terms of weight management [23]. Because it reflects the ability to do daily tasks, the ability to walk is the easiest approach to assess physical function and a critical component for quality of life. Enright et al., (1998) discovered that measuring the distance travelled during a normal walk on a horizontal surface is a simple and cost-effective way to evaluate individual physical function [24] Smart et al (2015) found that females who engaged in moderate intensity exercise for three months, such as cycling and jogging, had improved HRR, autonomic system, and breast cancer risk [25].

CONCLUSION

Based on the findings, the researcher concluded that moderate intensity aerobic exercises have a substantial impact on weight, fat free mass/lean body mass, fat mass, fat percentage, and fat mass. Sum skin fold measurements, Mid-calf circumference, Mid-Thigh Circumferences, Mid Arm Circumferences, Waist Hip Ratio, Resting Heart Rate and Heart Recovery Rate of the girls at college level. Hence the researcher concluded that Moderate Intensity Aerobic Exercises put positive effect upon body composition, resting heart rate and heart recovery rate of College girls.

REFERENCES

[1] Chlebowski RT, Blackburn GL, Thomson CA, Nixon DW, Shapiro A, Hoy MK, et al. Dietary fat reduction and breast cancer outcome: interim efficacy results from the Women's Intervention Nutrition Study. J Natl Cancer Inst. 2006;98(24):1767-1776.doi.org/10.1093/jnci/djj494

[2] Surendran P, Drenos F, Young R, Warren H, Cook JP, Manning AK, et al. Trans-ancestry meta-analyses identify rare and common variants associated with blood pressure and hypertension. Nat Genet. 2016;48(10):1151-1161.doi.org/10.1038/ng.3654

[3] Seidell JC, Halberstadt J. The global burden of obesity and the challenges of prevention. Ann Nutr Metab. 2015;66(2): 7-12. doi.org/10.1159/000375143

[4] Peçanha T, Silva-Júnior ND, Forjaz CL. Heart rate recovery: autonomic determinants, methods of assessment and association with mortality and cardiovascular diseases. Clin Physiol Funct Imaging. 2014;34(5):327-339.doi.org/10.1111/cpf.12102

[5] Khairy P, Harris L, Landzberg MJ, Viswanathan S, Barlow A, Gatzoulis MA, et al. Implantable cardioverter-defibrillators in tetralogy of Fallot. Circulation. 2008;117(3):363-370.doi.org/10.1161/CIRCULATIONAHA.107.726372

[6] Hamila A, Younes M, Cottin F, Amor YB, Shephard R, Tabka Z, et al. Effects of walking exercises on body composition, heart rate variability, and perceptual responses in overweight and obese adolescents. Science & Sports. 2018;33(5):191-202.doi.org/10.1016/j.scispo.2018.03.076

[7] Sothern MS. Safe and effective exercise for overweight youth. CRC Press. 2014.doi.org/10.1201/b17025

[8] Nawaz F, Khan MA. Impact of moderate intensity aerobic exercises upon body composition of college girls. Journal of Social Research Development. 2021;2(1): 29-40.doi.org/10.53664/JSRD/02-01-2021-03-29-40

[9] Molsted S, Eidemak I, Sorensen HT, Kristensen JH. Five months of physical exercise in hemodialysis patients: effects on aerobic capacity, physical function and self-rated health. Nephron Clin Pract. 2004;96(3):c76-c81.doi.org/10.1159/000076744

[10] Beriault K, Carpentier AC, Gagnon C, et al. Reproducibility of the 6-minute walk test in obese adults. Int J Sports Med. 2009;30(10):725-727. doi.org/10.1055/s-0029-1231043

[11] Shah NR, Braverman ER. Measuring adiposity in patients: the utility of body mass index (BMI), percent body fat, and leptin. PLoS One.2012;7(4):e33308. doi.org/10.1371/journal.pone.0033308

[12] Ford PA, Perkins G, Swaine I. Effects of a 15-week accumulated brisk walking programme on the body composition of primary school children. J Sports Sci. 2013;31(2):114-122.doi.org/10.1080/02640414.2012.723816

[13] Murphy M, Nevill A, Neville C, Biddle S, Hardman A.

DOI:https://doi.org/10.54393/pbmj.v5i5.415

Accumulating brisk walking for fitness, cardiovascular risk, and psychological health. Med Sci Sports Exerc. 2002;34(9):1468-1474.doi.org/10.1097/00005768-200209000-00011

[14] Bardal EM, Roeleveld K, Mork PJ. Aerobic and cardiovascular autonomic adaptations to moderate intensity endurance exercise in patients with fibromyalgia. J Rehabil Med. 2015;47(7):639-646. doi.org/10.2340/16501977-1966

[15] Jensen MT, Suadicani P, Hein HO, Gyntelberg F. Elevated resting heart rate, physical fitness and all-cause mortality: a 16-year follow-up in the Copenhagen Male Study. Heart. 2013;99(12):882-887. doi.org/10.1136/heartjnl-2012-303375

[16] Voorhees AP, Han HC. Biomechanics of Cardiac Function. Compr Physiol. 2015;5(4):1623-1644. Published 2015 Sep 20.doi.org/10.1002/cphy.c140070

[17] Fontaine KR, Redden DT, Wang C, Westfall AO, Allison DB. Years of life lost due to obesity. JAMA. 2003;289(2):187-193.doi.org/10.1001/jama.289.2.187

[18] Karstoft K, Winding K, Knudsen SH, Nielsen JS, Thomsen C, Pedersen BK, et al. The effects of free-living interval-walking training on glycemic control, body composition, and physical fitness in type 2 diabetic patients: a randomized, controlled trial. Diabetes Care. 2013;36(2):228-236.doi.org/10.2337/dc12-0658

[19] Speakman JR, Selman C. Physical activity and resting metabolic rate. Proc Nutr Soc. 2003;62(3):621-634. doi.org/10.1079/PNS2003282

[20] Talat D, Khadijeh E, Sara, G. Evaluation of the effect of vaginal misoprostol on cervical priming in patients candidate for dilatation and diagnostic curettage: a

[21] randomized clinical trial. 2013.
Richard OC, Murthi BS, Ismail K. The impact of racial diversity on intermediate and long-term performance: The moderating role of environmental context. Strategic Management Journal.

[22] 2007;28(12): 1213-1233.doi.org/10.1002/smj.633
Brandou F, Dumortier M, Garandeau P, Mercier J, Brun JF. Effects of a two-month rehabilitation program on substrate utilization during exercise in obese

[23] adolescents. Diabetes Metab. 2003;29(1):20-27. doi.org/10.1016/S1262-3636(07)70003-4
Wang AY, Lai KN. Use of cardiac biomarkers in end-stage renal disease. J Am Soc Nephrol. 2008; 19(9):1643-1652.doi.org/10.1681/ASN.2008010012

[24] Enright PL, Sherrill DL. Reference equations for the six-minute walk in healthy adults. Am J Respir Crit Care Med. 1998;158(5 Pt 1):1384-1387.doi.org/10.1164/ajrccm.158.5.9710086

[25] Smart NA, Waldron M, Ismail H, Giallauria F, Vigorito C, Cornelissen V, et al. Validation of a new tool for the assessment of study quality and reporting in exercise training studies: TESTEX. Int J Evid Based Healthc. 2015;13(1):9-18.doi.org/10.1097/XEB.0000000000000020

DOI:https://doi.org/10.54393/pbmj.v5i5.362

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Original Article

Prevalence of Shoulder Pain and Disability in Adults Using Manual Wheelchair: A Cross-Sectional Study

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ABSTRACT

Shoulder soreness is a frequent complaint among people who use wheelchairs. Shoulder discomfort is the major prevalent region of musculoskeletal pain in persons with spinal cord injury (SCI) functional skills. **Objective:** To find out the prevalence of shoulder pain and disability in adults using a manual wheelchair in Pakistan. **Methods:** This is a cross-sectional study. After taking consent and ethical approval from UOL, this study was conducted on manual wheelchair users from at last three months of Lahore. It included both males and females of 25 above age. Shoulder pain disability index (SPADI) and the Wheelchair User's Shoulder Pain Index (WUSPI) will be used to collect data. The questionnaire was filled on the spot. **Results:** Out of total 127 participants, 48.8% were female and 51.2% were male. The mean age of the study subjects was 32.32±4.719 years. The prevalence of shoulder pain documented in 127 participants is 78% with moderate pain 27.6% and severe pain in 38.0%. There was mild disability in 29.9% of health care providers and moderate disability in 31.5% of wheelchair users. **Conclusions:** The findings of this study concluded that 78.7% prevalence of shoulder pain in manual wheelchair users and 69.3% shoulder disability in manual wheelchair users. As the duration of wheelchair usage increases the shoulder pain and disability also increase.

INTRODUCTION

Shoulder soreness is a frequent complaint among people who use wheelchairs [1]. Shoulder discomfort is the major prevalent region of musculoskeletal pain in persons with spinal cord injury (SCI) functional skills [2]. Shoulder complex innervations are controlled by the C7 and C5 nerve roots, as well as the brachial plexus [3]. Rotator cuff fatigue can occur when the biceps brachii, infraspinatus and supraspinatus are subjected to high peak force throughout the push phase, additionally at the beginning and conclusion of the recuperation phase. The infraspinatus and supraspinatus muscles get fatigued as a result of the increased strain, leading to significant upper humeral head movement [4]. Treede defined pain as "an unpleasant sensory and emotional experience associated with or resembling that associated with, actual or potential tissue damage [5]. The rotator cuff muscles provide for precise control of uneven contracts to retain the shoulder in the glenoid during forceful movements that will otherwise result in dislocation. Common symptoms include limited range of motion and shoulder placement to avoid pain [6]. A disability is defined as any physical or mental impairment that makes it more difficult for the person with the condition to conduct particular tasks and interact with the environment around them [7]. Detecting shoulder pain and dysfunction in MWCUs is a crucial first step toward gaining a better knowledge of wheelchair propulsion dynamics, and it may assist in identifying the components that lead to pathology [8]. A manual wheelchair is described as a

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manually operated or power-driven equipment designed primarily for use by an individual with a mobility limitation for the primary function of both indoor and outdoor, locomotion [9]. Shoulder pain in wheelchair users is caused by excessive use, weakness in shoulder internal, adduction, external rotation, and other factors. Increased complaints of shoulder discomfort in wheelchair users are also associated with poor trunk control. Patients with long-term shoulder discomfort may be more difficult to identify. Manual wheelchair use causes significant strain on the upper extremities, especially the shoulder, as a result of the recurrent loading caused by wheelchair propulsion as well as other daily activities including transferring and weight reduction chores [10]. The most prevalent disorders related to shoulder pain are glenohumeral instability, joint oedema, inflammation of the bursa, rotator cuff tear and shoulder impingement syndrome [11]. Such illnesses may be catastrophic for wheelchair users since they might make it difficult for them to remain physically active, jeopardizing their independence and quality of life. Obesity and cardiovascular pathology are two secondary health problems that can arise as a result of a lack of physical activity. Injury-induced structural changes in the shoulder can lead to chronic illnesses such as osteoarthritis, which causes joint degradation and may eventually need shoulder arthroplasty [12]. Shoulder pain makes it difficult to do things like pushing a wheelchair up steep hills, using ramps, and transferring from bed to wheelchair and vice versa [13]. Some of the shoulder-specific tests that have been carried out are as follows: To detect subacromial impingement, the Neer, Hawkins-Kennedy, and Yocum painful arc tests are utilized. The rotator cuff muscular integrity was assessed using the Jobs test, lift-off, and resisted internal and external rotation. Glenohumeral instability can be diagnosed with the Sulcus sign, Cofield test, occupational relocation test, and jerk test. Among the most often used are the Yergason, O'Brien, and scarf tests [14]. Additional evaluating techniques include: The WUSPI is a self-reported evaluation of 13 health-related quality of life functions (sleeping, housework, driving, work school activity, self-care, wheelchair mobility and transfer) [15] and Visual Analogue scale (VAS) is a measuring instrument to measure pain. It is an easy and recurrent method to assess pain with different intensities of pain and the efficacy of the treatment. The scale consists of 0-10 numerical. "0" means "no pain" and "10" means "Extreme pain" [16,17]. This study will help to provide an awareness of pain and functional disability due to the use of a manual wheelchair. In our country, new interventions or strategies to reduce the negative impacts of wheelchairs should be devised.

METHODS

This is a cross-sectional study. The sample was selected according to previously defined inclusion and exclusion criteria from the general population to observe the pain and functional disability due to the use of a manual wheelchair. The inclusion criteria for this study were Use of a manual wheelchair for a duration of at least 3 months, because of these reasons (Spinal Cord Injury, Spina Bifida, Amputation, Cerebral Palsy, Multiple Sclerosis, and Fracture), both healthy males and females of age between 25 to 40 years. Exclusion criteria were persons who have shoulder pain as a result of a fall on the damaged shoulder after SCI, and people who have pain referred from heart and pancreas, mental illness and severe systemic disease. Each participant filled out a survey on his or her disability duration of time in a wheelchair, age, gender, and dominant hand. Subjects who stated they were experiencing shoulder pain were asked questions regarding how their pain was acting and their shoulder complex was clinically examined. SPADI and WUSPI will be used to collect data. SPSS was used to examine the data. The mean and standard deviation of quantitative variables were determined. The frequency and percentage of qualitative characteristics were calculated.

RESULTS

In this current study total of 127 participants participated with a mean age of 32.32±4.719 years. The minimum age was 25 years and the maximum age was 45 years. In this study, 65(51.2%) males and 62(48.8%) females participated. 117(92.1%) manual wheelchair users were right-handed and 10(7.9%) were left-handed (Table 1).

Age	
Mean ± SD	32.32 ± 4.719 years
Minimum	25.00
Maximum	45.00
Gender	**Frequency and Percentage**
Male	65(51.2%)
Female	62(48.8%)
Dominant hand use for manual wheelchair	**Frequency and Percentage**
Right	117(92.1%)
Left	10(7.9%)

Table 1: Descriptive statistics of demographic variables

In the current study, 48(37.8%) participants used wheelchair due to amputation and the duration of wheelchair was more than 1 year in 38(29.9%) of participants. The prevalence of shoulder pain using WUSPI questionnaire is 78.7% (Table 2).

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Variables	Construct	Frequency	Percentage
Sport activity before using MWC	Yes	14	11.0%
	No	113	89.0%
Reason of using manual wheelchair	Facture	36	28.3%
	Amputation	48	37.8%
	Spinal cord injury	27	21.3%
	Cerebral palsy	7	5.5%
	MS	9	7.1%
Duration of using manual wheelchair	3-6 months	25	19.7%
	7-9 months	27	21.3%
	10-12 months	37	29.1%
	> 1 year	38	29.9%
Any rehabilitation session done before	Yes	17	13.4
	No	110	86.6
Prevalence of shoulder pain using manual wheelchair (WUSPI)	78.7%		

Table 2: Prevalence of shoulder pain in manual wheelchair users

In the final Scoring of pain scale of SPAID, 15(11.8%) of wheelchair users had mild pain, 35(27.6%) had moderate pain, 49(28.0%) had severe pain and 1(0.8%) had the worst pain in the study. 38(29.9%) of manual wheelchair users had mild disability, 40(31.5%) had a moderate disability and 10(7.9%) had severe disability in the study. The prevalence of shoulder pain using SPADI is 78.7% and disability is 69.3% (Table 3).

Variables	Construct	Frequency	Percentage
Pain scale of SPADI	No pain	27	21.3%
	mild pain	15	11.8%
	moderated pain	35	27.6%
	severe pain	49	38%
	worst pain	1	0.8%
Disability scale of SPAID	no disability	39	30.7%
	mild disability	38	29.9%
	moderate disability	40	31.5%
	severe disability	10	7.9%
Prevalence of shoulder pain in manual wheelchair users (SPADI)	78.7%		
Prevalence of shoulder disability using manual wheelchair (SPADI)	69.3%		

Table 3: Prevalence of shoulder pain and disability in manual wheel chair users shoulder pain and disability index (SPADI)

DISCUSSION

Shoulder soreness is a common complaint among wheelchair users [1]. Shoulder discomfort is the most prevalent site of musculoskeletal pain in individuals with SCI who use manual wheelchairs (MWC), and its presence can considerably impede a person's functional skills [2]. Manual wheelchair use causes significant strain on the upper extremities, especially the shoulder, as a result of the recurrent loading caused by wheelchair propulsion as well as other daily activities including transferring and weight reduction chores [10]. The result showed that 92.1% of participants used their right hand dominantly, 19.7% of wheelchair users used wheelchairs for 3-6 months, 21.3% used for 7-9 months, 29.1% used for 10-12months and 29.9% used for > 1 year. Another contrast study stated that increasing the duration of wheelchair use causes the development of shoulder pain [18]. 37.8% of participants use a wheelchair due to amputation and 28.3% due to fracture. The result shows that 86.6% of participants do not do any rehabilitation sessions before. Visual Analogue scale (VAS) is a measuring instrument to measure pain. It is easy and recurrent method to assess pain with different intensities of pain and the efficacy of the treatment. The scale consists of 0-10 numerical. "0" means "no pain" and "10" means "Extreme pain". Results show that 11.8% of wheelchair users had mild pain, 27.6% had moderate pain and 28.0% had severe pain in the study. In the final Scoring of Disability Index of shoulder pain and disability index, 29.9% of manual wheelchair users had mild disability, 31.5% had moderate disability and 7.9% had severe disability in the study. Another comparable study conducted by Karal K Wessels et al., reported that 47 percent of individuals experienced shoulder discomfort, which was within the normal range [19]. In the current study, 11.5% of participants complained of mild pain, 27.6% had moderate pain and 39.4% had severe pain during activity according to Wheelchair User's Shoulder Pain Index (WUSPI). In contrast, another comparable study was conducted by Curtis KA et al., The prevalence and degree of shoulder discomfort during functional activities were substantially greater in tetraplegic patients than in paraplegic subjects [20]. Silfverskiold and Waters14 reported that although 6 to 18 months after the beginning of SC1, 33% of patients with tetraplegia had moderate to severe functional impairment, whereas paraplegics had modest functional losses owing to shoulder discomfort [21].

CONCLUSIONS

The findings of this study concluded that there is a 78.7% prevalence of shoulder pain in manual wheelchair users and a 69.3% prevalence of shoulder disability in manual wheelchair users. As the duration of wheelchair usage increases the shoulder pain and disability also increase.

REFERENCES

[1] Soo Hoo J. Shoulder Pain and the Weight-bearing Shoulder in the Wheelchair Athlete. Sports Med Arthrosc Rev. 2019;27(2):42-47. doi: 10.1097/JSA.0000000000000241.

[2] Goodwin BM, Cain SM, Van Straaten MG, Fortune E, Jahanian O and Morrow MMB. Humeral elevation workspace during daily life of adults with spinal cord

DOI:https://doi.org/10.54393/pbmj.v5i5.362

injury who use a manual wheelchair compared to age and sex matched able-bodied controls. PLoS One. 2021;16(4):e0248978. doi: 10.1371/ journal. pone. 0248978.

[3] Emamhadi M, Chabok SY, Samini F, Alijani B, Behzadnia H and Firozabadi FA et al. Anatomical Variations of Brachial Plexus in Adult Cadavers; A Descriptive Study. Arch Bone Jt Surg. 2016;4(3):253-8.

[4] Telhan G and Areson D. Shoulder problems-pain in the wheelchair athlete. 2018.

[5] Treede RD. The International Association for the Study of Pain definition of pain: as valid in 2018 as in 1979, but in need of regularly updated footnotes. Pain Rep. 2018;3(2):e643. doi: 10.1097/ PR9.00000 00000000643.

[6] Brown G, Park K and Bicknell RT. Management of occupational shoulder injuries in primary care. J Musculoskelet Disord Treat. 2015;1(002).

[7] Fakorede OO, Ogunwale A and Akinhanmi AO. Disability among patients with schizophrenia: A hospital-based study. Int J Soc Psychiatry. 2020;66(2):179-187. doi: 10.1177/0020764019894608.

[8] Bakhsh W and Nicandri G. Anatomy and Physical Examination of the Shoulder. Sports Med Arthrosc Rev. 2018 Sep;26(3):e10-e22. doi: 10.1097/JSA.00 00000 000000202.

[9] Desai S, Mantha SS and Phalle VM. Advances in smart wheelchair technology. In2017 International Conference on Nascent Technologies in Engineering (ICNTE)2017:1-7. doi: 10.1109/ICNTE.2017.7947914.

[10] Mason B, Warner M, Briley S, Goosey-Tolfrey V and Vegter R. Managing shoulder pain in manual wheelchair users: a scoping review of conservative treatment interventions. Clin Rehabil. 2020;34 (6):741-753. doi: 10.1177/0269215520917437.

[11] VanBaak K and Aerni G. Shoulder Conditions: Rotator Cuff Injuries and Bursitis. FP Essent. 2020;491:11-16.

[12] Hansen RK, Larsen RG, Laessoe U, Samani A and Cowan RE. Physical Activity Barriers in Danish Manual Wheelchair Users: A Cross-sectional Study. Arch Phys Med Rehabil. 2021;102(4):687-693. doi: 10.1016/j.apmr.2020.09.384.

[13] Shah Sayed. The Prevalence of Shoulder Pain in Spinal Cord Injury Patients Using Manual Wheelchair in KPK(Khyber Pakhtunkhwa). 2017;12(2):101-5.

[14] Roy J-S, Desmeules F, Frémont P, Dionne CE and MacDermid JC. Clinical Evaluation, Treatment and Return to Work of Workers Suffering from Rotator Cuff Disorders: Institut de recherche Robert-Sauvé en santé et en sécurité du travail; 2017.

[15] Spinal Cord Medicine. Lippincott Williams & Wilkins (Wolters Kluwer Health), 2011: Kindle edition. Location 14247-14520.

[16] Carlsson AM. Assessment of chronic pain. I. Aspects of the reliability and validity of the visual analogue scale. Pain. 1983;16(1):87-101. doi: 10.1016/0304-3959(83)90088-X.

[17] Young IA, Dunning J, Butts R, Cleland JA and Fernández-de-Las-Peñas C. Psychometric properties of the Numeric Pain Rating Scale and Neck Disability Index in patients with cervicogenic headache. Cephalalgia. 2019;39(1):44-51. doi: 10.1177/0333102418772584.

[18] Finley MA and Rodgers MM. Prevalence and identification of shoulder pathology in athletic and nonathletic wheelchair users with shoulder pain: A pilot study. J Rehabil Res Dev. 2004;41(3B):395-402. doi: 10.1682/jrrd.2003.02.0022.

[19] Wessels KK, Brown JL, Ebersole KT and Sosnoff JJ. Sex, shoulder pain, and range of motion in manual wheelchair users. J Rehabil Res Dev. 2013;50(3):351-6. doi: 10.1682/jrrd.2011.02.0025.

[20] Curtis KA, Drysdale GA, Lanza RD, Kolber M, Vitolo RS and West R. Shoulder pain in wheelchair users with tetraplegia and paraplegia. Arch Phys Med Rehabil. 1999 Apr;80(4):453-7. doi: 10.1016/s0003-9993(99)90285-x.

[21] Silfverskiold J and Waters RL. Shoulder pain and functional disability in spinal cord injury patients. Clin Orthop Relat Res. 1991;(272):141-5.

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Original Article

Association of Learning Styles With Academic Performance of Final Year MBBS Students

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ABSTRACT

As the profession of medicine continues to be challenging demanding active learning practices with high concerns over immediate and informed decisions with concerns over the health practices **Objective:** To determine how the learning styles, as well as approaches, impact the medical students. **Methods:** This observational study was conducted at different Medical Universities in Quetta, Balochistan, from 1st March 2017 to 30th March 2018 **Results:** The results were concluded from 200 participants from different medical universities that became part of the study. The three main determinants of the study were activist, reflector, the rest where the mean values were illustrated as 6.82, 8.04, and 7.47 respectively. The highest number of participants were 35 in total with percentage as 17.5%. This was followed by 33 individuals (16.5%) **Conclusions:** Hence, it can be said that association of learning fits best with the primary goal of education that is reasoning and understanding towards the opportunities. Moreover, this practice develops the characteristic issue of life-long learning habits in medical students.

INTRODUCTION

Learning style is viewed in terms of information processing strategies or personality trait. It is a distinctive and habitual manner of acquiring knowledge, skill and attitude through study or experience. Learning style also has been defined as the characteristics cognitive, social and physiological behaviors that serve as relatively stable indicator of how learners perceived, interact with and respond to the learning environment [1]. Different learners have different learning habits; if the method of information delivery conforms to their learning habit they learn better [2]. While disparity can result in failure, that's why there is a great deal of interest amongst educators in identifying preferable learning style of their students. Learners and educator can derive clear benefits by identifying and evaluating an individual preferred learning style. The commonly referred mode in this regard have root in the Neurolinguistics programming (NLP) theory which proposes three learning style, visual, auditory, kinesthetic. Pask divided learner in serialistic (analytic) and holistic (gestaltic) types. Honey and Mumford proposed a classification of learning style into activist, reflector, Theorist and pragmatist. We will follow Honey and Mumford classification of learning style in our study and will use their structured learning style Questionnaire (LSQ) for learning style identification. Medical students are adult thus they have already developed their own learning style. Henceforth, it is essential for medical educators to" tailor instruction" in such a way that the medical students appreciate and follow it to learning. Many types of research have been conducted to determine the correlation of learning style preferences with performance. It has been repeatedly proved that the motivation and performance of the students are positively

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correlated with the instructions that are adopted to their predominant learning preferences. The aim of this study is to assess learning style preferences of medical students in Pakistan (Baluchistan). Moreover, this study is conducted to ascertain any relation between academic performance and preferred learning style among undergraduate medical students. Many studies in the past have identified the relationship with preferred learning styles in context with the performance of the students as well as students' orientation or background [3-6]. The differentiated number of learning styles practiced by the students where the most common included kinesthetic (VARK), association of learning, reading/writing, or visual assistance. However, all the identified learning mediums and styles are inclined towards a central point indicating that there is a great disparity present over these numerous learning styles where each one of them has its distinctive characteristics [7]. This appears to be a great deal to identify the most preferred learning styles among the different groups of students like medical, engineering, business, etc. [8] indicates that the relationship between the learning behaviors with the academic performance has no significant impact on each other. However, others, demonstrated that academic performances vary with the different learning behaviors. SDL learning behaviors were found to enhance the performance during the quiz, problem-solving, and teamwork [9]. In order to become an Association learner, the offered curriculum, students, level of understanding, and teacher attitude where the understanding regarding the learning attitude. Relating the context with medical students where they are asked to retain and apply the challenging amount of knowledge while they come across a variety of situations [10]. Apart from there, practical as well as theoretical expertise, the most crucial factor is the learning behavior or styles that must fit best with the study demands [11]. For this reason, self-direction learning over the years has become an interesting area to research and study while it is called with so many synonymous names like association of learning, independent study, self-planned learning, andragogy, autonomous learning, etc [12]. As per Knowles in 1975, association of learning is described as learning behaviors where students take the sole responsibility for their learning practices with or without the use of resources or assistance of others. They continue to diagnose their need while formulating and strategizing the goals to accomplish the learning demands [13]. Moreover, the learning behavior also makes use of effective and resourceful learning needs and practices while lately evaluating the success or progress that was able to be achieved [14,15]. In response to this, [16] presented a study while observing the habits of medical students' where the learning behavior positively influenced and enhanced the individual learning behavior while they became more responsible. Accountability and assertiveness are also enhanced that appears to be key attributes of the professional career of medical students [17]. Apart from this, medical educations are the continuous quest for knowledge that fit best with the SDL approach or learning behaviors that welcomes the knowledge, skill, or information sharing adhered by the critical thinking, recalling of information at suitable timing, and informed-decision making to maximize the outcomes [18]. Recent trends in higher education have also inclined the behaviors towards self-assessment, and self-efficacy that methods like Problem-based learning (PBL) that promotes SDL learning [12].The behavior of auto-didacticism appears to be an active process where the medical students not only plan their study practices but also select the resources as well as tools that fit as per their level of understanding and cognitive skills while developing motivation and increased enthusiasm towards academic practices [19]. The method, therefore, indicates that achievement of superior skills and knowledge is possible in the area of interest or chosen area where SDL is applied. Meanwhile, an innovative curriculum is studied to better associate with SDL learning rather than the conventional learning practices that are normally part of the academic culture. The feasibility of SDL is also inclined towards the culture of the learning environment where the medical schools incorporate both the theoretical as well as practical learning habits. The surrounding plays an important role where the environment that persuades the analytical thinking behaviors among the students enhances their academic performance [20]. This was supported by the research presented by [14] on the Ethiopian Medical Students where the second-year students were found with a better understanding of SDL in comparison with the first-year medical students. The idea of problem-solving practices was too better reflected in the learning behaviors of the second-year students in contrast to one that was the freshmen. While the earlier study considered the element of the practice of SDL by the students in context with their study year, the study by [21] presented insights over SDL practices in medical colleges with respect to gender difference. However, no significant impact was studied and no difference was found among the practices of males and females over learning behaviors. The motivational, as well as management levels, were equal and both groups were found making use of SDL learning style on an equal basis. Meanwhile, the most common learning styles adopted by medical students are oriented around self-reflective practices, one of the key

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elements of association of learning or autonomous learning. This makes it easier to diagnose that whether or not the information being processed is effectively utilized and learned. A study observed the learning behaviors of medical students in Pakistan where SDL practices optimistically enhanced the research activities among the undergraduates. Though, the research proved that learning disposition was significantly associated with the personality traits of students [22]. Hence, it can be said SDL recognizes the deficiencies through the ability of self-control and supports critical management by confidence and competence. [23] centered their study practices on the major goals perceived through self-determined learning. As per the analysis, three goals were considered a) Enhancing the ability of learning and become more self-reliant, b) Fostering the transformational learning attitude, and c) promotion of emancipatory learning and social actions as part of learning behavior [24] referred that the first goal focuses on the inner strength and indicates that enhanced learning outcomes can be achieved if individual practices motivation and dedication that comes from willingness. The sense of discovery and encountering new amendments is figured to be the keynote practice of SDL. Moreover, the learning behavior is shifted from dependency to self-facilitating the issues or challenges felt or medical students come across their learning journey [25]. The potency and effectiveness are enhanced while autonomous behaviors will aid in the future during the practical ground when attributes of critical thinki8ng and problem-solving needs are required. Following this, the second goal is well studied by [26] where the transformational learning attitude was placing a reflection and self-analysis over the personal traits and its effective use for enhancing the learning capacity and capabilities. Moreover, SDL indicates how intrinsic behaviors are necessary for consistency in association of learning, self-motivated, and independent behaviors [27,28]. The exercising control achieved by the candidates makes it easier to adapt and act flexibly in tough situations when no external assistance is provided or resource availability for learning is not possible [29]. The present study aims to determine how the learning styles, as well as approaches, impact the medical students. As the profession of medicine continues to be challenging, demanding, and active learning practices with high concerns over immediate and informed decisions with concerns over the health practices. Therefore, for medical students, it is necessary to adopt those learning styles that must come in parallel with the need of their academics as well as profession. The present study through a quantitative analysis will aid in finding out whether or not the SDL learning style positively impacts the learning outcomes and behaviors of the medical students.

METHODS

The study was conducted through a cross-sectional survey aimed to investigate the readiness and use of association of learning behaviors among the medical students at Bolan Medical College, Quetta. The quantitative research design was chosen to conduct a questionnaire-based survey study among 200 candidates. Non-probability sampling was done. The results were assessed through measuring the score of activist, reflector and theorist indicates how association of learning promotes creativity and love towards the learning apart from the initiative, and independence in learning. The study followed all the ethical considerations where all the data collected was kept confidential and only be used for the research purpose. SPSS was used for the analysis. The purpose of this study was to identify the association between learning styles and academic performances of MBBS final year students, their association between learning styles and academic performance in undergraduate medical students. For the format frame work of design, the research question is applicable (6). Undergraduates required for the study were easily recruited from final year MBBS class of Bolan Medical College Quetta.

Knowledge claim	Post positivism knowledge claim
Strategy of inquiry	Observational, co relational
Methods	predetermined closed ended questionnaire,
Practices of rese	Verifies explanation, identify variable, Observe validity and reliability, Employ statistical procedure.
Research design	Quantitative

Table 1: Post positivism knowledge claim

The purpose of identification of all these diverse learning styles and their association to result, had matching with teaching strategies, curriculum, and appropriate assessments methods. The presence of four learning styles (in variable association) in a class showed that having a single teaching technology for entire MBBS class will be inappropriate. This study could be beneficial in local context, learning style and their performance provide a base line for reconsideration of needed aspects of: Teaching strategies, Curriculum Context of institution and Appropriate assessment methods. In current study, the instrument of data collection is learning style questionnaire which is a pre-determined and structured questionnaire? It is close ended with a rating scale. Learning style questionnaire (LSQ) is used by Mumford in his article. It is worthy in validity and reliability. It is comprising a series of questions prepared by researcher that are answered by all respondents. It is commonly used

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to get demographic data. It allows the collection of larger data from large number of samples quickly and inexpensively. The degree of structure is close ended or fixed alternative. The data for the identification of learning style was collected by a structured questionnaire of learning style (LSQ). The data was collected in a single contact session with students. The session was planned after their routine classes. Purpose of that contact session and questionnaire was presented in an easy way to understand by students. Later the questionnaire was distributed and recollected after a due time among students. Data was analysed and categorized into four prescribed style of Mumford. The association between these identified styles and final year result score was identified. The judgment about an association rests on whether the association is: **Valid:** look for the alternative explanation including, confounding, chance and bias or **Repeatable:** the evidence taken from a number of sources supporting the judgment of causality. The role of confounding, chance and bias have to be evaluated in several clinical trials and other epidemiologic investigations where appropriate selection of the population to be studied is made and with proper study design, so that the results can be applied to other populations i.e., they are valid and generalize able.

Ethical Principles	Issues	Solution / Justification
Autonomy –	permission from gatekeeper,Informed consent.	Convinced/replaced by another candidate.
Beneficence-no harm to participant.	Nil	Nil
Non-Malfeasance-ensuring confidentiality	Nil	Nil
Justice ownership of the data and result should be delivered beforehand.	Nil	Nil

Table 2: Ethical Principles

RESULTS

The results were concluded from a total of 200 candidates from different medical universities that became part of the study. In the earlier section of the results, descriptive statistics were presented.

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Activist	200	1	20	6.82	2.974
Reflector	200	1	20	8.04	2.858
Therist	200	3	20	7.47	2.286
Valid N (listwise)	200				

Table 3: Descriptive statistics

According to the descriptive statistics, the total number of individuals that answered the questionnaire was 200. The three main determinants of the study were activist, reflector, therist where the mean values were illustrated as 6.82, 8.04, and 7.47 respectively (Table 4).

Activist					
Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1	5	2.5	2.5	2.5
	2	6	3.0	3.0	5.5
	3	10	5.0	5.0	10.5
	4	15	7.5	7.5	18.0
	5	28	14.0	14.0	32.0
	6	27	13.5	13.5	45.5
	7	35	17.5	17.5	63.0
	8	33	16.5	16.5	79.5
	9	12	6.0	6.0	85.5
	10	21	10.5	10.5	96.0
	11	2	1.0	1.0	97.0
	16	2	1.0	1.0	98.0
	17	2	1.0	1.0	99.0
	20	2	1.0	1.0	100.0
	Total	200	100.0	100.0	

Table 4: Number of Candidates

From the table 4, the highest number of candidates were 35 in total with percentage as 17.5%. This was followed by 33 individuals that accounted for 16.5%. The lowest number of candidates as per the statistical analysis were found to be 2.

Reflector

Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	1	2	1.0	1.0	1.0
	3	2	1.0	1.0	2.0
	4	11	5.5	5.5	7.5
	5	16	8.0	8.0	15.5
	6	21	10.5	10.5	26.0
	7	29	14.5	14.5	40.5
	8	35	17.5	17.5	58.0
	9	49	24.5	24.5	82.5
	10	23	11.5	11.5	94.0
	12	2	1.0	1.0	95.0
	16	6	3.0	3.0	98.0
	18	2	1.0	1.0	99.0
	20	2	1.0	1.0	100.0
	Total	200	100.0	100.0	

Table 5: Reflector analysis

According to the table 5, the reflector analysis indicated that highest frequency was observed under 9 with 49 individuals opting for it. This made up a total of 24.5%. Followed by this, was illustrated under 8 with 35 students concluding up 17.5%. The least percentage was observed with only 1 candidate that made up 1%.

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Valid		Frequency	Percent	Valid Percent	Cumulative Percent
	3	2	1.0	1.0	1.0
	4	8	4.0	4.0	5.0
	5	16	8.0	8.0	13.0
	6	46	23.0	23.0	36.0
	7	42	21.0	21.0	57.0
	8	31	15.5	15.5	72.5
	9	30	15.0	15.0	87.5
	10	17	8.5	8.5	96.0
	11	2	1.0	1.0	97.0
	14	4	2.0	2.0	99.0
	20	2	1.0	1.0	100.0
	Total	200	100.0	100.0	

Table 6: Scoring Chart

The table 6 also presented a scoring chart followed by the number of individuals and percentage. The highest number of candidates were demonstrated with 46 candidates that made up a total of 23%. The lowest frequency indicated was 1%.

DISCUSSION

The findings from the present study are clearly indicative of students' inclined behaviors towards association of learning practices. Habits of self-reflection to becoming independent and development of self-efficacy were observed after the interpretations. This comes in support of the previous literature including [15] that indicate that SDL makes the student compel to go backward and realize the gap between what is learned and what is left out while making the learner more independent and focusing on inner strength and potential rather than being dependent on teachers. A study presented by [10] took the stance from the faculty members of the medical institute regarding the SDL learning style among the students. To seek how it is perceived by the end of teachers, the faculty supported its implementation in the medical colleges and universities where the student itself acts as the owner of its learning ideas, tools, and resources to strengths and weaknesses. The current research study illustrates that SDL practices are also based on the individual understanding and idea towards association of learning habits. In context to this, another study indicated that the difference over the SDL practices among the groups of students belonging to different years in medical institutes is due to the traditional learning practices, teacher-based lectures, and failure of the curriculum to address the cognitive needs of the students [7]. Hence, to foster better behaviors of SDL it is necessary to modify and restructure the curricula where students must dictate themselves to gain better access to knowledge. The study practices indicate that the abilities of reflector, activist, and theorist were built open group discussion over the patient's issues, critical situations that might arise in the clinical settings to problem-based studies can foster the attitude in medical students to become more self-aware and directed. The previous studies also supported the idea of metacognition that s built with the adoption of the SDL learning style. The idea funds the self-reflection and increases the enthusiasm towards continual self-assessment. The study findings were in parallel with the earlier scholarly finding where the SDL learning style makes the students adhere and concentrate more on evaluation and examination resulting in better reasoning and diagnostic skills. Moreover, another major finding added by the research is the identification of the students about their strengths and weaknesses. Thus, making them aware of whether they need more attentive practices, how to detect the available opportunities and make effective use of them.

CONCLUSION

Hence, it can be said that association of learning fits best with the primary goal of education that is reasoning and understanding towards the opportunities. Moreover, this practice develops the characteristic issue of life-long learning habits in medical students. This is necessary because the entire medical career is based on openness towards learning and finding appropriate resources that can provide guidance for the future learning process. It was also studied that course activities supported by the lectures and practical clinical experiences can together support students in the medical profession. Moreover, medicine is associated with evidence-based learning that is possible through active learning gained from the SDL approach. From the literature review, it was diagnosed that earlier the undergraduate medical education was focused on teacher-centered learning practices with a highly-disciplined curriculum. One of the contributions of the SDL learning style was the problem-based learning attribute that enable the students to utilize the habit of critical thinking and enhanced knowledge-structuring in the clinical as well as non-clinical context.

REFERENCES

[1] Creswell J. A frame work for design; research design quantitative, qualitative and mixed methods approaches. Sage publication, Clafornia 91320, 2003; 1-26.

[2] Irfan Shukr, Roop Zainab, Mowadat H Rana. Learning style of postgraduate and undergraduate medical students.JCPSP. 2013; Vol 23(1): 25-30.

[3] Viberg O, Hatakka M, Bälter O, Mavroudi A.The current landscape of learning analytics in higher education. Computers in Human Behavior. 2018; 89: 98-

DOI:https://doi.org/10.54393/pbmj.v5i5.309

110.doi.org/10.1016/j.chb.2018.07.027
[4] Azevedo R, Taub M, Mudrick NV. Understanding and reasoning about real-time cognitive, affective, and metacognitive processes to foster self-regulation with advanced learning technologies. doi.org/10.4324/9781315697048-17
[5] Wilson D, Conyers M. Developing growth mindsets: Principles and practices for maximizing students' potential. Ascd; 2020 May 26.
[6] Kamal I, Karim MK, Awang Kechik MM, Ni X, Razak HR. Evaluation of Healthcare Science Student Learning Styles Based VARK Analysis Technique. International Journal of Evaluation and Research in Education. 2021 Mar;10(1):255-61.doi.org/10.11591/ijere.v10i1.20718
[7] Rezigalla AA, Ahmed OY. Learning style preferences among medical students in the College of Medicine, University of Bisha, Saudi Arabia(2018). Adv Med Educ Pract. 2019 Sep 6; 10:795-801. doi: 10.2147/AMEP.S219176.
[8] Khiat H. Academic performance and the practice of self-directed learning: The adult student perspective. Journal of further and Higher Education. 2017 Jan 2;41(1): 44-59.doi.org/10.1080/0309877X.2015.1062849
[9] Karim MR, Asaduzzaman AK, Talukder MH, Alam KK, Haque F, Khan SJ. Learning style preferences among undergraduate medical students: an experience from different medical colleges of Bangladesh. Bangladesh Journal of Medical Education. 2019 Dec 25;10(2):26-30. doi.org/10.3329/bjme.v10i2.44640
[10] Premkumar K, Vinod E, Sathishkumar S, Pulimood AB, Umaefulam V, Prasanna Samuel P, et al. Self-directed learning readiness of Indian medical students: a mixed method study. BMC Med Educ. 2018 Jun 8;18(1):134. doi: 10.1186/s12909-018-1244-9.
[11] Amin A. Effect of Learning Style and Intelligence type on Academic Performance of Nursing Students.
[12] Wong RSY, Siow HL, Kumarasamy V, Shaherah Fadhlullah Suhaimi N. Interdisciplinary and inter-institutional differences in learning preferences among Malaysian medical and health sciences students. J Adv Med Educ Prof. 2017 Oct;5(4):164-171.
[13] Williamson SN. Development of a self-rating scale of self-directed learning. Nurse Res. 2007;14(2):66-83. doi: 10.7748/nr2007.01.14.2.66.c6022.
[14] Kidane HH, Roebertsen H, van der Vleuten CPM. Students' perceptions towards self-directed learning in Ethiopian medical schools with new innovative curriculum: a mixed-method study. BMC Med Educ. 2020 Jan 8;20(1):7. doi: 10.1186/s12909-019-1924-0.
[15] Yang C, Zhu Y, Jiang H, Qu B. Influencing factors of self-directed learning abilities of medical students of mainland China: a cross-sectional study. BMJ Open. 2021 Oct 6;11(10): e051590. doi: 10.1136/bmjopen-2021-051590.
[16] Bokhari NM, Zafar M. Learning styles and approaches among medical education participants. J Educ Health Promot. 2019 Sep 30; 8:181. doi: 10.4103/jehp.jehp_95_19.
[17] Bhandari B, Chopra D, Agarwal P, Panwar A, Kaur D, Sidhu TK. Approbation of Self-directed Learning by first year medical students: a mixed method study. medRxiv. 2021 Jan 1. doi.org/10.1101/2021.08.29.21261700
[18] Nayak MK, Belle VS. various methods of self-directed learning in medical education. MediSys Journal of Medical Sciences. 2020 Dec; 1:15-22. doi.org/10.51159/MediSysJMedSci.2020.v01i01.004
[19] Hernández-Torrano D, Ali S, Chan CK. First year medical students' learning style preferences and their correlation with performance in different subjects within the medical course. BMC Med Educ. 2017 Aug 8;17(1):131. doi: 10.1186/s12909-017-0965-5.
[20] Oyserman D. Culture Three Ways: Culture and Subcultures Within Countries. Annu Rev Psychol. 2017 Jan 3; 68:435-463. doi: 10.1146/annurev-psych-122414-033617.
[21] Zeb S, Yusuf S, Mahmood RA, Zeb R. Gender based differences in self-directed learning readiness amongst medical students of Pakistan. Rawal Medical Journal. 2018 Oct 1;43(4):754-64.
[22] Yasmin M, Naseem F, Masso IC. Teacher-directed learning to self-directed learning transition barriers in Pakistan. Studies in Educational Evaluation. 2019 Jun 1; 61:34-40. doi.org/10.1016/j.stueduc.2019.02.003
[23] Tovar LA, Misischia C. Experiential Learning: Transformation and Discovery through Travel Study Programs. Research in Higher Education Journal. 2018 Oct;35.
[24] Al Kindy S, Al Kindy F, Al Kindy A. The Advantages and Disadvantages of Self Directed Learning: A Survey Study of Saudi Medical Students. Med Ed Publish. 2018 Mar 8. doi.org/10.15694/mep.2018.0000058.1
[25] Nash C. Medical Professionals Require Curricula Support to Overcome Their Reluctance to Embrace Self-Directed Learning in Response to COVID-19. InMedical Sciences Forum 2021 (Vol. 4, No. 1, p. 20). Multidisciplinary Digital Publishing Institute.doi.org/10.3390/ECERPH-3-08986
[26] Viberg O, Hatakka M, Bälter O, Mavroudi A. The

DOI:https://doi.org/10.54393/pbmj.v5i5.309

current landscape of learning analytics in higher education. Computers in Human Behavior. 2018 Dec 1; 89:98-110. doi.org/10.1016/j.chb.2018.07.027

[27] Ryu G, Moon SG. The effect of actual workplace learning on job satisfaction and organizational commitment: the moderating role of intrinsic learning motive. Journal of Workplace Learning. 2019 Oct 14.doi.org/10.1108/JWL-05-2019-0061

[28] Van Deur P, editor. Managing Self-Directed Learning in Primary School Education: Emerging Research and Opportunities: Emerging Research and Opportunities. IGI Global; 2017 Jun 19. doi.org/10.4018/978-1-5225-2613-1

[29] Mohoaduba PL. Self-directed learning readiness of nursing students in their fourth year of study in a public nursing college in Johannesburg, Gauteng Province, South Africa (Doctoral dissertation, Stellenbosch: Stellenbosch University)

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Original Article

Effects of Functional Therapy Program on Elbow Arthropathy of Hemophilia Patient

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ABSTRACT

Hemophilia is an X-linked genetic progressive hemorrhage condition that is characterized by a clotting factor VIII (classic hemophilia, or hemophilia A) or IX (hemophilia B) deficiencies. **Objective:** To determine the comparative effects of functional therapy program and manual therapy program on elbow arthropathy of haemophilia patients. **Methods:** It was a single blinded randomized controlled trial in which assessor was kept blind. In this study non-probability purposive technique was applied. The study was conducted in the Sundas foundation Lahore taking into account consort guidelines. Thirty participants suffering from hemophilia were enrolled in study in 2 groups while considering inclusion and exclusion criteria. Randomization was done through lottery method and concealment was done. Group A (n=15) was treated with manual therapy Grade 1, 2 or 3 mobilization techniques according to patient condition program and Group B (n=15) were treated with functional therapy. Hot pack was used as a baseline treatment for 10 min. For data collection Goniometer was used to measured elbow flexion and extension and Stanford HAQ 20 item Disability for assessing disability. **Results:** *P-value* was <0.01which shows that both groups were effective for managing the patient of hemophilia, but manual therapy show more significant result as compared to functional therapy program. **Conclusion:** In manual therapy treatment group, there was significant improvement in range of movement of elbow joint which enhanced functional activity of arm in haemophilic patients with chronic elbow arthropathy.

INTRODUCTION

Hemophilia is an X-linked genetic progressive hemorrhage condition that is characterized by a clotting factor VIII (classic hemophilia, or hemophilia A) or IX (hemophilia B) deficiencies [1,2]. In severe hemophilia patients have < 1 percent involvement in the coagulation factor, 1-5% in moderate patients and 6-40% in mild patient [3]. Initially hemophilia was treated with intravenous administration of the missing clotting factor, only when bleeding occurred [4]. Across developed countries early prophylactic diagnosis has become the preferred procedure for patients with severe hemophilia [5]. Radial head hypertrophy is a characteristic feature of Elbow arthropathy of patients with haemophilia (PWH). So, correcting the radius head can improve the pronation and supination activities of the forearm [6]. The elbow is not a weight-bearing joint, so restrictions to initial movement (flexion and extension) less affect with usability as the related cycle is progressing worsening. The humerus-ulnar joint is impaired, thus restricting flexion and expansion movements [7]. This impacts normal daily routine activities growth. In certain cases, bone deformity may contribute to ulnar neuropathy [8]. Searching for signs of hemophilic arthropathy is an essential part of assessing hemophilic patients, even in the case of young patients benefiting from primary or

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secondary prophylaxis [9]. Recurrent joint hemorrhages cause damage to various joint elements with subsequent arthropathy growth [10]. This study focused to assess the development of hemophilic arthropathy in children by using clinical, X-ray and MRI scores to compare their relative contribution to the disease assessment [11]. Many fitness treatments resulted in change in one or more of the measures assessed, including discomfort, range of motion, energy, and resistance to walking [12]. Hydrotherapy may be more effective in relieving pain in adults than land exercises. Functional exercises such as partial weight-bearing exercises and walking the treadmill appear to be more effective than static or short arc exercises for muscle improvement [13]. Such results fit with the many unchecked accounts of interference in the hemophilia literature. Several researchers, though, used prophylactic conditions until exercise and other studies even examined people with mild hemophilia [14]. Sufficient weight-bearing physical activity in teenage years, particularly in the area of puberty, is related with the gaining and maintenance of high bone mineral density which helps to prevent osteoporosis in later life. Adult PWH on long-term prophylaxis has also been documented not to suffer a reduction of bone mass independent of their degree of physical activity [15]. Arthropathy is a common complication which leads to pain and disability in people with hemophilia. A new approach is measuring individual physical performance at PWH [16]. The goal of this analysis was to equate the subjective physical performance of PWH to healthy controls and to associate the findings with objective data. The HEP-Test-Q proved to be a workable test, that reinforced objective measurements and is therefore appropriate for the initial indicator of physical performance in PWH clinical practice [17]. It is evident that manual therapy program for elbow arthropathies is well established. There is need to establish standardized home-based functional therapy program for elbow arthropathies in patients with hemophilia. Functional therapy program is totally self/home based management to improve and maintain the joint mobility. This study helps the researchers and clinician to manage the arthropathies of different joints. The aim of this research was to investigate improvements in musculoskeletal processes over a six-week of physical therapy treatment sessions along with replacement therapy in a young hemophiliac group of patients and to evaluate the effect of a formal recovery program in hemophiliac arthropathy patients. If therapy was given at an early age the effectiveness of therapy would be greater, in this study participants were limited and includes only male patients aged 18 years or younger.

METHODS

It was a single blinded randomized controlled trial in which assessor was kept blind. Non-probability purposive technique was applied. The study was conducted in the Sundas foundation Lahore taking into account CONSORT guidelines. Duration of the study was 6 months. Total sample size was 30 with 20% dropout rate. Thirty participants suffering from hemophilia were enrolled into study (15 participant in each group) in 2 groups while considering inclusion and exclusion criteria. Inclusion criteria comprise Age group 5 -20 years, Children with enough motivation and cognition to follow directions to task, appeared alert and oriented to their surroundings, Parental consent, no part take in further therapeutic plan decide physical therapy. Exclusion Criteria comprise of children with active history of fracture and open wound, Joint laxity, sensory motor impairment, hemarthrosis, mental retardation psychological issues, other systematic diseases. Before enrolling the participant in the study informed consent were taken from them in written, and also all the information were given to them regarding their involvement into our study, treatment session and taken them into confidence that their personal data were kept confidential. Group A (n=15) was treated with manual therapy Grade 1, 2 or 3 mobilization techniques according to patient condition program and Group B (n=15) were treated with functional therapy. Hot pack was used as a baseline treatment for 10 min. For data collection Goniometer was used to measured elbow flexion and extension and Stanford HAQ 20 item Disability for assessing disability. Data was collected pre and post treatment. Treatment sessions consisted of 6 weeks. In Group A treatment procedure given to patients was Elbow joint mobilization (Grade 1 & Grade 2) of for 5 min with base line treatment of hot pack for 10 min. Proprioceptive neuromuscular facilitation (PNF) including upper limb abduction, flexion, and external rotation of shoulder. Muscle stretching (within the limits of joint mobility) for 15 min. Local cryotherapy with cold pack for 15 min. Patients were reassessed at the end of 6 weeks through Stanford HAQ 20 item Disability scale [18]. In Group B (n=2) treatment procedure was base line treatment of hot pack for 10 min, dragging trolley bag (15 Rep), throwing, and catching football (15 Rep), hold 4liter water bottle for 3-5 mints & Rep 5 times, Supinate & Pronate elbow while holding 1 kg weight, ball Squeezing hold for 10 sec 5 rep. drawing the sword 10 rep 3 sets, patients were re assessed at the end of 6 weeks through Stanford HAQ 20 item Disability scale.

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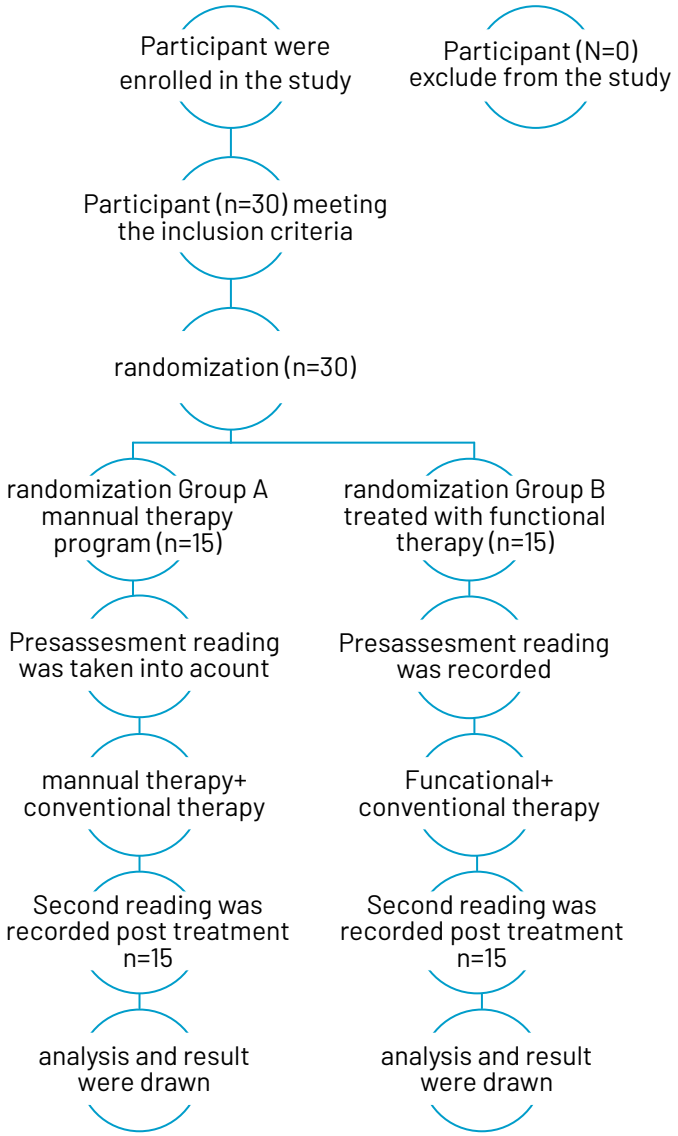

Figure 1: CONSORT diagram

RESULTS

Hemophilia patients with elbow arthropathies were included. Total 30 patients were allocated in two groups. Group A was illustrated to receive manual therapy program and group B was illustrated to receive Functional therapy program. Patients of group A had mean age 12.2± 4.09 years and patient of group B had mean age 11.6± 3.89 years. Table 1 revealed the comparison of flexion and extension range of motion between two groups before and after treatment session with applying Independent t-test.

Range of motion for elbow movement (flexion & extension) *Independent t-test*

Variable	Outcome measurement	Manual Therapy Program n (15) Mean ± SD	Functional Therapy Program n (15) Mean ± SD
Flexion	Pre	87.86± 10.73	97.14± 13.54
	Post	116.00± 11.98	101.78± 12.80
	P	0.01	0.01
Extension	Pre	57.87± 7.01	68.33± 14.47
	Post	26.67+ 6.45	58.57+ 14.34
	P	<0.01	<0.01

ROM (Range of motion), *P* (Coefficient of alpha, P≤0.05), SD (Standard Deviation), Pre (Pretreatment), Post (Post treatment)

Table 1: Comparison of flexion and extension range of motion between two groups before and after treatment session

With p≤0.01 which shows that both groups were effective for managing the patient of hemophilia, but manual therapy show more significant result as compared to functional therapy program (Table 2).

Independent T-test HAQ

Variables	Outcome measurement	Manual Therapy Program n (15) Mean ± SD	Functional Therapy Program n (15) Mean ± SD
HAQ	Pre	23.07± 5.26	25.60± 1.19
	Post	14.13+ 3.93	21.47+ 4.34
	P	<0.01	<0.01

HAQ (Health assessment questionnaire disability index), P (Coefficient of alpha, P≤0.05), SD (Standard Deviation), Pre (Pretreatment), Post (Post treatment)

Table 2: Independent T-test HAQ

DISCUSSION

Schafer GS conducted a systematic research to assess the impact of physical exercise on pain and musculoskeletal function in patients with hemophilia; randomized, non-randomized and quasi-randomized controlled trials including patients with hemophilia over 18 years of age who have undergone physical activity alone or with other therapies; Included in the care of elbow, knee and/or ankle injuries, such as thermo phototherapy, which was associated with those without medication, no involvement or other forms of operation. This systematic review proposes that physical workout and physiotherapy techniques can promote a decrease in pain perception and improve range of motion and muscle strength of hemophilia patients [19]. Our study result was supported by above mention study. For flexion in group A (manual therapy program) mean & standard deviation before treatment was (87.86± 10.73) and after treatment it was (116.00± 11.98). While in group B (functional therapy program) mean & standard deviation formerly treatment was (97.14± 13.54) and after treatment it was (101.78± 12.82). For extension in group A (manual therapy program) mean & standard deviation before treatment was (57.87± 7.01) and after treatment it was (26.67± 6.45). While in group B (functional therapy program) mean & standard deviation formerly treatment was (68.33± 14.47) and after treatment it was (58.57± 14.34). For HAQ in group A (manual therapy program) mean & standard deviation before treatment was (23.07± 5.26) and after treatment it was (14.13± 3.93). While

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in group B (functional therapy program) mean & standard deviation formerly treatment was (25.60± 1.19) and after treatment it was (21.47± 4.34). With p<0.01 which shows that both groups were effective for managing the patient of hemophilia, but manual therapy show more significant result as compared to functional therapy program. Another study supports our study results GOTO M et al., (2014) conducted a randomize control trial. This study is proposed to clarify the efficacy of home exercise self-monitoring for hemophiliacs with intervention in four hospitals in Japan over 8 weeks. Home exercise improved their physical function without raising the frequency of bleeding and pain. A self-monitoring home exercise routine has the capacity for tolerance to, frequency of knee extension and self-efficacy in hemophilia. Using the Internet and mobile phones, self-monitoring reached a high rate [20].

CONCLUSION

In manual therapy treatment group, there was a significant improvement in range of movement of elbow joint which enhanced functional activity of arm in haemophilic patients with chronic elbow arthropathy. Physiotherapy treatment program by mobilization, muscle relaxation, and proprioceptive neuromuscular facilitation can enhance perception of flexion and pain in elbow haemophilic arthropathy patients.

REFERENCES

[1] Mannucci PM. Hemophilia therapy: the future has begun. Haematologica. 2020 Mar;105(3):545-553. doi: 10.3324/haematol.2019.232132.

[2] Perrin GQ, Herzog RW, Markusic DM. Update on clinical gene therapy for hemophilia. Blood. 2019 Jan 31;133(5):407-414. doi: 10.1182/blood-2018-07-820720.

[3] Weyand AC, Pipe SW. New therapies for hemophilia. Blood. 2019 Jan 31;133(5):389-398. doi: 10.1182/blood-2018-08-872291.

[4] Forsyth A, Blamey G, Lobet S, McLaughlin P. Practical guidance for non-specialist physical therapists managing people with hemophilia and musculoskeletal complications. Health. 2020 Jan 21;12(2):158-79. DOI: 10.4236/health.2020.122014.

[5] Kikuchi K, Komachi T, Honma Y, Fujitani J. Benefits of physical therapy for people living with hemophilia. Glob Health Med. 2021 Dec 31;3(6):409-412. doi: 10.35772/ghm.2021.01026.

[6] Vochteloo AJ, Roche SJ, Dachs RP, Vrettos BC. Total elbow arthroplasty in bleeding disorders: an additional series of 8 cases. J Shoulder Elbow Surg. 2015 May;24(5):773-8. doi: 10.1016/j.jse.2015.01.004.

[7] Rodriguez-Merchan EC, De la Corte-Rodriguez H. Complications of hemophilia in the elbow: current management. Expert Rev Hematol. 2020 Sep;13(9):991-1001. doi: 10.1080/17474086.2020.1803061.

[8] Cuesta-Barriuso R, Gómez-Conesa A, López-Pina JA. Manual and educational therapy in the treatment of hemophilic arthropathy of the elbow: a randomized pilot study. Orphanet J Rare Dis. 2018 Sep 3;13(1):151. doi: 10.1186/s13023-018-0884-5.

[9] Alblaihed L, Dubbs SB, Koyfman A, Long B. High risk and low prevalence diseases: Hemophilia emergencies. Am J Emerg Med. 2022 Jun;56:21-27. doi: 10.1016/j.ajem.2022.02.045.

[10] Hirayama AB, Silva AKCD, Rocha JS, Roberti MDRF. Prevalence of symptoms in hemophilia carriers in comparison with the general population: a systematic review. Hematol Transfus Cell Ther. 2019 Oct-Dec;41(4):349-355.doi: 10.1016/j.htct.2019.02.006.

[11] Konkle BA, Huston H. Hemophilia a. 2017.

[12] Cuesta-Barriuso R, Trelles-Martínez RO. Manual therapy in the treatment of patients with hemophilia B and inhibitor. BMC Musculoskelet Disord. 2018 Jan 22;19(1):26. doi: 10.1186/s12891-018-1934-9.

[13] Donoso-Úbeda E, Meroño-Gallut J, López-Pina JA, Cuesta-Barriuso R. Effect of manual therapy in patients with hemophilia and ankle arthropathy: a randomized clinical trial. Clin Rehabil. 2020 Jan;34(1):111-119. doi: 10.1177/0269215519879212.

[14] Strike K, Mulder K, Michael R. Exercise for haemophilia. Cochrane Database Syst Rev. 2016 Dec 19;12(12):CD011180. doi: 10.1002/14651858.CD011180.pub2.

[15] Negrier C, Seuser A, Forsyth A, Lobet S, Llinas A, Rosas M et al. The benefits of exercise for patients with haemophilia and recommendations for safe and effective physical activity. Haemophilia. 2013 Jul;19(4):487-98. doi: 10.1111/hae.12118.

[16] Stephensen D, Bladen M, McLaughlin P. Recent advances in musculoskeletal physiotherapy for haemophilia. Ther Adv Hematol. 2018 Jul 2;9(8):227-237. doi: 10.1177/2040620718784834.

[17] Prasetyo M, Moniqa R, Tulaar A, Prihartono J, Setiawan SI. Correlation between Hemophilia Early Arthropathy Detection with Ultrasound (HEAD-US) score and Hemophilia Joint Health Score (HJHS) in patients with hemophilic arthropathy. PLoS One. 2021 Apr 7;16(4):e0248952. doi: 10.1371/journal.pone.0248952.

[18] Douglas-Withers J, McCulloch K, Waters D, Parker K,

DOI:https://doi.org/10.54393/pbmj.v5i5.391

Hogg N, Mitsuhashi T et al. Associations between Health Assessment Questionnaire Disability Index and physical performance in rheumatoid arthritis and osteoarthritis. Int J Rheum Dis. 2019 Mar;22(3):417-424. doi: 10.1111/1756-185X.13460.

[19] Schäfer GS, Valderramas S, Gomes AR, Budib MB, Wolff ÁL, Ramos AA. Physical exercise, pain and musculoskeletal function in patients with haemophilia: a systematic review. Haemophilia. 2016 May;22(3):e119-29. doi: 10.1111/hae.12909.

[20] Goto M, Takedani H, Haga N, Kubota M, Ishiyama M, Ito S et al. Self-monitoring has potential for home exercise programmes in patients with haemophilia. Haemophilia. 2014 Mar;20(2):e121-7. doi: 10.1111/hae.12355

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Original Article

Effect of Speech Therapy in Children with Cochlear Implant

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ABSTRACT

Hearing loss is the absence or difficulty in hearing. And its levels range from mild severe to profound while the term deafness is used for the person who cannot hear it. **Objective:** To determine the effect of speech therapy in children with cochlear implant. **Methods:** This descriptive study was carried out at Fatima Memorial College Medicine and Dentistry, from 1st October 2021 to December 2021 to determine the effect of speech therapy in children with cochlear implant. For this purpose a total of 30 children who were implanted and receiving speech therapy were evaluated. Effect of speech therapy was determined by collecting data from the parents of cochlear implant children by using a questionnaire. The questionnaire constituted the receptive and expressive language measures that determine the effect of speech therapy. Questionnaire which was used as data collecting instrument that was designed by expert opinion and literature review. **Results:** Result indicated that out of 30 children who were implanted and receiving speech therapy, 30 (100%) were communicating verbally using word phrase and sentence. These findings suggested that children with cochlear implant were communicating verbally instead of sign language or gestural mode of communication and improved intelligibility. **Conclusions:** It is concluded that speech therapy is effective in children with cochlear implant.

INTRODUCTION

In the 1980s, World Health Organization recommended the term 'deaf' which can be used for individuals who have lost their ability to hear and are so severely impacted that they need hearing aids to amplify the sounds which might come in their reception [1]. WHO in the 1980s recommended the following classifications on the basis of pure tone audiometry taken from a number of frequencies 500,1000, 2000 [2]. Mild range is from 26 to 40. While the moderate ranges from 41 to 55 severe moderately severe ranges from 56 to 70. Severe is from 71 to 91 and profound is more than 91. Children with profound ever hearing loss that is greater than 90 decibels loss or total deafness failed to develop speech and communicative skills and are termed as deaf, mute or dumb. The children have no defect in their speech production apparatus, but are unable to hear the sound and hence imitated. The main effect is deafness. They never heard a speech sound and therefore cannot develop it [3]. So to develop speech and language communication, a child must be able to fully participate and engage with the wider society in order to develop expressive and receptive skills. Reception of information through visual auditory and sang tactile. That is the sense organs will be expressed in the

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form of oral written and sign language by which the child will be able to express his or her opinions and ideas [4]. But when the child is completely deaf or the Cochlear and hearing apparatus is completely dysfunctional, then the child may require a cochlear implant to develop speech skills and by the means of Speech and Language Pathology they can be made to understand and interpret sounds [5]. There are many therapies available to address the key learning and communication of for children with hearing impairment with the advancement of cochlear implant large number of patients who have the means to undertake the procedure and have the environment to support their children are opting for this procedure and has become the mainstream intervention for people who are deaf [6]. Verbal therapy is a type of therapy which is used after the child is implanted with the artificial cochlea and would help the child develop his speech and language abilities or do verbal therapy can also be used in other degrees of hearing impairment. That is the mild and moderate with the use of hearing aids this therapy is equally as effective [7]. Trained and certified or do you verbal therapists provide sessions, therapies, train the parents and manage educational services for the children with hearing impairment or cochlear implant. The ultimate goal of this therapy is to develop a sense of listening, which can later help in the child's development as well as language use [8]. If the ability to respond to the presence or absence of sound is the first step and then the child moves on to pay attention to that particular sound and imitate it in a manner which would be able to communicate with the wider audience when the child learns different sounds and is able to imitate them, the ability of repeating becomes markedly increase in the hearing stimulus or speech stimulus [9].The ability to understand the meaning of this speech and by answering questions and following instructions or participating in a conversation. The child's response must be quantitatively different than stimuli presented. The effectiveness of the speech therapy of these patients depends on their age, their hearing history, their age of cochlear implant, the mode of communication learning style and the literacy rate. There are several therapies approaches available which are similar to audio verbal therapy, or total communication or Cued Speech. Each of these approaches differ in the amount of structured therapy, which the child will require as a consequence [10].

METHODS

This descriptive cross-sectional study was carried out at FMH College of Medicine and Dentistry, from 1st October 2021 to December 2021 to determine the effect of speech therapy in children with cochlear implant. For this purpose a total of 30 children who were implanted and receiving speech therapy were evaluated. Effect of speech therapy was determined by collecting data from the parents of cochlear implant children by using a self-designed questionnaire. The questionnaire constituted the receptive and expressive language measures that determine the effect of speech therapy. Questionnaire which was used as data collecting instrument that was designed by expert opinion and literature review.

RESULTS

Out of 30 subjects, 17(56.7%) were males and 13(43.3%) were females and the mean age of patients was 14.30± 7.53 years as shown in Table 1.

Demographics		N=Frequency	%Frequency
Gender	Male	17	56.7%)
	Female	13	43.3%
Age of Patients	Minimum	Maximum	Mean
	7	42	14.30 ± 7.53

Table 1: Participants Characteristics

On asking the respondents about hearing loss of their children, 26(86.7%)responded that the hearing loss of their child was congenital and 4(13.3%) responded that the hearing loss of their child was acquired. On asking the respondent about diagnosis of hearing loss of their children, 27 (90%) responded that their child was diagnosed at the age of 1 to 12 months, and 3(10%) responded that their child was diagnosed after the age after 36 months. On asking the respondent about the start of speech therapy sessions, 19(63.3%)responded that their speech therapy was started 2 month after cochlear implantation, 9(30%) responded that their speech therapy was started 3 month after cochlear implantation, 1(3.3%) responded that their speech therapy was started 4 months after cochlear implantation, 1(3.3%) responded that their speech therapy was started 6 month after cochlear implantation. On asking the respondent about the number of their speech therapy sessions after cochlear implantation, 3(10%)responded that they had only 1 speech therapy session per month,6(20%)responded that they had only 4 speech therapy session per month, 211(69.9%) responded that they had more than 4 per months speech therapy sessions. On asking the respondent about the communication of their children after cochlear implantation, 30(100%) responded that their child communicate verbally after cochlear implantation, none of them reported the sign language or gestural mode of communication of their child as shown in Table 2 below.

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Questions	Response	Frequency (%)
Is hearing loss of child Congenital or Acquired?	Yes	26 (86.7)
	No	4(13.3)
Is hearing loss of patients Unilateral or Bilateral?	Yes	30(100.0)
	No	0
When the HL was first diagnosed?	1-12	20 (66. 6)
	13 -24	2 (6. 6)
	25- 36	5 (16. 6)
	after 36	3 (10.0)
What was age at the time of cochlear implant?	1-12	2 (6.7)
	13 -24	2 (6.7)
	25- 36	6 (20.0)
	after 36	20 (66.6)
When was speech therapy started after CI?	After 1 month	0
	After 2 months	19(63.3)
	After 3 months	9(30)
	After 4 months	1(3.3)
	After 5 months	0
	After 6 months	1(3.3)
No. of speech therapy sessions after CI?	1 per month	3(10)
	2 per month	0
	3 per month	0
	4 per month	6(20)
	More than 4 per month	21(69.9)
How does your child communicate after cochlear implantation?	Verbal communication	30(100)
	Non Verbal communication	

Table 2: Question-wise Analysis

DISCUSSION

The results indicated directly that the verbal communication of children with cochlear implant was 100% by using word, phrase and sentence [10]. The findings suggested that the speech therapy was effective in children with cochlear implant but some discrepancies were also observed regarding the implantation of the children and speech therapy sessions [11]. On asking the respondent when they came to know about the deafness of their child. 27(90%) responded that the identification was done when the child was less than 12 months, 3 (10%) said that they identify the impairment in their child after age of 36 months [12]. As the findings suggest, the majority of respondents identified deafness in their child when he/she was less than 12 months of age. It shows that symptoms of deafness were found quite evident. The result also suggested more concern of the parents towards their children. It is important to note that majority of parents were found more concerned towards the verbal communication of their children as they implanted their child to restore the auditory skills [13,14]. The result suggested that 2 (6.7%) children were implanted at the age of 1 to 12 months, 2 (6.7%) children were implanted at the age of 13 to 24 months, 6(20.0%) children were implanted at the age of 25 to 36 months, and 20 (66.7%) children were implanted after 36 months of their age. It is important to note that early implantation is more important to develop verbal communication but these findings suggested that 20 (66.7%) children were implanted after the age of 36 months of diagnosis [15,16]. Financial situation can be possible reasons for this delay in cochlear implantation. On asking about the start of speech therapy sessions from the parents of cochlear implant children 19(63.3%) responded that speech therapy was started 2 month after cochlear implantation, 9(30%) responded 3 month, 1(3.3%) responded 4 months and 1(3.3%) responded that their speech therapy was started 6 month after cochlear implantation. These findings suggested that mostly parents provided speech therapy to their children within 3 months of cochlear implantation which shows their concerns about the verbal communication. It is important to note that intensive speech therapy is more important to develop verbal communication but the result indicated that children received fewer speech therapy sessions as only 21(69.9%) responded that they had more than 4 per months speech therapy sessions, 3 (10%) responded that they had only 1, 6 (20%) responded that they had only 4 speech therapy session per month. There can be many possible reasons for lack of intensive speech therapy sessions, financial situation, availability of speech therapist and cultural atmosphere may be few of them [17,18]. Despite delay in the implantation of children with cochlear implant the expressive and receptive language skills in children with cochlear implant were excellent [19]. Almost 30 (100%) responded that their child is able to understand words, phrase, and sentence and communicate verbally by using words, phrase and sentence after cochlear implantation and 30 (100%) responded that their child's speech is intelligible because speech therapy was started immediately after cochlear implantation and greater no. of speech therapy sessions per month [19,20].

CONCLUSION

It is concluded from this study that speech therapy is effective in children with cochlear implant.

REFERENCES

[1] Wake M, Poulakis Z, Hughes EK, Carey-Sargeant C, Rickards FW. Hearing impairment: a population study of age at diagnosis, severity, and language outcomes at 7-8 years. Arch Dis Child. 2005 Mar;90(3):238-44. doi: 10.1136/adc.2003.039354.

[2] Stapells DR, Oates P. Estimation of the pure-tone audiogram by the auditory brainstem response: a review. Audiol Neurootol. 1997 Sep-Oct;2(5):257-80. doi: 10.1159/000259252.

[3] Johnston T. W(h)ither the deaf community? Population, genetics, and the future of Australian sign language. Am Ann Deaf. 2004 Winter;148(5):358-75. doi: 10.1353/aad.2004.0004.

DOI:https://doi.org/10.54393/pbmj.v5i5.463

[4] Stokoe WC. Language in hand: Why sign came before speech. Gallaudet University Press; 2001.
[5] Lim SY, Simser J. Auditory-verbal therapy for children with hearing impairment. Ann Acad Med Singap. 2005 May;34(4):307-12.
[6] Shivaprakash S, Castro NO. Performance of hearing-impaired children with hearing aid and cochlear implant in auditory verbal therapy. Scholarly Journal of Otolaryngology. 2019 Jun 13;2(3):10-32474. doi: 10.32474/SJO.2019.02.000140.
[7] Bates E, Camaioni L, Volterra V. The acquisition of performatives prior to speech. Merrill-Palmer quarterly of behavior and development. 1975 Jul 1;21(3):205-26.
[8] Niparko JK, Tobey EA, Thal DJ, Eisenberg LS, Wang NY, Quittner AL et al. Spoken language development in children following cochlear implantation. JAMA. 2010 Apr 21;303(15):1498-506. doi: 10.1001/jama.2010.451.
[9] Peterson NR, Pisoni DB, Miyamoto RT. Cochlear implants and spoken language processing abilities: review and assessment of the literature. Restor Neurol Neurosci. 2010;28(2):237-50. doi: 10.3233/RNN-2010-0535.
[10] Davis A, Bamford J, Wilson I, Ramkalawan T, Forshaw M, Wright S. A critical review of the role of neonatal hearing screening in the detection of congenital hearing impairment. Health Technol Assess. 1997;1(10):i-iv, 1-176.
[11] Joint Committee on Infant Hearing. Year 2000 position statement: principles and guidelines for early hearing detection and intervention programs. Joint Committee on Infant Hearing, American Academy of Audiology, American Academy of Pediatrics, American Speech-Language-Hearing Association, and Directors of Speech and Hearing Programs in State Health and Welfare Agencies. Pediatrics. 2000 Oct;106(4):798-817. doi: 10.1542/peds.106.4.798.
[12] Ramkalawan TW, Davis AC. The effects of hearing loss and age of intervention on some language metrics in young hearing-impaired children. Br J Audiol. 1992 Apr;26(2):97-107. doi: 10.3109/03005369209077877.
[13] McMillan J, Jones FL. The ANU3_2 scale: a revised occupational status scale for Australia. Journal of sociology. 2000 Mar;36(1):64-80. doi.org/10.1177/1440783300003600105.
[14] Thompson DC, McPhillips H, Davis RL, Lieu TL, Homer CJ, Helfand M. Universal newborn hearing screening: summary of evidence. JAMA. 2001 Oct 24-31;286(16):2000-10. doi: 10.1001/jama.286.16.2000.
[15] Blamey P, Barry J, Bow C, Sarant J, Paatsch L, Wales R. The development of speech production following cochlear implantation. Clinical Linguistics & Phonetics. 2001 Jan 1;15(5):363-82. doi.org/10.1080/02699200010017823.
Cole EB, Flexer C. Children with hearing loss: Developing listening and talking, birth to six. Plural Publishing; 2019 Jul 22.
[17] ALANAZI M. Communicating with Deaf Students in Inclusive Schools: Insights from Saudi University Faculty. Eurasian Journal of Educational Research. 2021(95):188-209.
[18] Hilviu D, Parola A, Vivaldo S, Di Lisi D, Consolino P, Bosco FM. Children with hearing impairment and early cochlear implant: A pragmatic assessment. Heliyon. 2021 Jun 30;7(7):e07428. doi: 10.1016/j.heliyon.2021.e07428.
[19] King A, Gilles D, Xu Y. Investigating caregiver coaching in an early intervention model for children with hearing loss. Early Child Development and Care. 2021 Oct 19:1-9. doi.org/10.1080/03004430.2021.1989424.
[20] Chen PH, Lim TZ, Chang ST, Cho MY. Developing new scales for assessing parents' aural and oral rehabilitation skills to interact with children with hearing loss. Int J Audiol. 2021 Oct;60(10):797-807. doi: 10.1080/14992027.2020.1861345

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Original Article

Effects of Neurodynamics on Spasticity in Upper Extremity of Stroke Patients

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ABSTRACT

Stroke leads to long term disability and spasticity is one of them. Neurodynamic is a movement which aimed to restore the electrical signal directed to the nerve and the spinal cord. The neural mobilization is used to restore the movement and improve elasticity of nervous system to improve the arm function and regain the motor ability in patients with stroke. **Objective:** To assess the effects of neurodynamics on spasticity in upper extremities of stroke patients. **Methods:** It is a Randomized controlled trial. Data was collected from 46 stroke Patients. Simple Random Sampling was done through tossing a coin and data was collected from District headquarters hospital (DHQ) Jhelum. Patients with chronic stroke, age 40-60 years, Modified Ashworth Scale (MAS) ≥1 to 3 and both male and female were included in this study. For 6 weeks, the experimental group received conventional therapy with neurodynamics (10 reps/ set, 1 set/ day, 3 days/week), whereas the control group received conventional treatment (12 reps/ set, 1 set/ day, 3 days/week). The MAS, Fugl Meyer Upper Extremity Scale (FMUE), goniometry and Action Research Arm Test were used to examine the participants at zero, three, and six weeks (ARAT). The *Shapiro-Wilk test* was used to ensure that the data was normal, and statistical analysis was performed using SPSS 21. **Results:** Statistically significant improvement was found in between group analyses in MAS, FM-UE motor score and AROM as the *p-value* was <0.05. There was no significant difference in ARAT, FM-UE sensation, joint pain, passive joint motion, coordination and PROM as *p-value was >0.05*. Statistically significant improvement was found in within group analyses in MAS, FM-UE motor score, sensation, joint pain, AROM and PROM as the *p-value was <0.05* except in ARAT and FM-UE coordination. **Conclusion:** The result shows that neurodynamic combined with conventional treatment was more effective than conventional treatment alone to reduce spasticity, improve upper extremity function and AROM. The result also shows that there was significant improvement in upper extremity joint pain, sensation and PROM and no improvement occurred in coordination and fine task performance within groups. The study concludes that neurodynamic is effective for spasticity and has additional benefit in improving UE functional performance and active range of motion but the effects of neurodynamic combined with conventional treatment are no different than conventional treatment alone on passive range of motion, joint pain, coordination, fine task performance and sensation.

INTRODUCTION

Stroke leads to disability and spasticity is one of them [1]. Major cause of stroke is disturbance of blood supply to brain which results in sudden loss of neurological function. Stroke results in variety of deficits including motor, sensory, cognitive, language, perceptual deficits and also affect level of consciousness. In motor deficit hemiplegia

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occurs on affected side. Neural and muscular changes occur after stroke which leads to abnormally increased tone and muscle stiffness [2,3]. Spasticity is a motor disorder in which resistance increases with the speed of movement [4]. Spasticity is the consequence of damage to upper motor neurons which results from brain lesion e. g. stroke [5]. Spasticity is common in upper motor neuron disorder. Muscle hypertonia also results from shortening of muscle. It results from imbalance between excitation and inhibition [6]. In Asia, prevalence of spasticity is 30-80 percent. Spasticity affects 27 percent of stroke patients during 1st month, 28 percent during 3rd and 43 percent during 6th month [7]. Neurodynamic is the application of mechanics and physiology of the nervous system integrated with musculoskeletal system [8], which comprises of three-part system. Mechanical interface involve interaction between the nervous and musculoskeletal systems, neural structures and innervated tissues at zero level neurodynamic testing is contraindicated and at different level [9]. The neural mobilization is used to restore the movement and improve elasticity of nervous system to improve the arm function and regain the motor ability [10] in patients with neurological diseases such as stroke [11]. Neurodynamics is a movement which aimed to restore the electrical signal directed to the nerve and the spinal cord. Treatment mechanism of nerve comprises of movement, elasticity, conduction and reduction of axoplasmic flow, nerve conduction is promoted by decreasing pressure, and recovery occurs in soft tissues which include injured nerve and muscles, and the function is improved in the relevant region [12]. This study concluded that neurodynamic was effective to increase ROM but not effective to reduce spasticity. A majority of these studies concluded a positive therapeutic effect from using Neurodynamic for improving range and overall performance of upper limb. Several studies have been conducted in the past to examine the benefits of various physiotherapy treatment options for spasticity, but the current study will look at the effects of Neurodynamic on spasticity and motor function in stroke patients.

METHODS

Patients were randomized to experimental group (n=23) and control group (n=23) using simple random sample with randomization by tossing a coin. Data was gathered from 46 patients with hemiplegia induced by stroke from DHQ hospital Jhelum after informed permission was obtained. Three patients in the experimental group and two in the control group were dropped out (Figure 1). From January to June 2019, a six-month study was carried out. The study comprised male and female volunteers aged 40 to 60 years old who were scored on the Modified Ashworth Scale (MAS) 1 to 3 and chronic stroke (6 to 12 months) patients. Patients with a MAS of 1 to 4, pain in the upper extremity, upper extremity orthopedic issue (e.g. fracture), upper motor neuron illnesses other than stroke Acute stroke patients (1 to 6 months) and patients with evidence of significant pathology (e.g., cancer, inflammatory condition, infection) were excluded from the research. Data collection variables were spasticity, range of motion and upper extremity function. The Action research arm test (ARAT) was used to examine upper limb performance, Goniometry was used to assess range of motion, Fugl-meyer upper extremity scale (FM-UE) was used to assess motor functioning, sensation, and joint functioning, and the modified ashworth scale MAS was used to assess spasticity. In the control group (n=23), the intervention consisted of stretching (static stretching for 20 seconds) and active range of motion exercises (within range of motion). Over the course of 6 weeks, the intervention was provided one set each day (12 reps per set) with four repetitions for each movement direction (abduction, flexion, and adduction), three times per week. Traditional therapy (static stretching for 20 seconds) and active range of motion exercises (within limits of range were combined with Neurodynamic (Dynamic neural mobilization technique) which included median, ulnar, and radial nerve mobilization in the experimental group (n=23). Dynamic neural mobilization was progressed from grade 2 to grade 3(a, b, c, d), with dynamic openers applied at the lower level, dynamic closers applied at the higher level, and dynamic closers applied at grade 3. The peripheral nerve was stretched for 20 seconds, with dynamic movement added every 2 seconds for a total of 20 seconds. 13 Over the course of six weeks, one session of neurodynamic was performed every day (10 reps each set) for three days a week. Appropriate analytical abilities were used using SPSS version 21 and Microsoft Excel 2007. For between group comparisons and repeated measure analyses, the effectiveness of the intervention was assessed using one-way ANOVA and the Kruskal Wallis test for normally distributed and skewed data, respectively. For within-group analyses, the ANOVA and Friedman tests were used for normally distributed and skewed data, respectively. There was no significant difference ($P \leq 0.05$).

The anatomical zones were classified on MAUC criteria

"Zone H = central face, eyelids, eyebrows, nose, lips, chin, ear, periauricular sulci, temple, hands, feet, ankles, genitalia, nipples, and nail units"

"Zone M = cheeks, forehead, scalp, neck, jawline, and a pretibial leg"

"Zone L = trunk and extremities excluding areas included in

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Zone H"

The Chi-Square test, with a significance threshold of p0.05., was used to determine the relative frequency of MH in the study populations and subgroups.

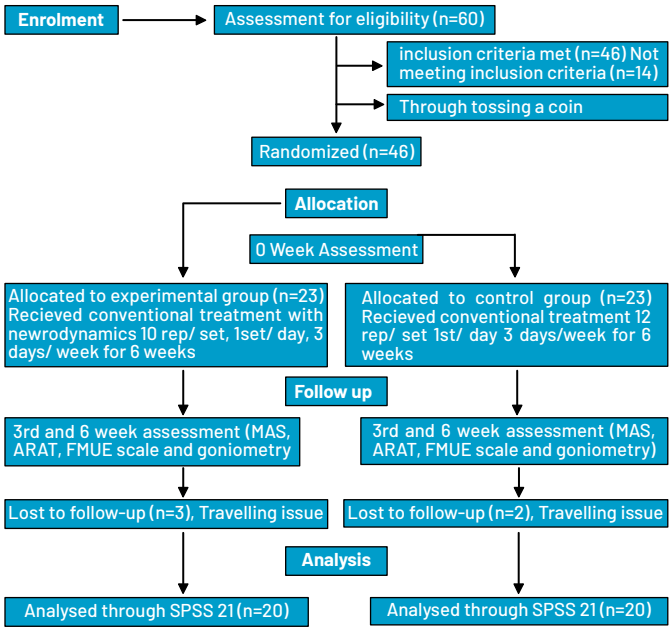

Figure 1: CONSORT Flow chart

RESULTS

Between group and within group analyses for MAS:

Kruskal Wallis test was used for between group analyses for MAS. *P- value* was 0.000 which was < 0.05 which shows that there was improvement in experimental group (neurodynamic After 6 weeks, the combination therapy group outperformed the control group (traditional treatment alone); *Friedman test* was used for within group analyses for MAS. *P-value* was 0.000 for experimental group of MAS was < 0.05 which shows that that there was improvement within experimental group. *P-value* was > 0.05 in control group of MAS which indicates that there was no improvement within control group after 6 weeks

Between group and within group analyses for FM-UE motor score:

Kruskal Wallis test was used for between group analyses for FM-UE motor score, *P-value* was 0.04 which was < 0.05 which shows that there was improvement in experimental group in comparison to the control group (neurodynamic coupled with conventional therapy) (conventional treatment alone) 6 weeks later; *ANOVA* was used for within group analyses for FM-UE motor score for experimental group as data was normally distributed. *P-value* was 0.000 for FM-UE motor score for experimental group which was < 0.05 which shows that there was improvement within experimental group after 6 weeks. *Friedman test* was used for within group analyses for FM-UE motor score for control group as data was skewed. *P-value* was 0.006 for control group which was < 0.05 which shows that there was improvement within control group after 6 weeks.

Between group and within group analyses for ARAT:

Kruskal Wallis test was used for between group analyses for ARAT. *P-value* was 0.099 which was > 0.05 which shows that there was no difference between neurodynamic and conventional treatment applied in After 6 weeks, the experimental group and the control group received just conventional therapy. *Friedman test* was used for within group analyses for ARAT. *P-value* was > 0.05 in experimental and control group of ARAT which was > 0.05 which shows that there was no improvement in both experimental and control group after 6 weeks.

Between group and within group analyses for active range of motion:

Because the data was skewed, *Kruskal Wallis* was employed for between group comparisons for active range of motion. The *P-value* was 0.05, indicating that the experimental group (neurodynamic combination with conventional therapy) outperformed the control group (conventional treatment alone) for shoulder, elbow and wrist joint motion in all degree of freedom; so, we rejected null hypothesis that neurodynamic is not effective for active range of motion in upper extremity of stroke patients after 6 weeks. Repeated measure *ANOVA* was used for within group analyses for AROM for shoulder extension, wrist flexion, extension and ulnar deviation in experimental group. *P-value* was 0.000 for AROM which was < 0.05 which shows that there was improvement within groups after 6 weeks. *Friedman test* was used for within group analyses for active range of motion of shoulder, elbow and wrist joint except shoulder extension, wrist flexion, extension and ulnar deviation in experimental group for which repeated measure *ANOVA* was used. *P-value* was < 0.05 which shows that there was improvement within groups in all shoulder, elbow and wrist active joint motion expect in control group of radial deviation after 6 weeks.

Median (IQR)					
Measure	Group	0 week	3rd week	6th week	P-value
MAS	Control	1(1)	1(1)	1(1)	-
	Experimental	1(0)	1(0)	0(0)	0.000

Table 1: Within group analysis for Modified Ashworth Scale

MAS is for Modified Ashworth Scale, while IQR stands for Interquartile Range. Friedman test is used to report the data as Median (IQR). There is no significant difference between groups (P ≤ 0.05). There is a significant difference between groups (P≤ 0.05).

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FM-UE motor Score	Median (IQR)		P-value
	Control	Experimental	
0 week	28(27.5)	34(16.5)	0.08
3rd week	30(27.5)	37(18.75)	0.06
6th week	32(29)	41(19.75)	0.04

Table 2: Between group analyses for FM-UE motor score

IQR = Interquartile range, FM-UE = Fugl Meyer upper extremity. The data is provided as a median (IQR) with a Kruskal Wallis post-hoc test. There is a significant difference between groups (P≤ 0.05). There is no significant difference between groups(P≤0.05).

Shoulder flexion	Median (IQR)						P-value
	Control			Experimental			
	0 week	3rd week	6th week	0 week	3rd week	6th week	
	120(142.5)	120(140)	123(153)	145(57.5)	150(53.75)	155(50)	0.025
Shoulder Extension	10(27.50)	10(27.50)	10(28.50)	27.50(23.75)	29(24.50)	31.50(25)	0.007
Shoulder abduction	100(127.5)	105(131.5)	108(128.5)	135(62.5)	139(65.5)	142(69.5)	0.015
Shoulder internal rotation	20(60)	20(61)	23(63)	70(55)	70(53.75)	70(48.75)	0.002
Shoulder external rotation	10(60)	10(60)	10(62)	70(70)	71(71.75)	74(73.5)	0.012
Elbow flexion	120(110)	122(115)	125(114)	132(25)	138(25)	142(22)	0.021
Elbow extension	0(5)	0(5)	0(4)	0(3.75)	0(3.75)	0(1.50)	0.487
Forearm supination	20(65)	22(65)	25(67)	60(37.50)	61(39)	64.50(39.75)	0.047
Forearm pronation	40(75)	40(75)	40(72.50)	72.50(35)	74.50(34.50)	80(33.50)	0.036
Wrist flexion	10(60)	10(60)	13(49.50)	35(40)	37.50(42.50)	41(43.5)	0.017
Wrist extension	10(32.50)	10(36)	12(38)	25(40)	27(41.5)	31(42)	0.039
Radial deviation	0(5)	0(5)	0(5)	10(12)	10(12)	12(15)	0.004
Ulnar deviation	0(5)	0(5)	0(6)	10(15)	10(15)	13(17.50)	0.010
Thumb abduction	20(50)	20(52.50)	22(52.50)	50(37.5)	50(37)	54(37)	0.023

Table 2: Between group analysis for AROM

AROMs is for active range of motion, whereas IQR stands for interquartile range. Kruskal Wallis test is used to report the data as Median (IQR). There is no significant difference between groups (P ≤ 0.05). There is a significant difference between groups (P≤0.05).

DISCUSSION

The findings from this study suggest that neurodynamic is effective for spasticity, upper extremity function and active range of motion. The current study demonstrates that neurodynamic combined with conventional treatment was more effective than conventional treatment alone in reducing spasticity as P- value was 0.000 which was < 0.05. Within group analyses for MAS also demonstrates that improvement occurred in experimental group to which neurodynamic combined with conventional treatment was applied as p-value was 0.000 which was <0.05 and no improvement occurred in control group to which conventional treatment was applied as p-value was >0.05. Alan Carlos et al., in 2016 Neurodynamic therapy has been shown to lower tone, enhance range, and improve function in stroke patients [14]. Sequence of movements in neurodynamic helps in the maintenance of elasticity resulting in increased extensibility of nervous system, increased axonal and dendritic sprouting and increased nerve conduction by reducing pressure on nerve which leads to increase range of motion, decrease tone and improvement in upper extremity function. Dynamic neural mobilization had a statistically significant influence on -waves and -rhythms in regions of the cerebral cortex in stroke patients. Dynamic neural mobilization was shown to be more successful than traditional neural mobilization in increasing -waves and decreasing -rhythms in the cerebral cortex by Kang JI and colleagues in 2018 [15]. The study was done on 20 hemiplegic stroke patients; interventions were applied for 4 weeks. Nowak et al., in 2009 stated that brain has ability to regenerate or transform by increasing axonal and dendritic sprouting as a result of which neuroplasticity occurs in central nervous system [16]. Jeong Kang et al., in 2017 determined that Rhythmic Neurodynamic accelerated the nerve conduction velocity resulting in improvement in upper extremity function more than the general neurodynamic [17] p-value was <0.05. The study was done on 18 hemiplegic stroke patients; interventions were applied for 2 weeks. Treatment mechanism of nerve comprises of movement, elasticity, conduction and reduction of axoplasmic flow, nerve conduction is promoted by decreasing pressure, and recovery occurs in soft tissues and the function is improved in the relevant region. The current study demonstrates that neurodynamic combined with conventional treatment was more effective than conventional treatment alone in improving upper extremity performance as the p-value was 0.04 which was < 0.05 which shows that neurodynamic is effective for upper extremity performance in stroke patients. This study also demonstrates that for Action Research Arm Test p-value was 0.099 which was > 0.05 which shows that neurodynamic is not effective for upper extremity fine task performance in stroke patients. Raid Saleem et al., 2017 determined a positive therapeutic benefit of using neural mobilization but limited evidence is available to determine the effect of neural mobilization techniques [18]. The present study found significant improvement occurred in spasticity, upper extremity function and active range of motion and no significant improvement occurred in passive range of motion, upper extremity sensation, coordination, joint pain and fine task performance between experimental and control group; significant improvement occurred in upper extremity function, active range of motion, passive range of motion, upper extremity sensation and joint pain and no significant improvement occurred in coordination and fine task performance within groups. Treatment mechanism of

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CONCLUSION

The result shows that neurodynamic combined with conventional treatment was more effective than conventional treatment alone to reduce spasticity, improve upper extremity function and active range of motion AROM. The result also shows that there was significant improvement in upper extremity joint pain, passive joint motion, sensation and passive range of motion PROM and no improvement occurred in coordination and fine task performance within groups. Thus, the study concludes that neurodynamic is effective for spasticity and has additional benefit in improving UE functional performance and active range of motion but the effects of neurodynamic combined with conventional treatment are no different than conventional treatment alone on passive range of motion, joint pain, coordination, fine task performance and sensation.

REFERENCES

[1] Saxena A, Sehgal S, Jangra MK. Effectiveness of Neurodynamic Mobilization versus Conventional Therapy on Spasticity Reduction and Upper Limb Function in Tetraplegic Patients. Asian Spine Journal. 2021 Aug;15(4): 498.doi.org/10.31616/asj.2020.0146

[2] Nery dos Santos AC, Gusmão de Goes AC, Lago RMV, et al. Neural mobilization as a therapeutic option in the treatment of stroke. Man Ther. 2016; 14(310):1-4. doi.org/10.17784/mtprehabjournal.2016.14.310

[3] De Lima KCS, Piauilino PMM, Franco RM, et al. Effect of muscle stretching, neural mobilization and vibration in patients with stroke. ConScientiae Saúde. 2016;15(1):62-70. doi.org/10.5585/conssaude.v15n1.5861

[4] Lee EK, Kim JH, Lee JH, Cho EB. Research trends and clinical applications of neural mobilization in Korea: A scoping review. The Journal of Korea CHUNA Manual Medicine for Spine and Nerves. 2021;16(1):53-66. doi.org/10.30581/jcmm.2021.16.1.53

[5] Mallmann JS et al. Prevenção de hipotrofia muscular pelo uso da mobilização neural em modelo experimental de ciatalgia. Revista Brasileira de Fisiologia do Exercício. 2012; 11(1):13-6. doi.org/10.33233/rbfe.v11i1.3374

[6] Zamberlan AL et al. Mobilização neural Como um recurso fisioterapêutico na reabilitação de pacientes com acidente vascular encefálico – revisão. Revista Salus-Guarapuava. 2007; 1(2):185-91.

[7] Machado GF, Bigolin SE. Estudo comparativo de casos entre a mobilização neural e um programa de alongamento muscular em lombálgicos crônicos. Fisioter Mov. 2010; 23(4): 545-54.doi.org/10.1590/S0103-51502010000400005

[8] Véras LST, Vale RGS et al. Avaliação da dor em portadores de hanseníase submetidos à mobilização neural. Fisioter Pesq. 2011; 18(1):31-6 doi.org/10.1590/S1809-29502011000100006

[9] Kim MJ, Kim TH. Effect of Neuro Dynamic Technique and Instrument Assisted Soft Tissue Mobilization on Lower Extremity Muscle Tone, Stiffness, Static Balance in Stroke Patients. The Journal of Korean Physical Therapy. 2020;32(6):359-64.

[10] Vladimirovna KE, Vladimirovna PL, Vasilyevich RA. Post-Stroke Motor Impairments: The Possibilities of Innovative Technologies and The Results of the Own Research. International Journal of Innovative Medicine. 2022;(1):4-10.

[11] Suhail M, Prakash A, Sonali D, Sangeeta M. Effectiveness of dynamic soft tissue mobilization vs passive stretching to improve hamstring flexibility in stroke patients–A comparative study.

[12] Kang JI, Moon YJ, Jeong DK, Choi H, Park JS, Choi HH. Muscle activity in relation to the changes in peripheral nerve conduction velocity in stroke patients: Focus on the dynamic neural mobilization technique. Journal of International Academy of Physical Therapy Research. 2018;9(2):1447-54.

[13] Li F, Jiang L, Zhang Y, Huang D, Wei X, Jiang Y, et al. The time-varying networks of the wrist extension in post-stroke hemiplegic patients. Cognitive Neurodynamics. 2021 Nov; 2:1-0.

[14] de Lima Souza R, Moriz KR, Teixiera FD, Fernandes AA, da Costa Neto SS, De Oliveira MD, et al. Effect of neural mobilization on balance, flexibility, strength and gait in stroke patients. Manual Therapy, Posturology & Rehabilitation Journal. 2018:1-5.

[15] Alan Carlos Nery dos Santos et al, The effects of neural mobilization as a therapeutic option in the treatment of stroke, MTP and Rehab journal 2017, ISSN 2236-5435

[16] Lundquist et al. The Fugl-Meyer assessment of the upper extremity: reliability, responsiveness and validity of the Danish version, Disabil Rehabil, 2017 May; 39(9):934-939.

[17] McClure P, Tevald M, Zarzycki R, Kantak S, Malloy P, Day K, et al. The 4-element movement system model to guide physical therapist education, practice, and movement-related research. Physical Therapy. 2021 Mar;101(3):pzab024.

[18] Raid Saleem Al Baradie et al. The effects of Neurodynamics and mobilization in Stroke Rehabilitation– a Systematic Review, Majmaah

DOI:https://doi.org/10.54393/pbmj.v5i5.443

Journal of Health Sciences 2017; Vol.5, issue 2.
[19] Mac Kenzie DE. Investigating Influences on the Current Trends in Occupational and Physical Therapy Management of Clients Experiencing Spasticity (Doctoral dissertation, Mount Saint Vincent University)
[20] Beschi M, Pth CV, Orth MZ, Orth MP, Orth GF, Orth AM. Jacobs Journal of Physical Rehabilitation Medicine.

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Original Article

Frequency of Peripheral Neuropathy in Chronic Hepatitis C Patients Presenting at Liaquat University Hospital, Hyderabad

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ABSTRACT

Hepatitis C virus (HCV) and its infective pathogenic role leads to the psychiatric and neurological signs and symptoms. Therefore, close monitoring and regular follow-up is warranted. **Objective:** To find out the frequency of peripheral neuropathy among patients presenting at Liaquat University Hospital, Hyderabad, having Chronic Hepatitis C. **Methods:** The cross-sectional study included 359 patients with chronic HCV, aged 20 to 70 years, who presented to the Liaquat University Hospital's Hepatitis Clinic and Outpatient Department of General Medicine and Neurology. Non-probability - sequential sampling was used to choose patients. Patients were asked about demographic information and the duration of chronic HCV after giving informed written consent. The clinical examination was performed to see if there were any reduced tendon reflexes in all of the patient's extremities. To diagnose peripheral neuropathy based on nerve conduction velocity, all patients had an electrophysiological test using a simplified nerve conduction study (NCS) methodology (NCV). The research lasted six months, from June 2021 to December 2021. The information was examined via SPSS version 25.0. **Results:** There were 219 Men (61%) And 140 Females (39%) among the 359 Patients. The average age (SD) of the participants was 42.3 (8.7) years (range 22–70). HCV infection lasted 36 months on average (range 1–156). Out of 359 patients, 61 had clinical peripheral neuropathy (PN) (17%). Electrophysiological evidence of PN was present in all of these patients, electrophysiological investigation revealed subclinical PN in 19 more patients (5.3%). **Conclusion:** On the basis of the findings from this study, it can be concluded that a high prevalence of peripheral neuropathy is present among the patients with HCV in our locality. However, an electrophysiological examination should always be done to avoid underestimating PN, particularly in older HCV patients.

INTRODUCTION

HCV infection accounts for up to 3% of global population. It is one of the major health related problem being faced by Pakistan [1]. Nearly 50-80% of individuals infected with HCV leads to chronic hepatitis, 20% of patients develop cirrhosis and 1-4% develop hepatocellular carcinoma (HCC). It is extensively prevalent around the globe and is leading cause of liver cirrhosis requiring liver transplantation [2]. However, disease burden varies among different countries being more among developing countries with low health and education standards [3]. HCV infection has hepatic and extrahepatic manifestation. It involves the blood (mixed cryo-globulinaemia and porphyria cutanea tarda) lymphoid tissue (lympho-proliferation), kidney (membrano-proliferative glomerulo-nephritis), sicca syndrome, thyroid gland (thyroiditis and thyroid dysfunction) and nervous system (myopathy, mono and multiple mononeuritis and, sensory-motor polyneuropathy) [4]. HCV replicates and forms cold-precipitating immunoglobulins. These immunoglobulins form complexes which bypass the reticuloendothelial clearance mechanism and aggregate in the body in the form cryoglobulins. They deposit in various tissue of the

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body inducing inflammatory response leading to tissue damage [5,7]. The pathogenesis involves damage of the endothelial cells by these complexes, eliciting inflammation of small and medium vessels and accumulation of perivascular mononuclear cells [8]. Therefore, neuropathy is attributed to multifactorial factors related to inflammation, direct HCV related damage and immune complex mediated damage [9]. Patients can present with clinical spectrum of features having symmetrical or asymmetrical presentation. They can be sensory, motor or mixed sensorimotor types. The patients usually present with paresthesia, weakness and gait difficulties [10,11]. Physicians caring for the patients HCV related chronic liver disease should always monitor them for its neurological manifestation [12]. As they may interfere or exacerbate with the HCV treatment, contributing to morbidity and poor health related quality of life [13,14]. Mapoure et al., found the incidence of neuropathy of peripheral nerves in people with positive HCV and found it to be 50.4% [15]. Thus, this study aimed to find out the prevalence of peripheral neuropathy among patients presenting at Liaquat University Hospital, Hyderabad, having Chronic HCV.

METHODS

The cross-sectional study was conducted upon a sample of 359 patients having chronic HCV patients of either gender with aged between 20-70 years, presenting to Hepatitis Clinic and OPD of General Medicine and Neurology, at Liaquat University Hospital, Hyderabad. (The sample size was calculated via WHO open-epi calculator, by taking the margin of error as 5%, confidence interval as 95% and frequency of peripheral neuropathy in patient with HCV patients as 37%) [16]. Patients were chosen via non-probability - consecutive sampling. Patients with history of Diabetes Mellitus type II or Leprosy, Hypo or Hyperthyroidism, Acute or Chronic Demyelinating Neuropathy, Venous Thromboembolism, Fracture of Lower Limb, Vasculitis and Connective Tissue Disorder, Alcohol Use, Vitamin B 12 Deficiency and patient receiving Chemotherapy or having any other significant comorbidities like Stroke, COPD, Asthma, Myocardial Infarction, and Chronic Renal Failure were excluded from the study. After taking informed written consent, patients were inquired about demographic data, clinical history and duration of chronic HCV. Severity of Chronic HCV was measured through Child-Pugh Classification. Anthropometric and Clinical Examination were done to assess diminished tendon reflexes in all extremities. To diagnose peripheral neuropathy based on Nerve Conduction Velocity, all patients received an electrophysiological test using a simplified nerve conduction study (NCS) methodology (NCV). The research lasted six months, from June 2021 to December 2021. SPSS 25.0 was used to analyze the data.

RESULTS

Out of 359 patients, 219 (61%) were males and 140 (39%) were females. Mean age (SD) was 42.3 (8.7) years (range 22–70). Median duration of HCV infection was 36 months (range 1–156). Clinical peripheral neuropathy PN was diagnosed in 61 out of 359 patients (17%). All these patients had electrophysiological evidence of PN. Moreover, electrophysiological examination disclosed a subclinical PN in 19 additional patients (5.3%). An axonal sensory-motor polyneuropathy and mononeuropathy multiplex was diagnosed in (19/61) (31.1%) and (17/42) patients (68.9%), respectively. No electrophysiological signs of demyelination or cranial nerve involvement was found. The median HCV RNA level in the blood was 1.8 million of copies/ml (range 1800–42 000 000). No correlation was found between HCV-RNA levels and the presence of PN (Pearson $\chi 2$, 0.9; p = NS). The main demographic, clinical, and laboratory features of patients with and without electro-physiologically defined PN" are shown in table 1.

Variable	Neuropathy			
	Yes		No	
	n	%	n	%
Total	61	17	298	87
Men	37	17	182	83
Women	24	17.15	116	82.85
<45	5	3.9	123	96.1
45-54	9	12.8	61	87.2
55-64	26	32.5	54	67.5
>65	21	30.4	48	69.6
<12	16	10.5	136	89.5
12-60	18	19	77	81
>60	27	24.1	85	75.9

Table 1: Characteristics of patients

DISCUSSION

The current study aimed to "find out the prevalence of peripheral neuropathy among patients presenting to the study setting. The prevalence of electrophysiological PN in this population was 17%. Firstly, only 36 patients were clinically and electrophysiologically investigated and PN was detected in 8% of them [17] in the other large prospective study, Cacoub and colleagues diagnosed a peripheral neuropathy in 9% of 321 HCV patients on the

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basis of clinical symptoms only. The prevalence of PN in our study (10.6%), if based on clinical assessment only, is very close to that of Cacoub and colleagues [18]. However, the electrophysiological examination revealed a subclinical neuropathy in 19 additional patients (5.3%). Therefore, pure clinical assessment tends to underestimate peripheral nervous system involvement in the HCV general population. As pointed out by England and colleagues [19], polyneuropathy occurs with a combination of multiple symptoms, signs, and abnormal electrodiagnostic studies, whereas symptoms alone have relatively poor diagnostic accuracy in predicting the presence of polyneuropathy. According to these criteria, PN could not be confirmed in all the patients complaining of pain, burning paresthesiae and fatigue in the absence of electrophysiological abnormalities. On the other hand, these symptoms are frequently described in HCV patients and they can be due to non-neurological (for example, rheumatological) causes or to a small fiber neuropathy [20]. A small fiber neuropathy could not be ruled out in our patients either by clinical examination or by conventional nerve conduction studies, but this was not an aim of the present study. Different mechanisms unrelated to the presence of PN, but possibly due to the direct or indirect effects of HCV infection, have been largely proposed in the pathogenesis of nerve damage [21-23]. Inflammatory vascular lesions and axonal degeneration, supporting an ischemic mechanism of nerve damage more than a direct role of the virus in HCV related PN, have been described in sural nerve biopsy of HCV patients. Under this assumption, the lack of correlation between type of PN and HCV duration is also in keeping with the current hypothesis that HCV related vascular nerve damage could be due to virus triggered immune mediated mechanisms [23]. Statistical analysis showed a strong correlation between older age and PN but not between PN and the known duration of HCV positivity. In keeping with these data, we found a strong correlation between older age and both PN and CG, which may be interpreted in the light of the emerging hypothesis of an immune mediated pathological mechanism of HCV related clinical manifestations [23]. At first sight, this latter observation might seem contradictory but the duration of HCV positivity was assessed from the first laboratory detection of HCV infection and it is likely different from the true duration of HCV infection, which might have actually occurred several years earlier. Some authors have already noted that older age is a major risk factor for the clinical and biological extrahepatic manifestations of HCV [20-24]. The study has several limitations. Firstly, although we elected to enroll consecutive patients which predisposes to selection bias towards more severe infection and patients with neurological complications, this is not a population-based study. For this reason, our findings cannot be extended to HCV patients who do not seek care in secondary and tertiary centers. Although there were no significant differences between patients tested and not tested, we cannot exclude that their physicians decided to test patients at higher risk for PN.

CONCLUSION

On the basis of the findings of this study, it can be stated that patients with HCV in the studied area have a significant prevalence of peripheral neuropathy. However, especially in older HCV patients, an electrophysiological evaluation should always be performed to prevent underestimating PN.

REFERENCES

[1] Lauer GM, Walker BD. Hepatitis C virus infection. N Engl J Med. 2001 Jul 5;345(1): 41-52.doi.org/10.1056/NEJM200107053450107

[2] Lidove O, Cacoub P, Maisonobe T, Servan J, Thibault V, Piette JC et al. Hepatitis C virus infection with peripheral neuropathy is not always associated with cryoglobulinaemia. Ann Rheum Dis. 2001 Mar;60(3):290-2.doi.org/10.1136/ard.60.3.290

[3] Cacoub P, Renou C, Rosenthal E, Cohen P, Loury I, Loustaud-Ratti V et al. Extrahepatic manifestations associated with hepatitis C virus infection. A prospective multicenter study of 321 patients. The GERMIVIC. Groupe d'Etude et de Recherche en Medecine Interne et Maladies Infectieuses sur le Virus de l'Hepatite C. Medicine (Baltimore). 2000 Jan;79(1):47-56.doi.org/10.1097/00005792-200001000-00005

[4] Moretti R, Caruso P, Dal Ben M, Gazzin S, Tiribelli C. Hepatitis C-related cryoglobulinemic neuropathy: potential role of oxcarbazepine for pain control. BMC Gastroenterol. 2018 Jan 25;18(1): 19.doi.org/10.1186/s12876-018-0751-9

[5] Monaco S, Ferrari S, Gajofatto A, Zanusso G, Mariotto S. HCV-related nervous system disorders. Clin Dev Immunol. 2012; 236148.doi.org/10.1155/2012/236148

[6] Carvalho-Filho RJ, Narciso-Schiavon JL, Tolentino LH, Schiavon LL, Ferraz ML, Silva AE. Central nervous system vasculitis and polyneuropathy as first manifestations of hepatitis C. World J Gastroenterol. 2012 Jan 14;18(2): 188-91.doi.org/10.3748/wjg.v18.i2.188

[7] Chin RL, Sander HW, Brannagan TH 3rd, De Sousa E, Latov N. Demyelinating neuropathy in patients with hepatitis C virus infection. J Clin Neuromuscul Dis.

DOI:https://doi.org/10.54393/pbmj.v5i5.473

2010 Jun;11(4):209-12. doi: 10.1097/CND.0b013e3181b701c1.

[8] Adinolfi LE, Nevola R, Lus G, Restivo L, Guerrera B, Romano C, et al. Chronic hepatitis C virus infection and neurological and psychiatric disorders: an overview. World J Gastroenterol. 2015 Feb 28;21(8):2269-80. doi: 10.3748/wjg. v21.i8.2269.

[9] Zampino R, Marrone A, Restivo L, Guerrera B, Sellitto A, Rinaldi L, et al. Chronic HCV infection and inflammation: Clinical impact on hepatic and extra-hepatic manifestations. World J Hepatol. 2013. October 27;5(10): 528-40.doi.org/10.4254/wjh. v5. i10.528

[10] Ghoneimy ATE, Hasanien A, Ramzy GM, Youssof AM, Elsayed M, Shalaby NM, et al. Hepatitis C virus and peripheral neurological complications in Egyptian patients. Arab J Gastroenterol. 2009. September;10(3):82-6.doi.org/10.1016/j.ajg.2009.09.002

[11] El Fatah Al kafrawy Nabil Abd, El-Aziz Kora Mahmoud Abd, Dala Ashraf Gharib, Sultan Walaa Khalil Mohamed Ali. Study of microvascular complications of chronic hepatitis C virus in nondiabetic patients. Wolters Kluwer Health-Medknow. 2014;27(2): 458-64.doi.org/10.4103/1110-2098.141727

[12] Al soud Atef Abo, ELlehleh Ayman, El-Kapany Rasha, El-Hagary Heba. Study of peripheral neuropathy in Chronic Hepatitis C patients. J Am Sci. 2011;7(4):282-8.

[13] Santoro L, Manganelli F, Briani C, Giannini F, Benedetti L, Vitelli E et al. Prevalence and characteristics of peripheral neuropathy in hepatitis C virus population. J Neurol Neurosurg Psychiatry. 2006 May;77(5):626-9.doi.org/10.1136/jnnp.2005.081570

[14] Aly Abdel Khalek M, El-barbary AM, Elkalla FS, Essa SA-M. Prevalence of peripheral neuropathy in Egyptian hepatitis C virus patients: Correlation to some clinical and laboratory parameters. Egypt Rheumatol. 2012. July;34(3):91-8.doi.org/10.1016/j.ejr.2012.04.001

[15] Mapoure NY, Budzi MN, Eloumou SAFB, Malongue A, Okalla C, Luma HN. Neurological manifestations in chronic hepatitis C patients receiving care in a reference hospital in sub-Saharan Africa: A cross-sectional study. PLoS One. 2018 Mar 7;13(3): e0192406.doi.org/10.1371/journal.pone.0192406

[16] Chung T, Prasad K, Lloyd TE. Peripheral neuropathy: clinical and electrophysiological considerations. Neuroimaging Clin N Am. 2014;24(1):49-65. doi: 10.1016/j.nic.2013.03.023

[17] Ripault M P, Borderie C, Dumas P et al. Peripheral neuropathies and chronic hepatitis C: a frequent association? Gastroenterol Clin Biol 199822891-896.

[18] Cacoub P, Renou C, Rosenthal E et al. Extrahepatic manifestations associated with hepatitis C virus infection. A prospective multicenter study of 321 patients. The GERMIVIC. Groupe d'Etude et de Recherche en Medecine Interne et Maladies Infectieuses sur le Virus de l'Hepatite C. Medicine (Baltimore)20007947-56.

[19] England J D, Gronseth G S, Franklin G et al. Distal symmetrical polyneuropathy: definition for clinical research. Muscle Nerve 200531113-123.

[20] Zaltron S, Puoti M, Liberini P, Antonini L et al. High prevalence of peripheral neuropathy in hepatitis C virus infected patients with symptomatic and asymptomatic cryoglobulinaemia. Ital J Gastroenterol Hepatol 199830391-395.

[21] Agnello V, Abel G. Localization of hepatitis C virus in cutaneous vasculitic lesions in patients with type II cryoglobulinemia. Arthritis Rheum 1997402007-2015.

[22] Bonetti B, Invernizzi F, Rizzuto N et al. T-cell-mediated epineurial vasculitis and humoral-mediated microangiopathy in cryoglobulinemic neuropathy. J Neuroimmunol 199773145-154.

[23] Authier F J, Bassez G, Payan C et al. Detection of genomic viral RNA in nerve and muscle of patients with HCV neuropathy. Neurology 2003, 60808-812.doi.org/10.1212/01.WNL.0000044399. 71601.EA

[24] Cacoub P, Poynard T, Ghillani P, et al. Extrahepatic manifestations of chronic hepatitis C. MULTIVIRC Group. Multidepartment Virus C. Arthritis Rheum 1999422204-2212.

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Original Article

Cyclopeptide Kalata B12 as HCV-NS5A potent Inhibitor

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ABSTRACT

Hepatitis C Virus (HCV) is the leading cause of liver diseases globally, causing severe complications such as liver fibrosis, cirrhosis, and hepatocellular carcinoma (HCC). Despite the advent of successful regimens, still, 71 million individuals are chronically infected every year. Therefore, more accessible novel therapies are needed to fight the challenges such as adverse effects, genotype selectivity, and resistance to these regimens due to viral mutations. HCV NS5A is a non-structural phosphoprotein, with its pivotal role in viral replication assembly, and has been the target of continuous research. Cyclopeptides are an emerging class of peptides reported to have antiviral, anticancer, and antimicrobial properties. These cyclopeptides have exceptional resistance to thermal, chemical, or enzymatic degradation. Herein, we present the inhibitory potential of cyclopeptide Kalata B12 against the HCV NS5A gene. **Objective:** To investigate the antiviral potential of Kalata B2, Kalata B12, and cycloviolacin O14 against HCV NS5A **Methods**: We investigated thirty cyclopeptides through molecular docking analysis for their anti-HCV-NS5A inhibition potential. Three cyclopeptides, Kalata B2, Kalata B12, and cycloviolacin O14 showed minimum binding energies, for their antiviral potential. The defense-related, circular mini-protein Kalata B12 showed an impressive docking score of -9.80 Kcal/mol. Further, it was synthesized and went through cytotoxicity analysis via MTT assay on HepG2 cell line, which showed more than 85% cell viability at submicromolar concentrations. **Results:** The peptide Kalata B12 showed significant *(***P<0.0001)* inhibition of NS5A gene (approx. 75%) at 100nM in *In vitro* trials, confirmed by real-Time PCR analysis. **Conclusions:** Kalata B12 cyclopeptide was found to be a potential HCV NS5A inhibitor.

INTRODUCTION

Hepatitis C Virus (HCV) is the leading cause of acute and chronic liver diseases imposing a serious public health burden worldwide. It is estimated that approximately 200 million people (3% of the world population) are chronically infected with this virus [1,2]. HCV is a positive, single-stranded RNA virus belonging to the *Flaviviridae* family that infects the liver cells causing liver fibrosis, cirrhosis, and Hepatocellular carcinoma (HCC) [3]. Previously standard therapy for HCV treatment was a combination of pegylated interferon (INFα) and Ribavirin (RBV) with less than 50% sustained virological response rate (SVR) [1]. With the discovery of direct-acting Antivirals (DAAs), higher SVR has been achieved with more than 90% cure rate in a shorter duration of time and fewer adverse effects [4]. Although with the availability of DAAs that directly target the HCV proteins NS3/4A protease, NS5B polymerase, and NS5A, treatment success has been accomplished but there are still some challenges such as high cost, adverse effects, and possible long-term drug resistance to these antivirals due to viral mutations and genotypes variability. So, there is a need to develop more efficient drugs and regimens to overcome these issues. Over the past decades, natural medicinal plant products and compounds have gained attention as therapeutic options against many micro-organisms and diseases[5-7]. Thus, natural plant products and compounds could be the best alternative therapeutic option that can be used alone or with other antivirals to defeat this virus [8]. NS5A is HCV non-structural membrane-associated phosphoprotein [9]. It consists of about 447 to 466 amino acids containing three structural

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domains I, II, and III has 58 kDa molecular weight. It has two phosphorylated forms named as P56 and P58, which plays important role in viral replication and assembly [10,11]. By targeting NS5A protein HCV infection can be inhibited, thus NS5A is a promising target for antiviral drugs. Cyclotides are a unique class of plant-derived peptides emerging as a promising therapeutic approach containing many biological and pharmacological properties. These cyclotides are macrocyclic peptides containing approximately 28-37 amino acids and three disulfides (-S-S-) bonds [12]. They contain a unique cyclic cysteine knot (CCK) motif in which three disulfide bonds and 6 conserved cysteine residues are arranged in a knot forming a cyclic backbone that's why named cyclotides or cyclopeptides. This CCK motif gives them exceptional resistance to high temperature, enzymatic and chemical degradation, and more stability as compared to linear peptides. In plants, they are considered to be part of their natural defense system against pests and insects *etc.*, [13]. Previous scientific studies proved that these circular peptides have many biological activities including cytotoxic, anti-microbial, anti-cancer, anti-bacterial, uterotonic, hemolytic, anti-HIV, *etc. [12]*. In the present study, thirty cyclopeptides from the literature were selected and *in-silico* studies were conducted on them. Based on their energy score of interaction with HCV NS5A genotype 1a, three peptides were selected for *in vitro* studies. Our results show that these cyclotides can be a potent therapeutic option against HCV as they inhibit the HCV NS5A gene. Further investigations are needed to explore the function and activity of these peptides.

METHODS

***In-silico* screening and synthesis of cyclopeptides:** Thirty cyclopeptides with vast pharmacological properties were selected from the literature. *In-silico* studies were carried out via molecular docking software on these cyclopeptides to check affinity with HCV NS5A genotype 3a protein [14]. Three cyclopeptides were selected based on energy score and interaction with the site for further studies. These peptides were synthesized from Karebay Biochem *Inc*. USA in lyophilized form. Then, these peptides were reconstituted in dimethyl sulfoxide (DMSO), (Sigma Aldrich).

***In-vitro* cytotoxicity Analysis of Cyclopeptides:** MTT 3-[4,5-dimethylthiazole-2-yl]-2,5-diphenyltetrazolium bromide Assay was performed to measure cell viability in 96 well plates. HepG2 cells were seeded in a Flat bottom 96 well plate at $1x10^4$ density in DMEM medium (Gibco). Then cells were incubated in a humidified environment at 37°C and 5% CO_2(Thermo Fisher Scientific). After 24 hours, upon cell confluency of 80-85% cells were treated with cyclotides at sub-micromolar concentrations (0.1nM to 1µM). DMSO was used as a control. After incubation for 24 hours, cells were washed with 1X PBS (Phosphate Buffer Saline). 10µl MTT dissolved in PBS at 0.5mg/ml concentration was added to each well and incubated for 2-3 hours. Then MTT buffer is removed and formazon is dissolved in DMSO. After 30 min incubation at room temperature absorbance was measured at 540nm and 650nm.

HCV NS5A transfection in HepG2 cells: HepG2 cells were grown in a 24-well plate at a seeding density of $5x10^4$ per well. The next day cells were transfected with HCV NS5a genotype 1a along with cyclopeptides at different concentrations using lipofectamine (Invitrogen™). After 24 hours of incubation at 37°C, total RNA was extracted using Triazole reagent (Invitrogen™ Life Technologies) and subjected to cDNA synthesis using a First-strand cDNA synthesis kit (Invitrogen, US).

NS5 A expression studies: Prepared cDNA was used for NS5A expression studies using semi-quantitative and quantitative Real-Time PCR. Each sample was prepared in triplicate in ABI 7500 Real-Time PCR system (Applied Biosystems, USA). The relative expression level of NS5A was determined using GAPDH as internal control and the fold change was evaluated using the RT-PCR comparative CT method (ΔΔ CT) as previously described [15]. Primer sequences of NS5A and GAPDH are listed in Table 1. Results were analyzed using Graphpad Prism software.

Gene	Primer Sequence
NS5a Forward primer	GGACGACGATGACAAGGACT
NS5a Reverse primer	TTATAGTTCGGCGCAGGAAG
GAPDH Forward primer	CGGATTTGGTCGTATTGG
GAPDH Reverse primer	AGATGGTGATGGGATTTC

Table 1: Sequence of Primers

RESULTS

***In-silico* study of cyclotides:**

In silico study was conducted on the thirty selected peptides using MOE docking software. The docking results revealed three cyclotides best fit in the HCV NS5A proteins pocket. Kalata B2 exhibited the highest binding affinity towards HCV NS5A i.e., -11Kcal/mol while binding GLy896 residue. Further, Kalata B12 and Cycloviolacin O14 also produced promising results against NS5A. Kalata B12 showed the second-lowest binding energy of -9.8Kcal/mol while Cycloviolacin O14 represented a -8.4 Kcal/mol docking score. The former trusses with Thr95 and Thr64 and the latter bind to Thr55, Thr94, and Thr64. The structure and interaction of cyclotides with the NS5A

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binding site are shown in Table 2.

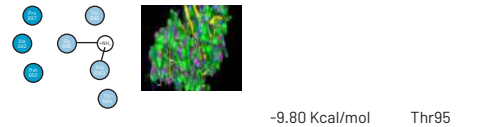
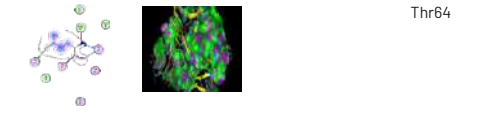
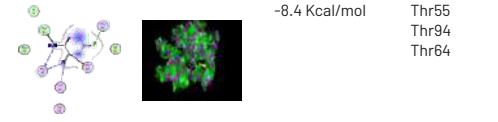
Structure	Interaction of peptide with NS5A site	Binding Energy Score	Reside Involved
Kalata B2		-11 Kcal/mol	Gly895
Kalata B12		-9.80 Kcal/mol	Thr95 Thr64
Cycloviolacin O14		-8.4 Kcal/mol	Thr55 Thr94 Thr64

Table 2: Structure and interaction of cyclotides with NS5A site

Properties of cyclopeptides:

Three selected cyclotides were synthesized based on their interaction with HCV NS5A gene. Table 3 shows peptide source, length, nature and their sequences.

Peptide	Source	Length	Nature	Sequence
Kalata B2	*Oldenlandia affinis*	28	Acidic	GLPVCGETCFGGTCNTPGCSCTWPICTRD
Kalata B12	*Oldenlandia affinis*	29	Acidic	GSLCGDTCFVLGCNDSSCSCNYPICVKD
Cycloviolacin O14	*Viola odorata*	31	Basic	GSIPACGESCFKGKCYTPGCSCSKYPLCAKN

Table 3: Properties and sequences of cyclotides

In-Vitro Cytotoxicity Analysis of Cyclotides

To check cytotoxic potential of these selected peptides, HepG2 cells were treated with different concentrations of cyclotides for 24 hours. MTT Assay results showed that all three cyclotides Kalata B2, Kalata B12, and Cycloviolacin O14 were non-toxic as all peptides showed more than 85% cell viability at concentrations from 0.05nM to 1µM.

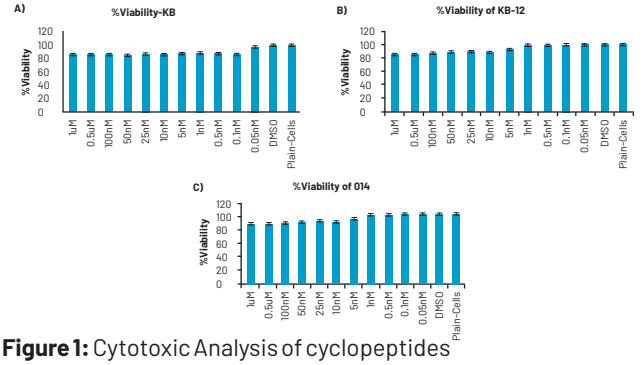


Figure 1: Cytotoxic Analysis of cyclopeptides

HepG2 cells were treated with cyclopeptides for 24 hours. After incubation, MTT assay was performed and measure absorbance at 540 and 650nm.

HCV NS5A expression in response to cyclotides:

HepG2 cells were grown in a 24-well plate. Upon 80-85% confluence, cells were transfected with HCV NS5A and incubated with peptides at different concentrations. After 24 hours, total RNA was extracted and cDNA was synthesized. This cDNA was used for inhibition studies using NS5A gene-specific primers. GAPDH is used as an internal control. All these cyclotides showed considerable inhibition of the NS5A gene. However, Kalata B12 showed more promising results. It showed significant inhibition at higher concentrations compared to the other two cyclotides as depicted in Figure 2.

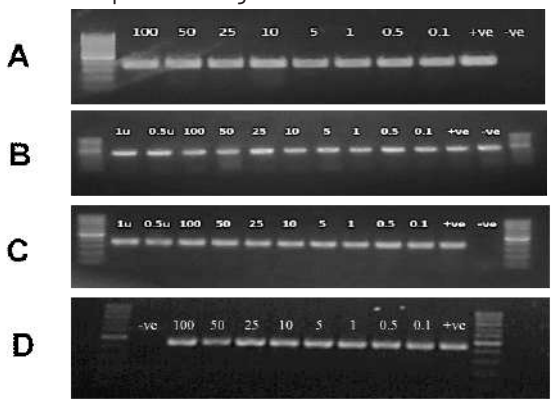


Figure 2: PCR Analysis of NS5A inhibition by cyclotides

Cells were transfected with HCV NS5A and incubated for 24 hrs with cyclotides. The next day total RNA was extracted and cDNA synthesized. This cDNA was used as a template and PCR analysis was conducted using GAPDH as a control. (A) GAPDH PCR (B) Inhibition of NS5A gene by Kalata B12. (C) Inhibition of NS5A gene by Kalata B2. (D) NS5A gene expression in response to Cycloviolacin O14 treatment.

Kalata B12 significantly inhibited HCV NS5A gene

NS5A expression in response to Kalata B12 was quantitatively determined through Real-time PCR. Kalata B12 showed significant inhibition of NS5A at the four highest concentrations from 100nM to 10nM. 100nM showed approximately 75% inhibition of NS5A. Whereas, 50nM, 25nM and 10nM exhibited almost 59%, 50% and 25% inhibition respectively. The graphical representation of the results is shown in Figure 3.

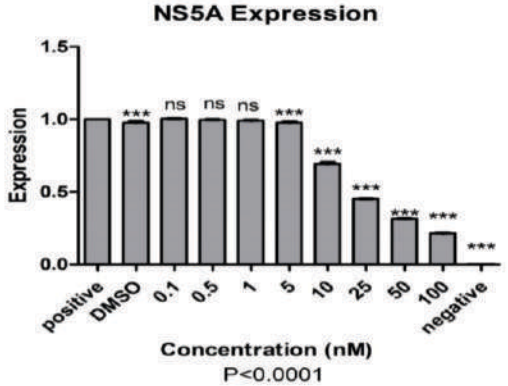


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Figure 3: Effect of KB12 on NS5A expression
Cells were transfected with HCV NS5A and incubated with Kalata B12 cyclotides for 24hrs. Total RNA was extracted and subjected to cDNA synthesis followed by Real-time PCR analysis using GAPDH as an internal control. The data is represented as mean±SD (n=3, One way ANOVA, *p-value <000.1).

DISCUSSION

Cyclotides are an appealing family of peptides derived from plants. These plant peptides contain a wide variety of biological activities such as anti-bacterial, antiviral, insecticidal, cytotoxic, and hemolytic activity [12]. In the present study synthetic peptides are used against HCV. We selected 30 cyclotides from literature with wide pharmacological and biological properties and checked for their molecular interaction with HCV NS5A protein by using docking software, MOE. Molecular docking is a frequently used process of rational drug designing (RDD) that helps to predict the strength of interaction and binding affinity and activity between drug molecules and the target site. Docking also suggests the preferred orientation between two molecules to form a stable complex [16]. Herein, in silico docking studies were conducted between these cyclotides and HCV NS5A protein using MOE software. We selected three cyclotides for in-vitro studies showing strong binding affinity with NS5A. The Kalata B2, Kalata B12, and cycloviolacin O14 showed the binding affinity of -11 Kcal/mol, -9.80 Kcal/mol, and -8.4 Kcal/mol respectively. HCV NS5A is a multifunctional protein that plays a crucial role in viral replication. Thus, literature shows that by targeting this protein HCV replication can be interrupted [17]. HepG2 cells are cancerous cells derived from a patient of hepatocellular carcinoma. They have high proliferation rate and used in cytotoxicity and drug metabolism studies [18]. MTT Assay is a widely used method in first drug screening to determine cell viability and cytotoxicity in cell lines [19]. Thus, to check cytotoxic potential of these peptides MTT assay was performed on HepG2 cell lines. All three peptides depicted no significant difference in %cell viability as compared to control and showed more than 85% cell viability at concentration from 0.05nM to 1µM. This interprets that these cyclotides are non-cytotoxic and safe for further studies. In a study, peptides showed no significant difference in cell viability in MDCK cell line in control and peptide treated group [20]. After confirmation of cytotoxicity downstream inhibition assay against HCV-NS5A gene was performed. Semi-quantitative PCR analysis was used for expression study of NS5A gene in cells when treated with three cyclotides separately. Kalata B2 and cycloviolacin O14 showed moderate inhibitory effect against NS5A but Kalata B12 showed approx. 75% inhibition of NS5A gene at 100nM concentration. Further Real time PCR analysis was also performed for Kalata B12 and interprets the strong dose dependent inhibition of HCV NS5A. Similarly, cyclotides isolated from Melicope pteleifolia showed potent antiviral activity against influenza A Virus [21]. In another study, a novel peptide NDFRSKT showed potent antiviral activity against avian influenza virus H9N2 in in vitro and in vivo models [20]. These studies support that cyclopeptide could have potential to be used as antiviral agents.

CONCLUSION

In-silico study can be time saving approach to narrow the range of compounds for potent target screening. Kalata B12 can be a promising potent therapeutic agent against HCV replication. These cyclotides should be further explored against antiviral activity so in future potent antiviral drugs with less side effects may be discovered.

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REFERENCES

[1] Gao M, Nettles RE, Belema M, Snyder LB, Nguyen VN, Fridell RA *et al.* Chemical genetics strategy identifies an HCV NS5A inhibitor with a potent clinical effect. Nature. 2010 May 6;465(7294):96-100. doi: 10.1038/nature08960.

[2] Jardim ACG, Shimizu JF, Rahal P, Harris M. Plant-derived antivirals against hepatitis c virus infection. Virol J. 2018 Feb 13;15(1):34. doi: 10.1186/s12985-018-0945-3.

[3] Reddy BU, Mullick R, Kumar A, Sharma G, Bag P, Roy CL *et al.* A natural small molecule inhibitor corilagin blocks HCV replication and modulates oxidative stress to reduce liver damage. Antiviral Res. 2018 Feb;150:47-59. doi: 10.1016/j.antiviral.2017.12.004.

[4] Chan J, Gogela N, Zheng H, Lammert S, Ajayi T, Fricker Z *et al.* Direct-Acting Antiviral Therapy for Chronic HCV Infection Results in Liver Stiffness Regression Over 12 Months Post-treatment. Dig Dis Sci. 2018 Feb;63(2):486-492. doi: 10.1007/s10620-017-4749-x.

[5] Pawlotsky JM. New hepatitis C therapies: the toolbox, strategies, and challenges. Gastroenterology. 2014 May;146(5):1176-92. doi: 10.1053/j.gastro.2014.03.003.

[6] Pawlotsky JM. New hepatitis C virus (HCV) drugs and

DOI:https://doi.org/10.54393/pbmj.v5i5.483

the hope for a cure: concepts in anti-HCV drug development. Semin Liver Dis. 2014 Feb;34(1):22-9. doi: 10.1055/s-0034-1371007.

[7] Kotwal GJ. Natural antivirals against human viruses. Virol. Mycol. 2014;3:e107.

[8] Ganta KK, Mandal A, Debnath S, Hazra B, Chaubey B. Anti-HCV activity from semi-purified methanolic root extracts of Valeriana wallichii. Phytotherapy research. 2017 Mar;31(3):433-40. doi.org/10.1002/ptr.5765.

[9] Lemm JA, O'Boyle D 2nd, Liu M, Nower PT, Colonno R, Deshpande MS *et al.* Identification of hepatitis C virus NS5A inhibitors. J Virol. 2010 Jan;84(1):482-91. doi: 10.1128/JVI.01360-09.

[10] Gao M, O'Boyle DR 2nd, Roberts S. HCV NS5A replication complex inhibitors. Curr Opin Pharmacol. 2016 Oct;30:151-157. doi: 10.1016/j.coph.2016.07.014.

[11] Badillo A, Receveur-Brechot V, Sarrazin S, Cantrelle FX, Delolme F, Fogeron ML *et al.* Overall Structural Model of NS5A Protein from Hepatitis C Virus and Modulation by Mutations Confering Resistance of Virus Replication to Cyclosporin A. Biochemistry. 2017 Jun 20;56(24):3029-3048. doi: 10.1021/acs.biochem.7b00212.

[12] Ireland DC, Colgrave ML, Craik DJ. A novel suite of cyclotides from Viola odorata: sequence variation and the implications for structure, function and stability. Biochem J. 2006 Nov 15;400(1):1-12. doi: 10.1042/BJ20060627.

[13] Troeira Henriques S, Huang YH, Chaousis S, Wang CK, Craik DJ. Anticancer and toxic properties of cyclotides are dependent on phosphatidyle thanolamine phospholipid targeting. Chembiochem. 2014 Sep 5;15(13):1956-65. doi: 10.1002/cbic.201402144.

[14] Khalil R, Ashraf S, Khalid A, Ul-Haq Z. Exploring Novel N-Myristoyltransferase Inhibitors: A Molecular Dynamics Simulation Approach. ACS Omega. 2019 Aug 15;4(9):13658-13670. doi: 10.1021/acsomega.9b00843.

[15] Schmittgen TD, Livak KJ. Analyzing real-time PCR data by the comparative C(T) method. Nat Protoc. 2008;3(6):1101-8. doi: 10.1038/nprot.2008.73.

[16] Sanghani HV, Ganatra SH, Pande R. Molecular—docking studies of potent anticancer agent. J Comput Sci Syst Biol. 2012;5(1):12-5.

[17] Gao M. Antiviral activity and resistance of HCV NS5A replication complex inhibitors. Curr Opin Virol. 2013 Oct;3(5):514-20. doi: 10.1016/j.coviro.2013.06.014.

[18] Donato MT, Tolosa L, Gómez-Lechón MJ. Culture and Functional Characterization of Human Hepatoma HepG2 Cells. Methods Mol Biol. 2015;1250:77-93. doi: 10.1007/978-1-4939-2074-7_5.

[19] Marks DC, Belov L, Davey MW, Davey RA, Kidman AD. The MTT cell viability assay for cytotoxicity testing in multidrug-resistant human leukemic cells. Leuk Res. 1992 Dec;16(12):1165-73. doi: 10.1016/0145-2126(92)90114-m.

[20] Rajik M, Jahanshiri F, Omar AR, Ideris A, Hassan SS, Yusoff K. Identification and characterisation of a novel anti-viral peptide against avian influenza virus H9N2. Virol J. 2009 Jun 5;6:74. doi: 10.1186/1743-422X-6-74.

[21] Lee BW, Quy Ha TK, Park EJ, Cho HM, Ryu B, Doan TP *et al.* Melicopteline A-E, Unusual Cyclopeptide Alkaloids with Antiviral Activity against Influenza A Virus from Melicope pteleifolia. J Org Chem. 2021 Jan 15;86(2):1437-1447. doi: 10.1021/acs.joc.0c02137.

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Original Article

Efficacy and Surgical Outcome of Trabeculectomy with Mitomycin-C in Congenital Glaucoma with Hazy Cornea

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ABSTRACT

Glaucoma is characterized by an optic neuropathy associated with raised intraocular pressure (IOP) and visual field defect **Objective:** To determine the efficacy and outcome of trabeculectomy augmented with anti-metabolite mitomycin-C in children with childhood glaucoma. **Methods:** A total of 40 eyes of 22 diagnosed cases of congenital glaucoma were studied. All these children underwent mitomycin-C augmented trabeculectomy from July 2017 to August 2020. The primary outcome was control of postoperative intraocular pressure (IOP) at the end of one year. A target pressure of <15mmHg was set as target pressure to label a successful surgical outcome. **Results:** The mean age of the patients enrolled in the study was 26.8 12.2 years (range: 8 – 32 months) with a male to female ratio of 7:4. The mean SD IOP before trabeculectomy surgery was (31.5 8.6) (range: 21 – 53) mmHg. At the one-year follow-up, the mean postoperative IOP was (19.4 7.9) (range: 9 – 48) mmHg. Target IOP < 15 mmHg was successfully achieved in 27 (67.5%), 24 (60.0%) and 22 (55.0%) eyes at postoperative 1, 6 and 12 months respectively. Repeat trabeculectomy was required in 5 (12.5%) eyes, while 5 (12.5%) eyes developed corneal perforations and 3 (7.5%) eyes developed phthisis bulbi. **Conclusion:** Trabeculectomy with mitomycin C can be a primary surgical intervention in congenital glaucoma. However, repeat surgery may be required and other related surgical complications can occur after this surgery in patients with uncontrolled IOP.

INTRODUCTION

Glaucoma in pediatric patients is characterized by intraocular pressure (IOP) of more than 21mmHg, cupping of the optic disc, increased diameter of the cornea, progressive myopia, and increase in ocular dimensions out of proportions with the normal growth leading to buphthalmos and visual field defects due to optic neuropathy [1]. Primary congenital glaucoma (PCG) is characterized by isolated angle anomalies with or without congenital anomalies of the iris and ocular enlargement [2]. It is responsible for 5% of childhood blindness though its incidence is variable worldwide [3]. However, it is usually bilateral (70-80%), with 60% of the patients being male (60%) [4]. The exact prevalence of PCG in Pakistan is not known [5]. The mainstay of treatment is surgery, with medical therapy having a supportive role. Surgical options include goniotomy, trabeculotomy, and trabeculectomy with or without anti-metabolites. Goniotomy is the first line of treatment and is performed in cases with the transparent cornea [6]. However, once the cornea becomes opaque, trabeculotomy or trabeculectomy is preferred [7]. Trabeculectomy has shown a high failure rate in the pediatric population, mainly due to increased fibroblastic activity at a young age, leading to scarring and failure of the procedure [8,10]. Over decades, anti-

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metabolites like mitomycin-C (MMC) have gained popularity to improve the outcome of trabeculectomy in children. The objective of this study was to evaluate the outcome of trabeculectomy assisted with MMC as a primary surgical procedure in pediatric patients with congenital glaucoma.

METHODS

After taking its institutional approval, we conducted this study following tenets of Ethical Medical Practice as laid down in the Declaration of Helsinki. Parents of the patients gave consent for their children to be enrolled in the study. Twenty-two children (40 eyes) were enrolled in this study. Only patients who did not have any previous ocular surgery history were included. These included patients with primary congenital glaucoma, congenital cataracts and glaucoma, and some patients with posterior embryotoxon and some other anatomical anomalies of the anterior segment. MMC augmented trabeculectomy was carried out on these patients as the primary procedure. All surgeries were performed between July 2017 to August 2020 at the Department of Ophthalmology, Jinnah Hospital, Lahore. Examination under anesthesia (EUA) of all these patients was done to establish the diagnosis and measure IOP (mmHg), corneal diameters (mm) using a caliper, axial length of the eye (mm) using an A-scan, and anterior segment examination using portable slit lamp and surgical microscope. A handheld Perkins applanation tonometer was used to measure IOP in the early stages of anesthesia.

A routine trabeculectomy procedure with application of 0.2mg/ml MMC for 2 minutes on bare sclera was performed after performing peritomy and securing hemostasis. A rectangular partial thickness scleral flap measuring 3.0 mm2 was created. A full-thickness sclerotomy measuring 1 mm2 was performed, followed by peripheral iridectomy and closure of the wounds with an interrupted 10/0 nylon suture. We re-examined our patients weekly for one month and then monthly for the next whole year. A target pressure of 15 mmHg was labelled as a measure of surgical success at the end of one year with no to minimum topical glaucoma medications. We analyzed the data using SPSS software version 23.0. Mean with standard deviation were calculated for quantitative variables like age and values of IOP at various follow-up visits. Qualitative variables were analyzed in terms of frequencies and percentages. Paired t-tests were applied to compare the resultant IOP with pre-operative value on follow-up visits.

RESULTS

We operated on 40 eyes of 22 children with PCG with MMC augmented trabeculectomy. The mean age of the study population was (26.8± 12.2) (range: 8 – 32) months with a female to male ratio of 1:1.75 (Table 1).

Gender	No. of patients (%)
Male	14 (63.6)
Female	8 (36.4)
Male: Female = 1.75 : 1	
AGE (MONTHS)	**NO. OF PATIENTS (%)**
< 12	7 (31.8)
12-24	2 (9.1)
>24	13 (59.1)
Mean Age ± SD = 26.8 ± 12.2 (range: 8 – 32) months	

Table 1: Age and Gender distribution (N=22)

An isolated diagnosis of primary congenital glaucoma was made in 26 eyes (65.0%). Other co-morbidities that were seen included coloboma of iris and adherent leucoma in 1 eye (2.5%), congenital cataract in 4 (10.0%), and posterior embryotoxon and iridocorneal dysgenesis in 2 eyes (5.0%). The mean IOP before trabeculectomy and postoperative IOP at 1 year follow-up were was (31.5± 8.6 mmHg) (Range: 21-53 mmHg), and (19.4± 7.9 mmHg) (Range: 9 – 48 mmHg) respectively ($p < 0.001$). The mean change in IOP after the surgical intervention was significantly improved at all follow-up visits as compared with the pre-surgery values (p-value < 0.0001) (Table 2).

IOP (mmHg)	Mean ± SD	Range (mmHg)	*p-value*
Pre-operative	31.5 ± 8.6	21 – 53	*<0.0001*
After 1 month	15.4 ± 7.8	4 – 42	
After 6 months	17.9 ± 8.1	6 – 42	
After 12 months		9 – 48	

Table 2: Comparison of mean Pre- and Postoperative Intraocular Pressure

Out of 40 eyes, a target pressure of <15 mmHg was observed in 27 (67.5%) eyes postoperatively in the first month. However, the success rate decreased with time, and 24(60.0%) and 22(55.0%) eyes showed our desired control at 6 and 12 months, respectively (Table 3).

Postoperative IOP	After 1 month n (%)	After 6 months n (%)	After 12 months n (%
Controlled (< 15 mmHg)	27 (67.5)	24 (60.0)	22 (55.0)
Raised (> 15 mmHg)	13 (32.5)	16 (40.0)	18 (45.0)
P- values	*0.011*	*0.048*	*0.258*

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Table 3: Post-Operative Control of Intraocular Pressure

Some surgical complications were also observed in our patients. These included phthisis bulbi in 3 eyes (7.5%), thinning of the bleb in 2 (5.0%), corneal abscess in 1 eye (2.5%), and corneal perforation in 5 eyes (12.5%) which was treated with conjunctival flap. Re-trabeculectomy was carried out in 5 eyes (12.5%).

DISCUSSION

We report our experience managing young children with congenital glaucoma with trabeculectomy with MMC. Patients had to undergo second revision surgery or were put on topical medications to control their disease. About a quarter of the patients also faced some form of surgery and disease-related complications. Childhood glaucoma is a very challenging disease to manage. As it is caused by angle dysgenesis, the mainstay of treatment is surgical intervention [11]. Patients diagnosed early with better corneal status can undergo goniotomy, whereas the children who present with advanced buphthalmos require more aggressive surgical intervention. Patients in developing countries usually present very late with an advanced form of the disease with cloudy corneas at presentation. This makes goniotomy impossible to perform. On the other hand, the trabeculotomy has its own limitations if the eyeball's size is too large because the Schlemm's canal remains compressed and is not visualized. Though a widely carried out procedure, trabeculectomy is a challenging procedure in the pediatric population. It is challenging to delineate the margins of the anatomical limbus in patients with advanced buphthalmos. Due to excessive globe expansion, creating scleral flaps usually leads to perforation and, sometimes, vitreous expression from the surgical site. The profuse healing response in children leads to excessive fibrosis at the surgical site leading to bleb closure and, eventually, surgical failure. Therefore, the recent trend has been shifted to concurrent use of anti-metabolites like MMC and 5-fluorouracil (5-FU) to prevent excessive fibrotic reaction over the area of scleral flaps hence, increasing surgical success rate [12]. An earlier study carried out a study on trabeculectomy with MMC in a higher concentration of 0.4 mg/ml for 3 minutes in pediatric glaucoma patients [13]. They observed complete success in 55% of eyes (IOP < 21 mmHg) at the end of one year; however, 27.5% of eyes required the addition of a single anti-glaucoma medication11. Another group reported a success rate of 94.7% with anti-metabolite augmented trabeculectomy in older children (mean age 7.6 years) [14]. This implies that the success rate of trabeculectomy increases as the age of the patients increases, indicating better and controlled postoperative fibrotic proliferation compared with the patients in the younger age group [15]. Another study also supported the importance of age at the time of surgery [16]. They reported that the success rate of trabeculectomy increased as the patient's age increased, but there was also an increased risk of antimetabolite-induced complications. Some investigators have advocated the use of a higher concentration of MMC in the pediatric population up to 0.5mg/ml for a longer duration of time [17]. But they have failed to demonstrate a higher success rate, which undercuts their proposition and makes the chances of anti-metabolite-related adverse effects less likely with routine 0.2 to 0.3mg/ml [18]. Furthermore, some reports have shown no difference in the surgical outcome of goniotomy, trabeculotomy, or combined trabeculotomy/trabeculectomy cases of primary congenital glaucoma [19]. This study highlighted possible demographic and racial disparities in response to surgical intervention in the Chinese population. We propose that the difference in the success rates reported in various studies are explained by the time of intervention and the severity of the disease at the time of intervention [19]. Other Limiting factors include differences in ethnicity, variations in the age groups, mean duration of follow-up, and per-operative concentration of MMC [20].

CONCLUSION

We conclude that trabeculectomy with MMC helps control IOP in more than half of pediatric glaucoma patients. However, the success rate of the surgery decreases with the advancing postoperative period, and the surgery is associated with various complications. A quarter of the patients require additional revisional surgery to control their disease.

REFERENCES

[1] Beck AD, Chang TCP, Freedman SF. Definition, Classification, Differential Diagnosis. Childhood Glaucoma: Consensus Series 9. Weinreb RN et al. Amsterdam: Kugler, 2013.

[2] Chang Ta C, Cavuoto KM. Surgical management in primary congenital glaucoma: Four Debates. J Ophthalmol. 2013; 612708.

[3] Qayyum A, Baloch RA. Trabeculectomy in Primary Congenital Glaucoma: Pak J Ophthalmol 2014; Vol. 30 No.3.

[4] Mahar PS, Memom AS, Bukhari S, Bhutto IA. Outcome of mitomycin-c augmented trabeculectomy in primary congenital glaucoma: Pak J Ophthalmol 2012, Vol. 28 No. 3.

[5] Worst IG. Goniotomy: An improved method for chamber angle surgery and congenital glaucoma. Am

DOI:https://doi.org/10.54393/pbmj.v5i5.458

J Ophthalmol. 1964; 57: 185-200.
[6] Hoskins HD, Sheffer RN, Hethrington J. Goniotomy versus trabeculotomy. J Paed Ophthalmol & Strabismus. 1984; 21: 1538
[7] Beauchamp GR, Parks MM. filtering surgery in children. Barriers to success. Ophthalmology. 1979; 86: 170-80.
[8] Cadera W, Pachtman M et al. filtering surgery in childhood glaucoma. Ophthalmic Surg. 1984; 15: 319-22.
[9] Skuta GL, Parish RK. Wound healing in glaucoma filtering surgery. Surv Ophthalmol. 1987; 32: 149-70.
[10] Burke JP, Bowell R. Primary trabeculectomy in congenital glaucoma. Br j Ophthalmol. 1989; 73: 186-90.
[11] Pechuho MA, Siddiqui SJ, Shah SIA, et al. Trabeculectomy with mitomycin C as primary surgery in congenital glaucoma. Medical Channel. 2009; 15: 77-9.
[12] Mandal AK, Walton DS, John T, et al. Mitomycin C-augmented trabeculectomy in refractory congenital glaucoma. Ophthalmology 1997;104:996–1001.
[13] Susana R, Oltrogge EW, Carani JCE, et al. Mitomycin as adjunct chemotherapy in congenital and developmental glaucoma. J Glaucoma. 1995; 4: 151-7.
[14] Al-Hazmi A, Zwaan J et al. Effectiveness and complications of mitomycin-C use during pediatric glaucoma surgery. Ophthalmology. 1998; 105: 1915-20.
[15] Sidoti PA, Belmonte SJ, Liebmann JM, et al. Trabeculectomy with mitomycin-C in the treatment of pediatric glaucoma. Ophthalmology. 2000; 107: 422-9.
[16] Beck AD, Wilson WR et al. Trabeculectomy with adjunctive mitomycin-C in pediatric glaucoma. Am J Ophthalmol. 1998; 126: 648-57.
[17] Zhang X, Du S et al. Long term surgical outcomes of primary congenital glaucoma in China. Clinics 2009; 64: 543-51.
[18] Dietlein TS, Jacobi PC, Krieglstein GK. Prognosis of primary abexterno surgery for primary congenital glaucoma. Br J Ophthalmol. 1999; 83: 317-22.
[19] Bindish R, Condon GP et al. Efficacy and safety of mitomycinC in primary trabeculectomy: Five year follow up. Ophthalmology. 2002; 109: 1336-42.
[20] Fontana H, Nouri-madhavi K et al. Trabeculectomy with mitomycin-C, outcomes and risk factors for failure in phakic open angle glaucoma. Ophthalmology. 2006; 113: 930-6

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Original Article

Serum Iron, Copper and Zinc Levels In Preeclampsia and Normotensive Primigravida Females

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ABSTRACT

Hypertensive ailments of pregnancy are major health problems for women and their babies around the world. Among the hypertensive disorders, preeclampsia and eclampsia are the major risk factors for maternal and neonatal morbidity and mortality. Now preeclampsia is considered a state of oxidative stress, in which over utilization of antioxidants may proceed into worst form of this disease**. Objective:** of this study was planned to assess the role of serum iron, copper and zinc as co factors for antioxidant system, and compare their levels within primigravida normotensive pregnant women and preeclampsia women. **Methods:** It was a cross-sectional comparative study conducted in Biochemistry department, University of health Sciences, Lahore. The study was carried out on 90 women which were divided into two equal groups of 45 each, preeclampsia and controls respectively. Serum levels of iron, copper and zinc were estimated by atomic absorption spectrometer. Data analyses were performed by utilizing SPSS version 20.0. **Results:**Serum levels of Fe and Cu were raised in preeclampsia patients, 151.85±61.22 (µg/dl), 130.83±48.29 (µg/dl) and serum Zn levels were decreased 77.94±23.55 (µg/dl) when compared with normotensive controls 104.39±55.36 (µg/dl), 116.64±26.56(µg/dl), and 92.77±22.91(µg/dl)respectively. A positive correlation between copper and systolic blood pressure (r= 0.440), BMI and weight (r = 0.543), while negative correlation of iron with zinc(r = -0.285) was observed in preeclamptic women. A negative correlation between copper and zinc (r = -0.440) was also observed in normal pregnant women but no such correlation was observed within Preeclampsia group. **Conclusion:** It is apparent from this study that increased levels of iron and copper and decreased levels of zinc during pregnancy is associated with the pathogenesis of preeclampsia.

INTRODUCTION

Preeclampsia and eclampsia are the major risk factors for maternal and neonatal morbidity and mortality [1]. It is found that deaths from preeclampsia and eclampsia were 300 times more in less developed countries than in more developed countries. The pathogenesis of PE differs from woman to woman depending on the underlying risk factors. Therefore, it is important to identify the different risk factors that may predispose women to PE, such as nulliparity, family history of preeclampsia, diabetes, and increase in body mass index, maternal age, kidney disease and hypertension when booking the case. In case of suspicion, the doctor is supposed to take into account the patient's antecedents, advise the urine(proteins)and blood (hemoglobin)tests, measure the height and look for edema [2]. Pakistan is ranked sixth most populous country. In a recent survey for global mortality, Pakistan ranked third among the countries most affected by maternal, neonatal and juvenile mortality [3]. The prevalence of preeclampsia represents about 3 to 10% of all pregnancies in less developed countries [4,5]. Numerous etiological

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hypotheses of preeclampsia have been suggested and widely studied. Many factors contribute to its etiology are immunologic factors, obesity, dietary factors, genetic factors, preexisting maternal pathology and antiphospholipid antibody syndrome [6]. Now preeclampsia is considered a state of oxidative stress, in which over utilization of antioxidants may proceed into worst form of this disease [7]. Free iron acts as a pro-oxidant in the body. Oxidative stress and pathological conditions cause iron to undergo a Fenton and Haber-Weiss reaction to produce reactive oxygen species, which damage biological macromolecules. During preeclampsia, free radicals are released from the damaged placenta and react with excess iron. Lipid peroxidation of cell membranes and lipoproteins begins when excess free iron reacts with their membranes. This modifies the serum activities of ferritin, transferrin, TIBC and ceruloplasmin. The end results are endothelial dysfunction, hepatic dysfunction and increased vascular resistance [8]. In addition to Iron serum copper is also an essential cofactor for several antioxidant enzymes such as catalase, Cu / Zn SOD and cytochrome oxidase, thus contributing to the antioxidant defense system. Copper acts as a pro-oxidant and can generate a reactive hydroxyl radical by participating in a single electron transfer reaction, thus contributing to oxidative stress during preeclampsia [6]. The copper transporter (CTR1) transfers copper through the placenta and is bound to iron transport by an unknown mechanism [9]. Ceruloplasmin is a copper binding protein with ferroxidase properties. Ceruloplasmin level rises during pregnancy due to increased levels of estrogens and in response to increased lipid peroxidation [10]. Another reason for this increase is due to blockade in the transfer of copper to the fetus by the placenta [11]. Copper acts as a pro-oxidant and can generate a reactive hydroxyl radical by participating in a single electron transfer reaction, thus contributing to oxidative stress during preeclampsia [8]. Therefore, the role of copper (Cu) is both pro-oxidant and antioxidant [11]. Zinc is also considered as an antioxidant because it is cofactor of superoxide dismutase enzyme which protects against free radical damage. Zinc counteracts oxidation by linking the sulfhydryl group in proteins and occupying iron and copper binding sites in lipids, proteins and DNA. Some studies have shown that a decrease in zinc concentration during pregnancy can cause fetal problems such as fetal malformations, premature labor, and maternal problems such as preeclampsia and bleeding after childbirth [12]. The accessible literature shows that oxidative stress is the consequence of an excess of reactive oxygen species. So, we can say that oxidation reduction reactions have far reaching effects and role in pregnancy and its related pathologies like eclampsia and pre-eclampsia.

METHODS

It was a comparative cross-sectional study. The study was conducted in Department of Biochemistry from March 2017 to March 2018 at University of Health Sciences, Lahore. The current study was approved from Advanced Studies and Research Board (ASRB) and Ethical Review Board, University of health Sciences Lahore. This study was conducted according to the principles expressed in the Declaration of Helsinki. Samples were collected using convenient sampling method. A total of 90 study participants were recruited from Lady Wallington Hospital Lahore and Services Hospital, out of them 45 were preeclamptic pregnant females (Group A) according to inclusion criteria (the females were primigravida, age 20 to 35 year, gestational age 30-34 weeks, blood pressure ≥ 140/90 after 20 weeks of gestation and proteinuria ≥300mg/24hr urine sample or 1+ on dipstick), and 45 were normal pregnant females (Group B) (the females were primigravida with normal blood pressure, gestational age 30-34 weeks and absence of proteinuria). The exclusion criteria were strictly followed (patients with severe anemia, hepatic and renal dysfunction, diabetes mellitus, chronic inflammatory disease was excluded). Informed written consent was given by all participants in the study. Blood pressure of all participants was measured by mercury sphygmomanometer. BMI of all the participants was calculated. Serum Zinc (Zn), copper (Cu) and iron (Fe) were measured on an atomic absorption spectrophotometer (Hitachi Z2000) with a polarized Zeeman atomic absorption spectrophotometer flame. The data was entered and analyzed by using IBM SPSS (Statistical Package for Social Sciences) version 22.0. Mean ± Standard Deviation (SD) was given for normally distributed quantitative variables and Median and Inter Quartile Range (IQR) was given for non-normally distributed quantitative variables. In case of normally distributed quantitative variables, Student "t" test was applied to compare group means with each other. In case of non-normally quantitative variables, non-parametric statistics i.e., Mann-Whitney U test was used to compare various variables between two groups. Pearson correlation (r) was used to observe correlation between normally distributed quantitative variables and Spearman's rho correlation (rho) was used to observe correlation between non-normally distributed quantitative variables. A p-value of < 0.05 was considered statistically significant for all purposes.

RESULTS

In this study, age of preeclampsia (PE) primigravida females was 25.26±3.71 (Mean±S.D) years, while in control group it was 24.06±2.34 years. The median (IQR) gestational

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age in preeclampsia group and control group was 33(32-35) and 34(32-35) months respectively, showing that most of the PE females seeking medical care were pregnant of 32 to 35 weeks. The mean levels of systolic blood pressure (114.33±7.03), diastolic blood pressures (75.11±6.52) were normal in the control group and were very high in PE group,155.11±11.20mmHg and 99.77±6.82mmHg respectively (Table 1). Significant positive correlation (p=0.002) was observed between SBP and DBP in PE females (Table-2) and also in control pregnant females (p=0.012) (Table-2), indicating simultaneous increase of SBP and DBP in study groups (Figure-2). BMI was higher in PE group 28.42±1.45kg/m2 when compared with control group 27.57±2.4kg/m2 (p=0.046) (Table-1). Significantly higher serum iron levels (p=0.000) were observed in preeclampsia group (151.85±61.22 µg/dl) as compared to healthy pregnant group (104.39±55.36 µg/dl) (Table-1), also iron was negatively correlated (p=0.058) with zinc in PE females (Table-2) while no such correlation was found in control group (Figure-1). Results of current study showed clinically raised serum Cu levels in PE females 124.52(96-163.9µg/dl) (Median along with IQR) compared to normal pregnant females 113.67(96-135µg/dl) (Table-1), but the difference of serum copper between two groups was not statistically significant (p=0.317). We found significant positive correlation (P=0.002) of copper with systolic blood pressure (Table-2,Figure-1). Results of current study showed significant lower (p=0.003) serum zinc levels (Mean±S.D) in PE group (77.94±23.55 µg/dl) as compared to control group (92.77±22.91 µg/dl) (Table-1). A positive correlation of zinc was observed with age in control group (r=0.408, p=0.005) (Table-2) and negative correlation in preeclampsia group (r=-0.064, p=0.674)(Table-2). We also observed negative correlation of zinc with copper in control group (r=-0.440, p=0.002) (Table-2) and positive correlation in patient group (Figure-1).

Parameters	Patients (n = 45)		Controls (n = 45)		p-value
	Mean ± SD	Median (IQR)	Mean ± SD	Median (IQR)	
BP systolic (mm of Hg)	155.1±11.2	150 (145-160)	114.3±7.0	110 (110-120)	0.000†
BP diastolic (mm of Hg)	99.7±6.8	100 (95-104)	75.1±6.5	70 (70-80)	0.000*
BMI (Kg/m2)	28.4±1.4	28.3 (27.3-29.67)	27.5±2.4	27.91 (25.46-28.88)	0.046†
Iron (µg/dl)	151.8±61.2	147.70 (98-196.8)	104.3±55.3	98.82 (64.4-139.5)	0.000†
Copper (µg/dl)	130.8±48.2	124.52 (96-163.9)	116.6±26.5	113.67 (96-135)	0.317*
Zinc (µg/dl)	77.9±23.5	81.39 (58.6-92.8)	92.7±22.9	93.88 (82.7-107.2)	0.003†

Table-1: Comparison of all parameters in preeclampsia group (n=45) and control group (n=45).

*P value generated by Mann-Whitney U Test
† P-value generated by Independent Sample "t"-Test
P-value ≤ 0.05 is considered statistically significant

Correlation matrix of demographic and laboratory data in preeclampsia patients										
Parameters	Vale	Age	G age	SBP	DBP	Pulse	BMI	Iron	Copper	Zinc
DBP	r / rho	0.023[b]	0.177[b]	0.515**[b]						
	p-value	0.897	0.245	0.000	1					
BMI	r / rho	0.166[a]	0.134[a]	0.073[a]	0.005[a]	0.140[a]				
	p-value	0.275	0.382	0.636	0.973	0.360	1			
Iron	r / rho	0.240[a]	0.134[a]	0.238[a]	0.132[a]	-0.05[a]	-0.10[a]			
	p-value	0.112	0.381	0.115	0.386	0.745	0.502	1		
Copper	r / rho	-0.12[b]	-0.18[b]	0.44**[b]	0.08[b]	0.28[b]	0.119[b]	-0.18[b]		
	p-value	0.397	0.213	0.002	0.577	0.056	0.435	0.223	1	
Zinc	r / rho	-0.06[a]	0.049[a]	-0.016[a]	-0.06[a]	-0.06[a]	0.17[a]	-0.25[a]	0.122[a]	
	p-value	0.674	0.747	0.916	0.665	0.620	0.243	0.058	0.427	1
Correlation matrix of Demographic and laboratory data in healthy controls										
DBP	r / rho	0.073[b]	-0.2[b]	0.37*[b]	1					
	p-value	0.634	0.09	0.01						
BMI	r / rho	0.210[a]	0.06	0.32*[a]	0.187[a]	0.35*a	1			
	p-value	0.166	0.65	0.03	0.219	0.01				
Iron	r / rho	-0.07[a]	0.29[a]	-0.04[a]	-0.08[a]	0.08[a]	0.12[a]	1		
	p-value	0.622	0.05	0.79	0.568	0.57	0.40			
Copper	r / rho	-0.14[a]	0.08[a]	0.02[a]	-0.04[a]	0.08[a]	0.14[a]	-0.06[a]		
	p-value	0.362	0.60	0.87	0.779	0.58	0.34	0.65	1	
Zinc	r / rho	0.41**[a]	-0.10[a]	0.01[a]	-0.03[a]	-0.00[a]	-0.16[a]	-0.16[a]	-0.4*[a]	1
	p-value	0.00	0.51	0.91	0.843	0.96	0.28	0.28	0.00	

Table-2: Correlation matrix of demographic and laboratory data in preeclampsia patients and Healthy Controls

aCorrelation coefficient (r) and p -values are generated by Pearson Correlation coefficient
bCorrelation coefficient (rho) and p -values are generated by Spearman's Rho Correlation coefficient
p -value ≤ 0.05 is considered statistically significant
*correlation is significant at the 0.05 level (2-tailed)
** correlation is significant at the 0.01 level (2-tailed)

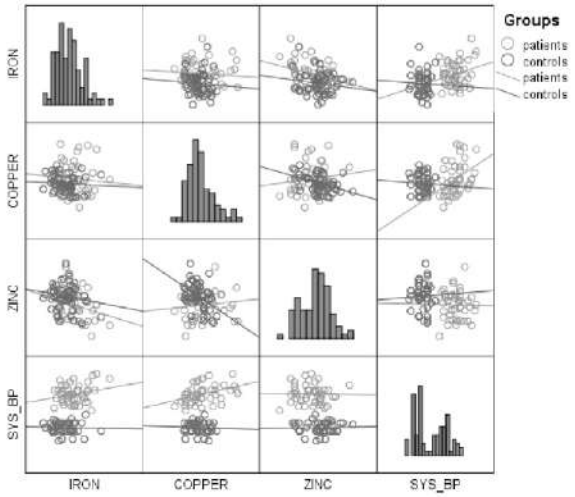

Figure-1: Scattered plots showing significant correlation of Serum Iron, Copper, Zn and Systolic Blood Pressure

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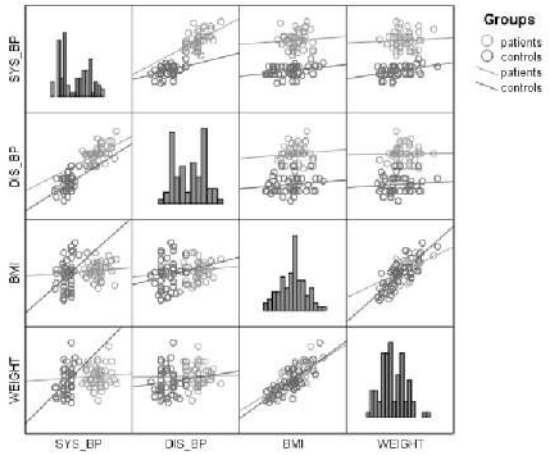

Figure-2: Scattered plots showing significant correlation of Weight, BMI, Systolic Blood Pressure and diastolic BP

DISCUSSION

Many studies have been conducted to evaluate iron levels in pregnancy and its possible contributory role in oxidative stress of PE but there were different and ambiguous results had been obtained [8]. In our study, we observed significantly higher serum iron levels in preeclampsia group as compared to healthy pregnant females. Our findings were in agreement with studies in Saudi Arabia, Bangladesh, UK, Iraq, Crotia and Korea [13-18]. It is well known that free iron act as prooxidant. It undergoes Fenton reaction to generate reactive oxygen species (ROS) and react with cell membranes and lipoproteins thus initiating lipid peroxidation. So in PE there is a possibility of placental-endothelial vasospasm which results into red bloood cells (RBCs) hemolysis leading to raised serum iron levels [8].In contrast to the present study Sarwar, M. et al. and Ahsan T. et al. in 2013 from Bangladesh, reported decreased Fe levels were observed in PE women [4,19]. The possible reason of this contradiction with our studies may be due to differences in conditions like duration of PE, severity of disease, nutritional deficiency and hemoglobin levels in PE women or some genetic and geographic variations of disease among different populations. The Cu levels are variable and contrasting in PE females. It may be due to differences in study populations, demographic variations or heterogeneity of PE or copper status of women at the time of conception, during earlier and terminal stages of the pregnancy [4]. The current study showed raised serum Cu levels in preeclampsia females compared to normal pregnant females but the difference of serum copper between two groups was not statistically significant. The results of the present study were comparable to previous studies from Iran [20]. and Sudan [21] in which no significant association of copper was observed with PE. Although a study from Turkey, showed significantly raised serum copper in PE females as compared to healthy pregnant females [22]. The variations in copper levels in different studies may be due to demographic variables or different reference range of copper level in their population. According to a studies from Iran, serum copper levels were high in PE as compared to Normal controls [23-25]. It is presumed that high copper levels are due to mobilization of Cu from maternal tissues due to increased estrogen in pregnancy. In pregnancy, ceruloplasmin levels are increased in response to higher estrogen and progesterone, which bind and carry Cu [12]. Ceruloplasmin oxidizes iron and consequently helps its binding to transferrin. It also inhibits free radical oxidation by utilizing itself as antioxidant and its rapid increase in inflammatory reaction have provided the basis for its consideration as acute phase protein(25). Contradictory to put study, lower serum copper levels were also reported in various studies in PE [4,26,7]. The potential reasons for copper damage may be associated with hormonal, metabolic, enzymatic and dietary changes in PE patients. We observed negative correlation between copper and iron in this study. Iron and copper interact with each other due to their positive charge, similar atomic radii and common metabolic fates [28]. Therefore, when level of one of them increases, the other will decrease. In our study iron levels were much increased in peeclampsia females compared to copper levels. In this study we found significant positive correlation of copper with systolic blood pressure (SBP). Similarly, the studies done by Sarwar, M in 2013 also, showed significant positive correlation of copper with SBP [4]. We can say that raised copper levels has some role in raising systolic blood pressure. A significant lower serum zinc levels in preeclampsia group as compared to control group was observed in current study. The results of present study are consistent with a study from Iran in which serum zinc levels were significantly low in PE patients as compared to controls [26].According to another study from Turkey, serum zinc levels in PE females were low as compare to healthy controls [22]. Several possible mechanisms have been put forward to explain maternal zinc deficiency in PE. There is increased cortisol production during pregnancy and furthur increase was observed in PE women [29]. Cortisol reduces circulating zinc levels therefore, zinc is expected to be lower in PE. Zinc in plasma is bound to albumin mainly, as serum albumin reduces in pregnancy and along with it, serum zinc also reduces [30]. Zinc levels are reduced in normal pregnancy due to increased cortisol levels but furthur decrease that is seen in PE is due to decrease albumin. Increased intake of iron supplements (upto 65mg/day) may decrease zinc absorption. So, pregnant women taking iron may require zinc supplementation [12]. In addition, placental zinc deficiency also plays a role in the connective

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tissue biosynthesis, maintaining its integrity, which could have an impact on the structure of the spiral arteries[30].

CONCLUSION

It is obvious from this study that modifications of certain micronutrients may play a key role in the pathogenesis of preeclampsia. An increase in iron level and a decrease in zinc levels may be an independent risk marker of preeclampsia before the onset of medical examinations. Careful supplementation with a mixture of antioxidants and micronutrients may be helpful in normalizing the formation of free radicals produced during oxidative stress.

REFERENCES

[1] Liu J, Yin JJCR. Letter by Liu and Yin Regarding Article,"Impact of the 2017 ACC/AHA Guideline for High Blood Pressure on Evaluating Gestational Hypertension-Associated Risks for Newborns and Mothers: A Retrospective Birth Cohort Study". 2019;125(11):e94e5.doi.org/10.1161/CIRCRESAHA.119.316028

[2] Khowaja AR, Qureshi RN, Sheikh S, Zaidi S, Salam R, Sawchuck D, et al. Community's perceptions of pre-eclampsiaandeclampsiainSindhPakistan:aqualitative study. 2016;13(1):39-44.doi.org/1 0.1186/s12978-0160136-x

[3] Bhutta ZA, Hafeez A, Rizvi A, Ali N, Khan A, Ahmad F, et al. Reproductive, maternal, newborn, and child health in Pakistan: challenges and opportunities. 2013;381(9884):2207-18.doi.org/10.1016/S0140-6736(12)61999-0

[4] Sarwar M, Ahmed S, Ullah M, Kabir H, Rahman G, Hasnat A, et al. Comparative study of serum zinc, copper, manganese, and iron in preeclamptic pregnantwomen.2013;154(1):1420.doi.org/10.1007/s12011-013-9721-9

[5] Council NR. Reducing maternal and neonatal mortality in indonesia: Saving lives, saving the future 2013.

[6] Prakash MJIJoN. Role of non-transferrin-bound iron in chronic renal failure and other disease conditions. 2007;17(4):188.doi.org/10.4103/0971-4065.39169

[7] Rafeeinia A, Tabandeh A, Khajeniazi S, Marjani AJJTobj. Serum copper, zinc and lipid peroxidation in pregnant women with preeclampsia in gorgan. 2014;8:83.doi.org/10.2174/1874091X01408010083

[8] Sabitha K, Venugopal B, Rafi M, Ramana KJAJMSM. Role of antioxidant enzymes in glucose and lipid metabolism in association with obesityand type 2 diabetes. 2014;2:21-4.doi.org/10.12691/ajmsm-2-1-5

[9] Liu J, Yang H, Shi H, Shen C, Zhou W, Dai Q, et al. Blood copper, zinc, calcium, and magnesium levels during different duration of pregnancy in Chinese. 2010;135(1):31-7.doi.org/10.1007/s12011-009-8482-y

[10] Bahadoran P, Zendehdel M, Movahedian A, Zahraee RHJIjon, research m. The relationship between serum zinc level and preeclampsia. 2010;15(3):120.

[11] Álvarez SI, Castañón SG, Ruata MLC, Aragüés EF, Terraz PB, Irazabal YG, et al. Updating of normal levels of copper, zinc and selenium in serum of pregnant women.2007;21:4952.doi.org/10.1016/j.jtemb.2007.09.023

[12] Muna F, Sirazi A, Majumder M, Serajuddin K, Debnath B, Hossain MJBJoMB. Status of Serum Copper and Zinc in Pre-Eclampsia. 2015;8(2):49-54.doi.org/10.3329/bjmb.v8i2.33279

[13] Siddiqui IA, Jaleel A, Al Kadri HM, Saeed WA, Tamimi WJAog, obstetrics. Iron status parameters in preeclamptic women. 2011;284(3):587-91.doi.org/10.1007/s00404-010-1728-2

[14] Howlader M, Tamanna S, Parveen S, Shekhar HU, Alauddin M, Begum FJB. Superoxide dismutase activity and the changes of some micronutrients in preeclampsia. 2009;15(2):107-13.

[15] Mudher HHA-SN, Hasan A-HMAJMJoB. The association of serum iron, zinc, and copper levels with preeclampsia. 2015;12(4):1027-36.

[16] Fenzl V, Flegar-Meštrić Z, Perkov S, Andrišić L, Tatzber F, Žarković N, et al. Trace elements and oxidative stress in hypertensive disorders of pregnancy.2013;287(1):1924.doi.org/10.1007/s00404-012-2502-4

[17] Kim J, Kim YJ, Lee R, Moon JH, Jo IJNr. Serum levels of zinc, calcium, and iron are associated with the risk of preeclampsia in pregnant women. 2012;32(10):7649.doi.org/10.1016/j.nutres.2012.09.007

[18] Zafar T, Iqbal ZJTPMJ. Iron status in preeclampsia. 2008;15(01):7480.doi.org/10.29309/TPMJ/2008.15.01.2700

[19] Duvan CI, Simavli S, Keskin EA, Onaran Y, Turhan NO, Koca CJHiP. Is the level of maternal serum prohepcidin associated with preeclampsia? 2015;34(2):14552.doi.org/10.3109/10641955.2014.988350

[20] Farzin L, Sajadi FJJorimstojolUoMS. Comparison of serum trace element levels in patients with or without pre-eclampsia. 2012;17(10):938.

[21] Bakacak M, Kılınç M, Serin S, Ercan Ö, Köstü B, Avcı F, et al. Changes in copper, zinc, and malondialdehyde levels and superoxide dismutase activities in pre-eclampticpregnancies.2015;21:2414.doi.org/10.12659/MSM.895002

DOI:https://doi.org/10.54393/pbmj.v5i5.440

[22] Ranjkesh F, Jaliseh HK, Abutorabi SJBter. Monitoring the copper content of serum and urine in pregnancies complicated by preeclampsia. 2011;144(1):58-62.doi.org/10.1007/s12011-011-9026-9
[23] Gabay C, Kushner IJNEjom. Acute-phase proteins and other systemic responses to inflammation. 1999;340(6):44854.doi.org/10.1056/NEJM199902113400607
[24] Ranjkesh F, Jaliseh HK, Abutorabi S. Monitoring the copper content of serum and urine in pregnancies complicated by preeclampsia. Biological trace element research. 2011;144(1-3):58-62. doi.org/10.1007/s12011-011-9026-9
[25] Keshavarz P, Gh BFNM, Mirhafez SR, Nematy M, Azimi-Nezhad M, Afin SA, et al. Alterations in lipid profile, zinc and copper levels and superoxide dismutase activities in normal pregnancy and preeclampsia.2017;353(6):5528.doi.org/10.1016/j.amjms.2017.03.022
[26] Onyegbule A, Onah C, Iheukwumere B, Udo J, Atuegbu C, Nosakhare NJNMJJotNMA. Serum copper and zinc levels in preeclamptic Nigerian women. 2016;57(3):182.doi.org/10.4103/0300-1652.184071
[27] Gulec S, Collins JFJAron. Molecular mediators governing iron-copper interactions. 2014;34:95-116. doi.org/10.1146/annurev-nutr-071812-161215
[28] Lindsay JR, Nieman LKJEr. The hypothalamic-pituitary-adrenal axis in pregnancy: challenges in disease detection and treatment. 2005;26(6):775-99. doi.org/10.1210/er.2004-0025
[29] Dai D-M, Cao J, Yang H-M, Sun H-M, Su Y, Chen Y-Y, et al. Hematocrit and plasma albumin levels difference may be a potential biomarker to discriminate preeclampsia and eclampsia in patients with hypertensive disorders of pregnancy. 2017;464:218-22.doi.org/10.1016/j.cca.2016.12.001
[30] Acikgoz S, Harma M, Harma M, Mungan G, Can M, Demirtas SJBter. Comparison of angiotensin-converting enzyme, malonaldehyde, zinc, and copper levels in preeclampsia. 2006;113(1):1-8. doi.org/10.1385/BTER:113:1:1

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Original Article

Efficacy of Spinal Epidural Anesthesia and Sub Diaphragmatic Lidocaine with Spinal Anesthesia in Reduction of Pain: A Randomized Clinical Trial

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ABSTRACT

Objective: To determine the efficacy of spinal anesthesia with sub diaphragmatic lidocaine for gynecological laparoscopic surgery at the commencement of the procedure to spinal anesthesia for get pain relief **Methods:** It was a randomized clinical trial conducted at Ali Medical Hospital in Islamabad. A total of 84 patients were given sub diaphragmatic lidocaine spinal anesthesia, only spinal epidural anesthesia and general anesthesia. During procedure, 2, 4, 6 and 12 hours after surgery, and before discharge, patients' pain perception was measured using Visual Analogue Scale (VAS) **Results:** Outcomes showed no significant difference in perception of pain at different time intervals in all three groups. ($F\ 4, 77 = 0.38$, $p = 0.81$). At all-time intervals following surgery, patients' pain levels were similar between groups ($F\ 2, 77 = 0.53$, $p = 0.57$). **Conclusions:** The use of sub diaphragmatic lidocaine at the onset of surgery together with the spinal anesthesia did not result in a prominent statistical difference in patients' postoperative VAS scores when compared to general anesthesia and spinal epidural anesthesia after and prenatal invasive techniques.

INTRODUCTION

Traditionally, women's laparoscopic surgery is performed under general anesthesia and spinal epidural anesthesia has few surgical difficulties [1]. However, spinal epidural anesthesia has convenience, low chance of failure, patient alertness, decreased discomfort after surgery, early release, and avoidance of the hazards of general anesthetic and intubation as well [2]. However, spinal anesthetic is linked to neurological problems like cauda equine syndrome, low blood pressure and bradycardia, headaches, and back and shoulder pain [2, 3]. If a proper dose is chosen, the anesthetic level is regulated and sterilization is followed, the complications will be reduced [4]. Trendelenburg position and pressure on abdomen, which lead to shoulder and neck pain after initiating the pneumo-peritoneum due to diaphragm and phrenic nerve stimulation [5], are the most critical problems with laparoscopy under spinal anesthesia. As a result, patients may develop anxiety [6]. Surgery would be impossible to do since the pain would most likely be uncontrollable [2]. An infiltration of local anesthesia in sub diaphragmatic place before onset of procedure is one of the suggested solutions [7], depending to the pathophysiology of the condition. As far as we know, this procedure has not been reflected. Purpose of this trial is to determine that how efficient spinal anesthesia with sub diaphragmatic lidocaine was at minimizing pain during gynecological laparoscopic surgery compared to spinal epidural anesthesia.

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METHODS

Current trial was conducted as One-Unit, randomized controlled trial (RCT), equivalent group, and controlled-experiment, according to the CONSORT guidelines. Females who were visiting Obstetrics and Gynecology Department for their infertility treatments were enrolled if they matched the below criteria: American Society of Anesthesiologists (ASA) physical standard guidelines were followed, reproductive age between 25 to 45 years and an informed consent form with signature. A total of 194 patients were enrolled between May and August of 2019. Each of the treatment groups received 28 participants out of the eighty-four patients. Exclusion criteria was coagulopathies, cardiovascular disorders, anaphylaxis to local anesthesia, Complications related to abdominopelvic discomfort which may cause misperception of pain directly associated to the process such as endometriosis, prolonged pain syndromes, BMI more than 35, history of abdominal surgery, a history of any mental disorder. A total of 92 patients who did not fulfil the criteria were excluded and 84 patients were included in the trial after obtaining their consents. A random table made up of random numbers generated by computer with a block size of 5 was used to separate women into three categories. Before the patient went into the operation theatre, the therapy was given. A nurse who was not part of the surgery assessed every patient's discomfort and the occurrence of postoperative antagonistic problems. During the trial, pain levels were monitored countinusely by using Visual Analogue Scale (VAS) 100 mm linear: (0 = no pain to 100= utmost agonizing). The agony VAS is a tool for continuous measurement that consists of a horizontal line with linguistic descriptors fixed at both ends. As is standard procedure, each patient was medicated before with midazolam tab 0.05 mg/kg. Standard measurement was carried out during the procedure, which included non-invasive blood pressure readings, oxygen saturation via pulsoximetry and electrocardiography.

Group 1 (only spinal anesthesia) & Group 2 (Pulmonary anesthesia infiltration) (Sub-diaphragmatic Lidocaine spinal anesthesia): Before the spinal block, intravenous (IV) cannula placed in the operation theatre, and a Ringer's lactate solution (10 ml/ Kg) was given through IV. In sitting position 25-G spinal needle was used to puncture the subarachnoid space on the L3-4/ L4-. After confirming Cerebrospinal (CSF) flow, 4 ml of 0.5% hyperbaric bupivacaine was injected at a ratio of 0.1 ml/s into subarachnoid space. The patient was in supine position with a pad beneath right hip to avoid the aortocaval pressure. Using a gentle pinprick method, the level of sensory block was tested and reported. In Group B, 10ml of injections of 1% of lidocaine was given sub-diaphragmatically at the port locations in the beginning of this study.

Group C (General Anesthesia): For endotracheal intubation propofol (1–2.5 mg/kg) Liporo 1% and for an aesthetic stimulation, midazolam (0.02 mg/Kg) was given, the patients were kept anaesthetized with propofol 100–150 g/Kg (B. Broun AG Co., Germany). After every 30 min tracurium 10 mg and fentanyl 50 mg were given. For laparoscopic technique, two-puncture method with carbon dioxide & Filshie clips was used. Through a sub umbilical cut, a trocar of 3mm was introduced straight in peritonium. Micro endoscope 2.9 mm with 0-degree vision (Karl Storz, Germany) was then inserted, and about 2 L of CO_2 was insufflated. After a lateral 3 mm port was inserted with a tiny holder so the other pelvic organs and fallopian tubes were revealed. An intrauterine Foleys catheter was used to provide 30 ml of methylene blue for chromopertubation. The computed sample size was the base end point as the criterion of scoring via VAS. The trial was conducted to get 80% influence so that determine a variance of 35% on score of pain level via visual analogue scale (0.05 of two-sided alpha levels). Each group should include a minimum of 28 people, according to the sample size calculation for independent proportions (a total of 78). Data was analyzed by using SPSS latest version. The descriptive statistics for continuous variables were presented as mean standard deviation (SD), whereas the descriptive statistics for definite variables were presented in form of numbers as percentage. The baseline features of these 3 groups were compared. For continuous variables, *Analysis of Variance Test (ANOVA)* was used while the *Chi-square test* for categorical variables. Repeated measures *ANOVA* was used to investigate the endpoint mean VAS score. Treatment was a constant aspect, whereas parity were variables in the model. All tests were conducted on a 2-sided basis, with a statistical significance threshold of 0.05. All of the analyses were done with the purpose of intention to treat. The trial's methodology and analysis followed the CONSORT criteria from 2010.

RESULTS

Analysis, which was done for basis treatment, which include all those patients which selected randomly. Figure 1 demonstrate the profile of the study. Among all three groups no statistically significance was found in outcomes in term of mean of variables like age, weight, height, parity and leprosopcy indication. Table 1 presents the Pre-values of demographics and clinical variables. Patients felt the intensity of pain at various intervals following procedure is shown in Table 2 and Figure 2. Although there was a difference in pain across the all groups [F 2, 79 = 0.54, p= 0.58], it was not statistically significant. Despite the fact

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that the mean of pain level raised for all three groups throughout the whole course of the trial, within subject effects, repeated measures ANOVA showed no significance, representing that none of the three groups had any significant within-subject effects. During surgery, aching scores in spinal anesthesia with sub diaphragmatic lidocaine were comparable to those in the spinal anesthesia group (Figure 2). In terms of vomiting p=0.94 and analgesic p=0.84 between these three groups no prominent differences observed..

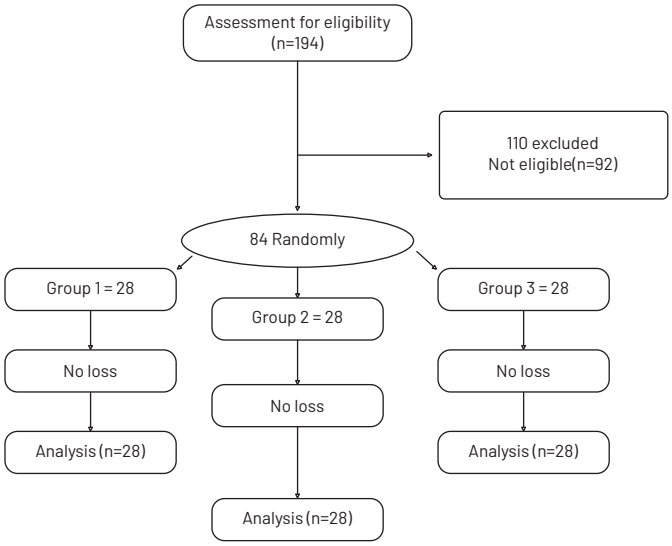

Figure 1: Participants' flow chart for three groups

	Group 1 (n= 28)	Group 2 (n= 28)	Group 3 (n= 28)	p value
Age(year)	28.61 ± (5.48)	26.51 ± (5.03)	29 ± (4.81)	0.88
Pair	0.14 ± (0.9)	0.38 ± (0.78)	0.17 ± (0.49)	0.84
Weight	52.9 ± (12.1)	69.9 ± (10.3)	75.8 ± (0.9)	0.77
Height(cm) Analgesic intake	158.7 ± (5.2)	160.4 ± (5.9)	161.6 ± (2.5)	0.34
Yes	18 (42.86)	10 (35.72)	10(39.29)	0.72
No Vomit	10 (57.14)	18 (64.28)	17 (60.71)	
Yes	8 (28.57)	7 (25)	7 (25)	084
No	20 (71.42)	20 (76)	21 (75)	
Surgery duration Laparoscopy indication	29.88 ± (11.25)	29.65 ± (10.6)	33.88 ± (19.13)	0.5

Table 1: Comparison of secondary outcomes and demographic variables

P value* Pain G1 (n=28), G2 (n=28), G3 (n=28)				
During surgery	-	2.75 ± (3.7)	2.25 ± (2.86)	0.57
After 2 hours	5.18 ± (3.66)	3.07 ± (3.4)	4.34 ± (3.58)	0.08
After 4 hours	4.69 ± (3.01)	3.38 ± (3.16)	4.15 ± (3.04)	0.27
After 6 hours	4.66 ± (3)	4.19 ± (3.13)	5.14 ± (3.02)	0.52
After 12 hours	4.36 ± (3.11)	4.96 ± (3.09)	3.96 ± (2.59)	0.47
prior to discharge	3.3 ± (2.18)	3.65 ± (2.69)	2.62 ± (1.82)	0.24

Table 2: Result for pain feeling during different time interval

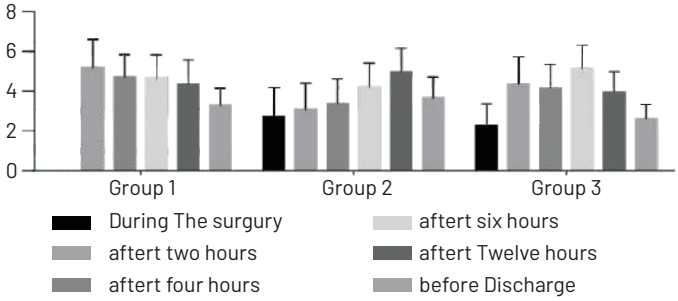

Figure 2: Outcome of feeling of pain for three groups reported experienced the pain at the all Interval

DISCUSSION

The results of this trial revealed that the mean score of pain level of patients in three groups measured instantly post operation at the interval of two. Adding 10 cc of 1% lidocaine to the place lower to the diaphragm at the commencement of operation had no effect on the discomfort level of shoulder, which could be compared to those who were given spinal anesthesia. Instillation of local anesthesia through intraperitoneal was considered to be effective to reduce the intensity of aching after the cholecystectomy & appendectomy in the prior researches [5, 8, 9]. According to a meta-analysis study based on the twenty-four RCTs, local anesthesia into the peritoneal area is statistically significant and effective to reduce the laparoscopic cholecystectomy [8]. On the other hand, local anesthetic peritoneal instillation after laparoscopic procedure is considered to lower the pain. Some studies [10–15] found the pain-relieving approach to be effective, while others did not. Marks et al., published a systematic review in 2012 that comprised seven publications in a meta-analysis. As an inclusion criterion, there was a comparison of the local anesthesia to the placebo group. Overall, the findings displayed that infiltration of local anesthesia into the intraperitoneal is beneficial for the initial 6 hrs afterward the surgical procedure, Anyhow, still no prominent difference found in discomfort twenty-four hours later between the intervention and placebo groups. In each of the seven studies, pain levels were compared between the intervention and placebo groups one and two hours after surgery. There were 220 patients in the therapeutic group and 171 in the placebo group. The interventional group experienced a reduced amount of discomfort as compared to the group with placebo. Three of the seven studies looked at how the intervention affected pain four to six hours following surgery108 patients were assigned to the therapy group, whereas 57 individuals were allocated for the placebo group. Pain was reported to be less in the intervention group as compared to placebo group. (Mean score difference, 2.00; 95% CI: 3.64 -0.35). Further 3 more trials compared the pain level in the two groups 24 hours

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after surgery. In these investigations, 106 people were given therapy and 47 people were given a placebo. Between the two groups, there was no significant difference (mean score difference, 0.26; 95% CI: 0.88-0.35) [16]. Because there was no placebo group in this investigation, local anesthesia effect on reduction of pain level was not determined. In current trial, effect of local anesthesia combined with spinal epidural anesthesia was matched. As a result, no difference between the groups is expected. Because epidural anesthesia is frequently used in women's surgery, neck and shoulder discomfort is the most common complaint [17]. Pain is influenced by a multitude of factors, including local injury from an epidural needle, a high BMI, position of patient during the operation, duration of surgery and time of epidural instillations according to previous study [18]. The three types of pain encountered after laparoscopic surgery are incision discomfort, which escalates to the neck along with pain in shoulder and other visceral pain. [14]. Anesthesia infiltration into intraperitoneal is justified because it chunks the peritoneum's free end: though, absorption from peritoneal surface also provides numbness. While local anesthetics are administered straight to the injured area on the surface of peritoneum, bowel motility returns more quickly. This is because of a lesser neuroendocrine reaction to the operation, as well as, in fact that local anesthetics can be direct administrated in to smooth muscle cells of gut. [19]. Depends on the kind, anesthesia infiltration and its dose, there was no agreement in study on the utility of local anesthetics for pain reduction. Various investigations have proposed gas infiltration of the trocar trajectory, instillation into peritoneal and fallopian tubes prior & post insufflations [20]. The procedure took about 30 minutes in each of the three groups in the current study, and no prominent difference was observed among the groups. Although the exact duration of topical lidocaine's efficacy is uncertain, it is most likely longer than the injectable type's half-life of 2 hours. Given the significant association between an aesthetic dose and an aesthesia severity, a low dose of local an aesthetic was one of the reasons for not detecting the effects of an aesthetic [12]. The dose was high in most research that looked at the favorable benefits of local anesthetics. In comparison to placebo Goldstein et al., discovered that injection (20ml) of 5% bupivacaine or 75% Ropivacaine lower analgesic intake and intensity of pain [21]. In a previous study, Callesen et al., discovered that injecting ropivacaine 50 ml into the spot between the mesosalpinx and peritoneal alleviated pain in eighty patients who got the laparoscopic tubal sterilization to get rid of the infection [22]. When compared the findings of earlier investigations, Current findings were different and unique. A dissimilar pain assessment tool was one of the distinctions. Although VAS was the most commonly used tool in earlier studies, in other investigations, Modified McGill Pain Intensity Scores and the Wong-Baker Faces Pain Rating Scale (WBFS) were used. Measurement error is likely to present in many studies when it comes to the result of pain as a subjective paradigm, and it can be one of the reasons for gaps between recent and previous researches [19]. Researches were conducted at various times, and no search has been conducted since 1980, Effect of advancements in invasive procedures & anesthetic could be the cause of study heterogeneity. Even though most of the research found in the literature suggested that local anesthetic reduced pain after surgery, three RCTs, similar to ours, found that local anesthesia had no effect on pain. Following a comprehensive evaluation by Marks et al., all three RCTs were carried out [16]. In 2016, Collins et al., conducted a study in which 55 women undergoing robotic and robotic gynecologic techniques were allocated to one group: one is placebo and the other one is intraperitoneal ropivacaine. The level of pain was measured post-operatively at the interval of 2, 4, 8 and 12. Though the mean score of pain in the group with placebo treatment was higher than in the Interventional groups and his outcomes did not revealed statistically much significance. [27]. A study conducted by Andrews, on patients undergoing hysterectomy to find out the outcomes of constant intraperitoneal instillation of levobupivacaine, the difference between the placebo and interventional groups on opioid consumption post-operation, stay duration in the hospital, and measure the pain level score did not determined significance [28]. In another RCT, Arden perform laparoscopic hysterectomy on sixty patients, the mean pain score, intake of opioids, and stay duration in hospital while groups placebo (normal saline) and showed similar effects [29].

CONCLUSION

During and after gynecological surgical operations, lidocaine which direct intraperitoneal combined with spinal epidural anesthesia did not show significance in postoperative VAS scores of patients as compared to GA and spinal epidural anesthesia.

REFERENCES

[1] Jacobson T Z, Duffy J N M, Barlow D, Koninckx P R, Garry R. Laparoscopic surgery for pelvic pain associated with endometriosis. Scopus Database of Systematic Reviews, 1–12,2019.

[2] Oddit J, Rajagopalan S. A Review of Local Anesthetic Techniques for Analgesia after Laparoscopic Surgery, Journal of Surgical Sciences, 3(3)2018.

[3] Jun GW, Kim MS, Yang HJ, et al. Laparoscopic appendectomy under spinal anesthesia with

DOI: https://doi.org/10.54393/pbmj.v5i5.468

dexmedetomidine infusion. Korean J Anesthesiol. 2014;67(4):246-251. doi:10.4097/kjae.2014.67.4.246

[4] Roy KK, Subbaiah M, Naha M, Kumar S, Sharma JB, Jahagirdar N. Intraperitoneal bupivacaine for pain relief after minilaparoscopy in patients with infertility. Archives of gynecology and obstetrics. 2014 Feb;289(2):337-40.doi.org/10.1007/s00404-013-2994-6

[5] Kahokehr A, Sammour T, Soop M, Hill AG. Intraperitoneal use of local anesthetic in laparoscopic cholecystectomy: systematic review and metaanalysis of randomized controlled trials. Journal of Hepato-Biliary-Pancreatic Sciences. 2010 Sep;17(5):637-56.doi.org/10.1007/s00534-010-0271-7

[6] Ali Y, Elmasry M N, Negmi H, Ouffi H A, Fahad B S.(vl-2),2019.

[7] Wang XX, Zhou Q, Pan DB, Deng HW, Zhou AG, Guo HJ, Huang FR. Comparison of postoperative events between spinal anesthesia and general anesthesia in laparoscopic cholecystectomy: a systemic review and meta-analysis of randomized controlled trials. BioMed research international. 2016 Jan 1;2016. doi.org/10.1155/2016/9480539

[8] Boddy A P, Mehta S, Rhodes M. The effect of intraperitoneal local anesthesia in laparoscopic cholecystectomy: a systematic review and meta-analysis, Anesthesia and Analgesia, 103(3): 682–688, 2007. doi.org/10.1213/01.ane.0000226268.06279.5a

[9] Hamill JK, Liley A, Hill AG. Intraperitoneal Local Anesthetic for Laparoscopic Appendectomy in Children. Annals of Surgery. 2017 Jul 1;266(1):189-94. doi.org/10.1097/SLA.0000000000001882

[10] Visalyaputra S, Lertakyamanee J, Pethpaisit N, Somprakit P, Parakkamodom S, Suwanapeum P.Intraperitoneal lidocaine decreases intraoperative pain during postpartum tubal ligation.Anesthesia and Analgesia, 89(4): 1077–1080, 1999.doi.org/10.1213/ 00 00 0539-199905000-00020

[11] Ng A, Swami A, Smith G, Davidson AC, Emembolu J. The analgesic effects of intraperitoneal and incisional bupivacaine with epinephrine after total abdominal hysterectomy. Anesthesia & Analgesia. 2002 Jul 1;95(1): 158-62.doi.org/10.1097/00000539-200207000-00028

[12] Ceyhan T, Teksoz E, Gungor S, Goktolga U, Pabuccu R. Effect of bupivacaine after operative laparoscopic gynecologic procedures. Journal of minimally invasive gynecology. 2005 Aug 1;12(4):326-9. doi.org/10.1016/j.jmig.2005.05.003

[13] Kaufman Y, Hirsch I,Ostrovsky L, et al. Pain Relief by Continuous Intraperitoneal Nebulization of Ropivacaine during Gynecologic Laparoscopic Surgery-A Randomized Study and Review of the Literature, Journal of Minimally Invasive Gynecology, 15(5):554–558,2008.doi.org/10.1016/j.jmig.2008.05.012

[14] Abdelazim I, Al-Kadi M, El Shourbagy MM, Mohamed AA, Abu Fasel ML. Intraperitoneal lidocaine tenoxicam for pain relief after gynecological laparoscopy. Asian Pac. J. Reprod. 2013 Jun 1; 2:146-50. doi.org/10.1016/S2305-0500(13)60136-0

[15] Cruz JJ, Diebolder H, Dogan A, Mothes A, Rengsberger M, Hartmann M, et al. Combination of pre-emptive port-site and intraoperative intraperitoneal ropivacaine for reduction of postoperative pain: a prospective cohort study. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2014 Aug 1; 179: 11-6.doi.org/10.1016/j.ejogrb.2014.05.001

[16] Marks JL, Ata B, Tulandi T. Systematic review and metaanalysis of intraperitoneal instillation of local anesthetics for reduction of pain after gynecologic laparoscopy. Journal of minimally invasive gynecology. 2012 Sep 1;19(5): 545-53.doi.org/10.1016/j.jmig.2012.04.002

[17] Nutthachote P,Sirayapiwat P, Wisawasukmongchol W, Charuluxananan S. A Randomized, Double-Blind, PlaceboControlled Trial of Oral Pregabalin for Relief of Shoulder Pain after Laparoscopic Gynecologic Surgery, Journal of Minimally Invasive Gynecology, 21(4): 669–673,2014.doi.org/10.1016/j.jmig.2014.01.018

[18] Jarrell J, Ross S,Robert M et al. Prediction of postoperative pain after gynecologic laparoscopy for nonacute pelvic pain, American Journal of Obstetrics and Gynecology, 211(4) :360–360.e8, 2014. doi.org/10.1016/j.ajog.2014.04.010

[19] Catenacci SS, Lovisari F,Peng S. et al. Postoperative analgesia after laparoscopic ovarian cyst resection: double-blind multicenter randomized control trial comparing intraperitoneal nebulization and peritoneal instillation of ropivacaine, Journal of Minimally Invasive Gynecology, 22(5): 759–766, 2015.

[20] Karaman S, Kocabas S, Ergun S, Firat V, Uyar M, endag FS.Intraperitoneal ropivacaine or ropivacaine plus meperidine for laparoscopic gynecological procedures, Agri, vol. 24, no. 2, pp. 56–62, 2012. doi.org/10.5505/agri.2012.21033

[21] Goldstein A, Grimault P, Henique A, Keller M, Fortin A, Darai E. Preventing postoperative pain by local anesthetic instillation after laparoscopic gynecologic surgery: a placebocontrolled comparison of bupivacaine and ropivacaine, Anesthesia and Analgesia, 91(2): 403–407, 2000.doi.org/10.1213/00000539-200008000-00032

DOI: https://doi.org/10.54393/pbmj.v5i5.468

[22] Callesen T,Hjort D, Mogensen T, et al. Combined field block and i.p. instillation of ropivacaine for pain management after laparoscopicsterilization, British Journal of Anaesthesia,82(4): 586–590, 1999. doi.org/10.1093/bja/82.4.586

[23] Sherbiny WE1, Saber W, Askalany AN, Daly AE1, et al. Effect of intra-abdominal instillation of lidocaine during minor laparoscopic procedures, International Journal of Gynecology and Obstetrics, 106(3) 3: 213–215, 2009. doi.org/10.1016/j.ijgo.2009.04.016

[24] Manjunath AP,Chhabra N, Girija S,Nair S.Pain relief in laparoscopic tubal ligation using intraperitoneal lignocaine: A double masked randomized controlled trial, European Journal of Obstetrics Gynecology and Reproductive Biology, 165(1): 110–114, 2012. doi.org/10.1016/j.ejogrb.2012.06.035

[25] Saleh A, Fox G, Felemban A,Guerra C, Tulandi T. Effects of local bupivacaine instillation on pain after laparoscopy. Journal of the American Association of Gynecologic Laparoscopists, 8(2): 203–206, 2001. doi.org/10.1016/S1074-3804(05)60578-6

[26] Fong SY, Pavy TJ, Yeo ST,Paech MJ, Gurrin LC. Assessment of wound infiltration with bupivacaine in women undergoing day-case gynecological laparoscopy. Regional Anesthesia and Pain Medicine, 26(2): 131 – 136, 2001. doi.org/10.1097/00115550-200103000-00007

[27] Collins GG, Gadzinski JA,Fitzgerald GD, et al. Surgical Pain Control With Ropivacaine by Atomized Delivery (Spray): A Randomized Controlled Trial. Journal of Minimally Invasive Gynecology, 23(1): 40–45, 2016. doi.org/10.1016/j.jmig.2015.07.018

[28] Andrews V,Wright JT,Zakaria F,Banerjee S, Ballard K. Continuous infusion of local anaesthetic following laparoscopic hysterectomy - A randomised controlled trial.BJOG: An International Journal of Obstetrics and Gynaecology, 121(6): 755–761, 2014.doi.org/10.1111/1471-0528.12610

[29] Arden D, Seifert E, Donnellan N, Guido R, Lee T, Mansuria S. Intraperitoneal Instillation of Bupivacaine for Reduction of Postoperative Pain After Laparoscopic Hysterectomy: A Double-Blind Randomized Controlled Trial. Journal of Minimally Invasive Gynecology, 20 (5): 620–626, 2013. doi.org/10.1016/j.jmig.2013.03.012

DOI: https://doi.org/10.54393/pbmj.v5i5.472

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Original Article

Effect of Forward Head Posture with Neck Disability and Quality of Life in Freelancers

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ABSTRACT

Freelancer is an independent person who earns money from clients on a task basis. Freelancers are often known to work on a computer or a laptop. They spend the majority of the time on the computer due to which they are more likely to develop bad posture **Objective:** To determine the effect of forward head posture with neck disability and quality of life in Freelancers. **Methods:** This cross-sectional study was conducted on 133 participants. The data was collected from freelancer teachers and students from The University of Lahore. Goniometer was used to assess the people with forward head posture. The neck disability was assessed by using neck disability index questionnaire. Quality of life was assessed by using SF-36 questionnaire. History of the symptoms including pain and tenderness clicking was noted. **Results:** The results showed that the frequency of posture, no forward head cases out of 133 were 24 (18.0%) and forward head cases out of 133 were 109 (82.0%). The results show the comparative relationship between posture and hours for which people use laptop. About 21 people without forward head posture use laptop for 4 to 6 hours and around 46 people with forward neck posture use laptop for 12 to 14 hours. The results show the comparative relationship between posture and time at which people use laptop. About 9 people (37.5%) without forward head posture use laptop at late night and around 38 people (34.9%) with forward neck posture use laptop at night time **Conclusions:** Based on the result, it was concluded that forward head posture has a strong effect on neck functional disability and quality of life in freelancers.

INTRODUCTION

Over the past few years, the usage of computers has been drastically increased [1]. Such digital means include freelance work [2,3]. Forward head posture (FHP) is the position where your head is slightly forward and the ear of the person is in front of the vertical midline [4]. Change in the curvature of the neck bone causes upper-crossed syndrome due to an imbalance in muscular pattern, which subsequently leads to rounded shoulder posture [5]. The rounded shoulder is a protrusion of the acromion of the shoulder joint relative to the centerline of gravity of the body [6,7]. FHP that causes round shoulder and neck pain due to an imbalance between the curvature of the spine and muscles that are attached to the neck bone, is correlated with problems in the neck bone [8]. Our body is associated with our head by a significant structure "Neck" [9]. Neck pain is commonly known as neck disability [10]. Neck pain that happens in individuals who spend significant stretches utilizing electronic gadgets with a bad body posture [11]. Researchers found that neck problems are very common and it is obvious the cell phone has become a regular need [12]. The anatomical connection between neck and cervical spine is quite complicated. It facilitate the muscles, bones, nerves and spine [13,14]. Neck pain can result in shoulder pain, thoracic kyphosis, radiating hand pain, back pain and headache [15]. Bad posture can cause the upper back muscle to work persistently to offset the pull of the gravity and forward neck [16]. Bad posture such as forward head posture is

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seen while utilizing cell phones or laptops, which may lead to neck pain and this posture is known cause for neck pain [17]. It happens due to outrageous and successive pressure to the flexed neck. [18]. The aggravation of the nerves can cause neck and shoulder pain [19]. Neck cause problems such as rounded shoulder, increase vertebral curvature and spastic back muscles. [20] While gazing forcefully downwards on the smartphones causes an unnecessary bend in the lower cervical vertebra, and over the top backbend in the upper thoracic vertebra to look after adjusting [21]. While several interventional studies are underway to improve FHP, research on the correlation between round shoulder and neck pain remains incomplete [22]. Neck problems normally cause a person to fall into depression, anxiety or frustration and affect a person daily activities as it diminishes the person's ability to work [23]. Parisa Nejati *et al.*, researched in 2013 in order to determine the relationship status between rounded shoulders and pain in the neck region. The study was conducted on Iranian office workers. Results showed that neck pain was positively correlated with work-related sitting positions and during normal positions [24]. In 2015 Parisa Nejati *et al.*, conducted a research in order to determine the correlated link between neck pain and forward head posture among the Iranian population. It was concluded that office workers have faulty posture during work time due to this faulty posture they suffer from problems such as neck pain [25]. In order to determine the incidence rate of forward head posture with desktop usage. The study was conducted on desktop users. It was concluded that there is no relationship between forward head posture with pain and the range of motion of the cervical spine and neck pain [26]. So, neck problem affects a person's quality of life. Hence, this study is conducted in order to see the impact of FHP on neck disability and quality of life in the freelancer's community.

METHODS

This cross-sectional study was conducted on 133 participants. The data was collected from The University of Lahore from freelancer teachers and students and home-based setting. The data was collected through convenient sampling technique. Goniometer was used to assess the people with forward head posture. Fulcrum of the goniometer is placed on the C7 level at the spinous process. Moving arm of the goniometer is placed to the tragus of the ear and the stationary part of the goniometer is placed at the horizontal line [27]. The neck disability was assessed by using neck disability index questionnaire. Neck disability scale was divided in to 10 sections which is scored from 0 to 5. All sections have a total score of 50 and is further divided in to 5 classification based on score no disability, mild disability, moderate disability, severe disability and total or compete disability [28]. Quality of life is assessed by using SF-36 questionnaire. The SF-36 consists of eight scaled scores, which are the weighted sums of the questions in their section. Each scale was directly transformed into a 0-100 scale on the assumption that each question carries equal weight [29]. The lower the score the more disability. The higher the score the less disability i.e., a score of zero is equivalent to maximum disability and a score of 100 is equivalent to no disability [30]. History of the symptoms including pain and tenderness clicking was noted. Tenderness was checked by adding firm pressure to the anatomical structures unilaterally or bilaterally palpation and trigger reflex was observed. Sample size was calculated using non-probability convenient sampling technique. Written consent was taken from all patients and importance of the study was explained before filling the questionnaires. The total score qualitative classification was used to find *Chi square* in order to see the association.
After taking informed written consent, basic demographic data were collected using Neck disability index, goniometer and SF 36 questionnaire and Include age, sex, self-reported weight, and height was calculated. It was analyzed using SPSS (version 22.0). For qualitative data, frequency and percentage were being taken out, and bar charts and pie charts were formed. For the quantitative type of data, the mean and standard deviation was analyzed, and the histogram was used.

RESULTS

Several participants who encountered the inclusion criteria were registered i.e. N= 133. Neck disability index, goniometer and SF 36 questionnaire were used to confirm the finding for all 133 participants both genders. The relationship of forward head posture with neck disability and quality of life was evaluated. The results showed distribution of the time mostly person use a laptop in. Morning time had a frequency of 23 (17.3%), evening with a frequency of 24 with a percentage of 18.0%, Night time had a frequency of 46 (34.6%) and late night time had a frequency of 40 with a percentage of 30.1%. The results showed distribution of the hours mostly person use a laptop in. People use laptop for 4 to 6 hours' laptop had a frequency of 13 with a percentage of 9.8%, people who use laptop for 7 to 9 hours with a frequency of 18 (13.5%), people use laptop for 10 to 12 hours had a frequency of 39 (29.3%) and people use laptop for had a frequency of 57 (42.9%) and people who use laptop for 14 to 16 hours had a frequency of 6 (4.5%). The results showed that the frequency of posture, no forward head cases out of 133 were 24(18.0%) and forward head cases out of 133 were 109 with a percentage of 82.0% (Table 1).

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Variables	Frequency (%)
Time on laptop	
Morning	23(17.3)
Evening	24(18.0)
Night	46(34.6)
Late Night	40(30.1)
Hours on Laptop	
4 To 6 Hours	13(9.8)
7 To 9 Hours	18(13.5)
10 To 12 Hours	39(29.3)
12 to 14 Hours	57(42.9)
14 To 16 Hours	6(4.5)
Posture	
No Forward Head Posture	24(18.0)
Forward Head Posture	109(82.0)

Table 1: Socio Demographic Details

The results show the comparative relationship between posture and hours for which people use laptop. About 21 people without forward head posture use laptop for 4 to 6 hours and around 46 people with forward neck posture use laptop for 12 to 14 hours. The results show the comparative relationship between posture and time at which people use laptop. About 9 (37.5%) people without forward head posture use laptop at late night (Table 2).

POSTURE IN RELATION TO HOURS		
Posture		**Frequency (%)**
no forward head posture	4 to 6 hours	21(87.5)
	10 to 12 hours	2(8.33)
	12 to 14 hours	1(4.17)
forward neck posture	4 to 6 hours	6(5.5)
	7 to 9 hours	18(16.5)
	10 to 12 hours	33(30.3)
	12 to 14 hours	46(42.2)
	14 to 16 hours	6(5.5)
POSTURE IN RELATION TO TIME		
No forward head posture	Morning	21(87.5)
	Evening	2(8.33)
	Night	1(4.17)
	Late night	6(5.5)
Forward neck posture	Morning	18(16.5)
	Evening	33(30.3)
	Night	46(42.2)
	Late night	6(5.5)

Table 2: Relation of Posture, Time, Hour and Gender

DISCUSSION

Forward head posture is the position where your head is slightly forward and the ear of the person is in front of the vertical midline [4]. Forward head posture prevalence is increasing rapidly it is about 63.96% in the student population. Forward head posture is also known as rounded shoulder often results in neck disability. Neck disability is a common disorder that involves soreness and pain of the muscles in the neck region. Neck disabilities are very prevalent globally, especially in Asian countries. Its prevalence range is between 54 to 64% [31]. The purpose of this research was to determine the effect of forward head posture with neck disability and quality of life in Freelancers. This cross-sectional study was conducted on 133 participants. The data was collected from University of Lahore from freelancer teachers and students. Goniometer was used to assess the people with forward head posture. The neck disability was assessed by using neck disability index questionnaire. Quality of life was assessed by using SF-36 questionnaire. The lower the score the more disability. The higher the score the less disability *i.e.*, a score of zero is equivalent to maximum disability and a score of 100 is equivalent to no disability. History of the symptoms including pain and tenderness clicking was noted. In previous studies, it was observed that individuals spending more hours while looking down at cells phones, causes the neck to be too stiff [32, 21]. While several interventional studies are underway to improve FHP, research on the correlation between round shoulder and neck pain remains incomplete [22,23]. Results show that people with forward head posture use laptop during night time. It is stated that people are more likely to develop forward head flexion who use laptop for more than 10 hours [33]. This statement is supported by our study result that people who use laptop for 12 to 14 hours have more forward head posture. This occurs as a result of reduce muscle activity over the time due to fatigue by overuse. These muscles include upper trapezius and erector spine muscle of the cervical region [34]. According to results females are more likely to develop forward head posture than male population. The results were supported by the study conducted by Ashok *et al.*, in the year 2020. According to that study females are more likely to develop forward head flexion [35]. While another study Arfa Naz *et al.*, had some conflicting debate related this. According to this 2018 study it was stated that males are more prevalent to forward head posture than females [36]. People with forward head posture have less quality of life as it impacts their activity of daily living. This study lies as an evidence base which states that forward head posture does impact neck disability and quality of life of a person. Higher the forward head people more at a risk they are at developing neck disability.

CONCLUSIONS

It was concluded that forward head posture has a strong effect on neck functional disability and quality of life in Freelancers.

REFERENCES

[1] Dockrell S, Bennett K, Culleton-Quinn E. Computer

DOI: https://doi.org/10.54393/pbmj.v5i5.472

use and musculoskeletal symptoms among undergraduate university students. Computers & Education. 2015 Jul 1;85:102-9. doi.org/10.1016/j.compedu.2015.02.001.

[2] Kang JH, Park RY, Lee SJ, Kim JY, Yoon SR, Jung KI. The effect of the forward head posture on postural balance in long time computer based worker. Ann Rehabil Med. 2012 Feb;36(1):98-104. doi: 10.5535/arm.2012.36.1.98.

[3] Breen R, Pyper S, Rusk Y, Dockrell S. An investigation of children's posture and discomfort during computer use. Ergonomics. 2007 Oct;50(10):1582-92. doi: 10.1080/00140130701584944.

[4] Jacobs K, Hudak S, McGiffert J. Computer-related posture and musculoskeletal discomfort in middle school students. Work. 2009;32(3):275-83. doi: 10.3233/WOR-2009-0826.

[5] Hussain SI, Ahmad A, Amjad F, Shafi T, Shahid HA. Effectiveness of natural apophyseal glides versus grade I and II Maitland mobilization in non specific neck pain. Annals of King Edward Medical University. 2016 Feb 11;22(1):23-. doi.org/10.21649/akemu.v22i1.792.

[6] Mahmoud NF, Hassan KA, Abdelmajeed SF, Moustafa IM, Silva AG. The Relationship Between Forward Head Posture and Neck Pain: a Systematic Review and Meta-Analysis. Curr Rev Musculoskelet Med. 2019 Dec;12(4):562-577. doi: 10.1007/s12178-019-09594-y.

[7] Pacheco J, Raimundo J, Santos F, Ferreira M, Lopes T, Ramos L et al. Forward head posture is associated with pressure pain threshold and neck pain duration in university students with subclinical neck pain. Somatosens Mot Res. 2018 Jun;35(2):103-108. doi: 10.1080/08990220.2018.1475352.

[8] Contractor ES, Shah SS, Shah SJ. To study correlation between neck pain and cranio-vertebral angle in young adults. Int Arch Integr Med. 2018;5(4):81-6.

[9] Anand B. Association of hand performance and neck disability. Indian Journal of Physiotherapy and Occupational Therapy. 2020 Oct;14(4):13.

[10] Genez Tarrifa SZ, Hoz Lara RD. Text Neck, More Technology, Less Health?. InCongress of the International Ergonomics Association 2018 Aug 26:758-767. Springer. doi.org/10.1007/978-3-319-96065-4_79.

[11] Vijayakumar M, Mujumdar S, Dehadrai A. Assessment of co-morbid factors associated with text-neck syndrome among mobile phone users. IJSRST. 2018;4(9):38-46.

[12] Lee HJ. Neck pain and functioning in daily activities associated with smartphone usage. The Journal of Korean Physical Therapy. 2016;28(3):183-8. doi.org/10.18857/jkpt.2016.28.3.183.

[13] Amjad F, Mohseni-Bandpei MA, Gilani SA, Ahmad A, Hanif A. Effects of non-surgical decompression therapy in addition to routine physical therapy on pain, range of motion, endurance, functional disability and quality of life versus routine physical therapy alone in patients with lumbar radiculopathy; a randomized controlled trial. BMC Musculoskeletal Disorders. 2022 Dec;23(1):1-2. doi.org/10.1186/s12891-022-05196-x.

[14] Neupane S, Ali UI, Mathew A. Text neck syndrome-systematic review. Imperial journal of interdisciplinary research. 2017;3(7):141-8.

[15] Sathya P, Tamboli SA. Prevalence of text neck syndrome in young-adult population. Int J Med Exerc Sci. 2020;6:749-59.

[16] Kamalakannan M, Rakshana R. Estimation and prevention of text neck syndrome among smart phone users. Biomedicine. 2020 Nov 9;40(3):372-6. doi.org/10.51248/.v40i3.30.

[17] Alzaid AN, Alshadokhi OA, Alnasyan AY, AlTowairqi MY, Alotaibi TM, Aldossary FH. The Prevalence of Neck Pain and The Relationship Between Prolonged Use of Electronic Devices and Neck Pain IN: A Saudi Arabia, Cross-Sectional Study in Saudi Arabia. The Egyptian Journal of Hospital Medicine. 2018 Jan 1;70(11):1992-9. DOI: 10.21608/EJHM.2018.9405.

[18] Amjad F, Mohseni-Bandpei MA, Gilani SA, Ahmad A, Waqas M, Hanif A. Urdu version of Oswestry disability index; a reliability and validity study. BMC Musculoskelet Disord. 2021 Mar 29;22(1):311. doi: 10.1186/s12891-021-04173-0.

[19] Masoumi AS, Akoochakian M. The effect of duration of smartphone use on head and shoulders posture of young adults aged 20-35 years. Iranian Journal of Ergonomics. 2019 Sep 10;7(2):62-71.

[20] Karkusha RN, Mosaad DM, Abdel Kader BS. Effect of smartphone addiction on neck function among undergraduate physical therapist students. The Egyptian Journal of Hospital Medicine. 2019 Jul 1;76(4):4034-8. DOI: 10.21608/ejhm.2019.42131.

[21] Portelli A, Reid SA. Cervical Proprioception in a Young Population Who Spend Long Periods on Mobile Devices: A 2-Group Comparative Observational Study. J Manipulative Physiol Ther. 2018 Feb;41(2):123-128. doi: 10.1016/j.jmpt.2017.10.004.

[22] Brink Y, Louw Q, Grimmer K, Jordaan E. The relationship between sitting posture and seated-related upper quadrant musculoskeletal pain in computing South African adolescents: A prospective study. Man Ther. 2015 Dec;20(6):820-6. doi:

DOI: https://doi.org/10.54393/pbmj.v5i5.472

10.1016/j.math.2015.03.015.

[23] Kim DH, Kim CJ, Son SM. Neck Pain in Adults with Forward Head Posture: Effects of Craniovertebral Angle and Cervical Range of Motion. Osong Public Health Res Perspect. 2018 Dec;9(6):309-313. doi: 10.24171/j.phrp.2018.9.6.04.

[24] Nejati P, Lotfian S, Moezy A, Moezy A, Nejati M. The relationship of forward head posture and rounded shoulders with neck pain in Iranian office workers. Med J Islam Repub Iran. 2014 May 3;28:26.

[25] Nejati P, Lotfian S, Moezy A, Nejati M. The study of correlation between forward head posture and neck pain in Iranian office workers. Int J Occup Med Environ Health. 2015;28(2):295-303. doi: 10.13075/ijomeh.1896.0035.

[26] Worlikar AN, Shah MR. Incidence of forward head posture and associated problems in desktop users. Int. J. Health Sci. Res. 2019;9(2).

[27] Shamsi M, Mirzaei M, Khabiri SS. Universal goniometer and electro-goniometer intra-examiner reliability in measuring the knee range of motion during active knee extension test in patients with chronic low back pain with short hamstring muscle. BMC Sports Sci Med Rehabil. 2019 Mar 22;11:4. doi: 10.1186/s13102-019-0116-x.

[28] Young IA, Dunning J, , Butts R, Mourad F, Cleland JA. Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms. Physiother Theory Pract. 2019 Dec;35(12):1328-1335. doi: 10.1080/09593985.2018.1471763.

[29] Jenkinson C, Wright L, Coulter A. Criterion validity and reliability of the SF-36 in a population sample. Qual Life Res. 1994 Feb;3(1):7-12. doi: 10.1007/Bf00647843.

[30] Agrawal R. Assessment of quality of life in normal individuals using the SF-36 questionnaire. International Journal of Current Research and Review. 2017 Feb 1;9(3):43.

[31] 31.Straker LM, Smith AJ, Bear N, O'Sullivan PB, de Klerk NH. Neck/shoulder pain, habitual spinal posture and computer use in adolescents: the importance of gender. Ergonomics. 2011 Jun 1;54(6):539-46. doi.org/10.1080/00140139.2011.576777.

[32] Khattak S, Gul M, Kakar HA, Ullah G, Rahman MU. The cost of long-term use of smart phones in the form of text neck syndrome; a systematic review. Rehman Journal of Health Sciences. 2019 Jun 30;1(1):3-5.

[33] Lee S, Lee Y, Chung Y. Effect of changes in head postures during use of laptops on muscle activity of the neck and trunk. Physical therapy rehabilitation science. 2017;6(1):33-8. doi.org/ 10.14474/ ptrs.2017.6.1.33.

[34] Alowa Z, Elsayed W. The impact of forward head posture on the electromyographic activity of the spinal muscles. J Taibah Univ Med Sci. 2020 Dec 16;16(2):224-230. doi: 10.1016/j.jtumed.2020.10.021.

[35] Ashok K, Purushothaman VK, Muniandy Y. Prevalence of forward head posture in electronic gamers and associated factors. International Journal of Aging Health and Movement. 2020 Sep 27;2(2):19-27.

[36] Naz A, Bashir MS, Noor R. Prevalance of forward head posture among university students. Rawal Med J. 2018 Apr 1;43(2):260-2.

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Original Article

Perception of Physical Therapist of Lahore Regarding Ethical Issues In Clinical Practice; A Cross Sectional Study

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ABSTRACT

Ethics are broad range of thinking about expressional interdependence behaviors of human being and about situational balance between right and wrong as moral duty. **Objective:** The purpose of this study was to figure out ethical issues in clinical practice of physical therapy practice. **Methods:** A cross sectional study was conducted at various clinical setups in Lahore enrolling practicing physical therapists via non-probability convenience sampling technique. A sample of 249 physical therapists was extracted using sample size calculator (Confidence interval 95%). Participants were selected on the basis of inclusion criteria and responses were recorded using self-structured questionnaire whose content validity was assessed using Lynn, M.R (1986) method. The questionnaire consisted of set of opinions regarding multidimensional aspects of ethics in patient care. The data was analyzed by SPSS version 20. The analysis was based on descriptive statistics such as frequency percentages and measures of central tendency and standard deviation. The multiple responses were calculated regarding collective opinions. **Results:** Demographics of the participants were expressed in frequency and percentages. The results showed that professional ethics were learned by 174(70.7%) respondents during physical therapy course, by 38(15.4%) via internet and by 34(13.8%) by other sources. On average, most of the responses regarding awareness, obligation and inter-professional relationship were reported as moderate to minimum. **Conclusions:** The study concluded that perception and opinions of physical therapists regarding ethical issues garnered only moderate to minimum concern about clinical practice. However, they identified a huge gap and lack of coordination with other health professional in clinical facility.

INTRODUCTION

Ethics are broad range of thinking about expressional interdependence behaviors of human being. This is about situational balance regarding conflict between right and wrong. As moral duty humans are ought to stay on a path that is ethically right. Taking into consideration moral concerns during patient care are termed as Medical Ethics Healthcare professionals came across a widespread range of ethical and regulatory issues in their practice settings [1]. Doing what is best for patients to achieve best practice standards is often influenced by external factors including certain rules and regulations. Physical therapists need to know and to apply available resources particularly American Physical Therapy Association (APTA), websites, documents, and references to support practice patterns and treatment. Some of ethical issues regarding physical therapy include the decisions according to which patients should be treated [2-10], For example, there may be very legal and permissible affairs may be disliked or not preferred in set circumstances. Although with advent of worldwide web both the patients and clinicians have come up not only with advance interaction but also knowledge of their choices. For example, patients are now aware of

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which doctor they should go for consultation and why. The same way clinicians also advertise and invite the choice of patients they prefer to see. This is fine ethical line in such scenario. This may be dropping a well-known ethical issue "Pick cherry-drop lemon" a highly controversial ethical concern in patient health care [11-15]. There may also be chances that some clinician rejects or avoid patients due to entire selfish reasons because of patients' poor prognosis or potential chance of extra resource utilization. The dilemma of providing care to under serving patients is also not less, because of patients' act against clinicians instruction and changing care plan on their own and sometimes they fell into a situation where they may have seriously worsen their condition and now require in depth care [16-19]

METHODS

This was a cross sectional study. The duration of study was 4 months after excluding the time in synopsis approval. The Physical therapists working in clinical setups were contacted. The physiotherapists with multiple jobs other than clinical such as in academics or looking after business were excluded. The ethical problems related to profession specifically come into light within the specific background of clinical practice. Therapists with employment in academics don't experience clinical professional situations on regular basis. Therefore, the educators and clinical students were also excluded due to their tendency be more sensitive to some ethical issues and may result in marked skew. The sampling technique was Convenience sampling technique. Surveying various authorities in physiotherapists and to the number of practicing physiotherapists in Punjab were not more than 700. Using online Sample Size Calculator. Keeping Confidence Level 95%, Confidence Interval 5, the sample size extracted to be as 249. It was questionnaire that was used as data collection tool. The questionnaire consisted of Demographics and 4 ethical aspects. Demographics consisted of age, gender, total number years of physiotherapists work, and educational level, as well as respondent's present category of employment sector or hospital, designation and type of employment. The section relating to investigation of ethical issues included decisions regarding the choice to treat, obligations deriving from the patient-therapist contract, moral obligation and economic issues and physical therapist's relationship to other health professionals and conflicts between two ethical principles. Physiotherapists were explained about the objectives of study. This was done to enhance their due motivation for service of profession however, were not forced to participate to all or any part of questionnaire given. The questionnaire was given as handouts or as email. The data was analyzed using Statistical Package of Social sciences 20 to extract frequency percentages, mean and standard deviation, also the graphical presentation pie charts and histograms.

RESULTS

The results as expressed in Table:1 showed age wise distribution of the participant that 186(75.6%) 25- 30 years, 52(21.1%) 30-40 years and 8(3.3%) were>40years. While gender wise distribution expressed that 87(35.4%) male and 159(64.6%) female. Total physical therapy work experience wise distribution demonstrated that 57(23.2%) had less than 1 year, 108(43.9%) having 1-2 years, 38(15.4%) with 2-3 years and 43(17.5%) had 3 years or more work experience. Qualification wise distribution showed that 107(43.5%) had Baccalaureate Degree while 139(56.5%) possessing Master degree as highest qualification. When questioned about Where you learned about professional ethics, 174(70.7%) responded to have been taught during in P.T course only, 38(15.4%) learned via internet and 34(13.8%) reported other sources. Table 2 showing frequencies of decision regarding the choice to treat: priority setting for care of patients wise distribution that 88(35.8%) high, 134(54.5%) moderate, 16 (6.5%) minimum and 8(3.3%) none, while for holding care for habitual patients wise distribution that 44(17.9%) high, 93(37.8%) moderate, 79 (32.1%) minimum and 30(12.2%) as none, and about discontinuing treatment with a terminally ill patient wise distribution showed that 68(27.6%) high, 82(33.3%) moderate, 74 (30.1%) minimum and 22(8.9%) none. On the other hand, discontinuing treatment or continuous care for psychological support once treatment goals achieved wise distribution expressed that 44(17.9%) high, 100(40.7%) moderate, 74 (30.1%) minimum and 28(11.4%) none. Table 3 demonstrating that frequencies of obligations driving from the patient-therapist contract as professional responsibilities in case of conflicts wise distribution reported by 85(34.6%) as high, by 127(51.6%) as moderate, by 28 (11.4%) as minimum and by 6(2.4%) as none. While responses towards Initial education role on future career behavior chosen by 78(31.7%) as high, 137(55.7%) as moderate, 25 (10.2%) as minimum and 6(2.4%) none. Information regarding care limitation was reported as high by 65(26.4%) high, moderate by 118(48%), minimum by 50 (20.3%) minimum and 13(5.3%) none. Considering patient or family's role and individual's role in treatment or discharge was reported as moderate by most of the respondents. The balance between treatment and pain of procedure was also reported to be moderately driving therapist patient contact. Maintaining patient's sense of personal space and dignity when treatment requires arrangements such as close proximity and group settings

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was expressed moderate to minimum. The result showed moral obligation and economic issues as expressed in table 4 deciding whether to represent certain necessary patient services in a way that would meet third- party-payer limitations and holding or decreasing physical therapy to improve job conditions were reported as moderate to minimum by respondents. In Table 5 the result showed physical therapist's relationship to other health professionals: maintaining doctor patient confidence and trust wise distribution that 59(24%) high, 122(49.6%) moderate, 59(24%) minimum and 6(2.4%) none. The result showed physical therapist's relationship to other health professionals: determining criteria for delegating duties to supportive personnel wise distribution that 63(25.6%) high, 107(43.5%) moderate, 66(26.8%) minimum and 10(4.1%) none. The result showed physical therapist's relationship to other health professionals: maintaining: interpersonal skills with fellow clinicians' wise distribution that 47(19.1%) high, 124(50.4%) moderate, 67(27.2%) minimum and 8(3.3%) none. The result showed physical therapist's relationship to other health professionals: maintaining: reporting questionable practices of a physician to the appropriate person wise distribution that 61(24.8%) high, 114(46.3%) moderate and 71(28.9%) minimum. The result showed physical therapist's relationship to other health professionals: maintaining reporting questionable practices of another health professional who is not a physical therapist or a physician to the appropriate person wise distribution that 68(27.6%) high, 123(50.0%) moderate, 45(18.3%) minimum and 10(4.1%) none. the result showed conflicts between two ethical principles: deciding what to do when two of my ethical principles or values are in conflict wise distribution that 68(27.6%) high, 123(50.0%) moderate, 45(18.3%) minimum and 10(4.1%) none (Table 6).

Variable	Frequency	Percentage
Age		
25-30	186	75.6
30-40	52	21.1
>40	8	3.3
Gender		
Male	87	35.4
Female	159	64.6
Work Experience		
Less than 1 year	57	23.2
1-2 year	108	43.9
2-3 year	38	15.4
3 year or more	43	17.5
Qualification		
Baccalaureate degree	107	43.5
Master degree	139	56.5
Source Ethics Learning		
In P.T. course only	174	70.7
Internet	38	15.4
Other	34	13.8

Table 1: Demographics of Respondents

		Responses	
		N	Percent
Decision regarding Choice to Treat	High	88	35.8%
	Moderate	134	54.5%
	Minimum	16	6.5%
	None	8	3.3%
Total		246	100.0%

Table2: Decision Frequencies

		Responses	
		N	Percent
Obligations Patient Therapist Contact	High	85	34.6%
	Moderate	127	51.6%
	Minimum	28	11.4%
	None	6	2.4%
Total		246	100.0%

Table 3: Obligations Frequencies

		Responses	
		N	Percent
Moral Obligations	High	50	29.2%
	Moderate	87	50.8%
	Minimum	79	17.7%
	None	30	2.3%
Total		246	100.0%

Table 4: Moral Frequencies

		Responses	
		N	Percent
Moral Obligations	High	50	29.2%
	Moderate	87	50.8%
	Minimum	79	17.7%
	None	30	2.3%
Total		246	100.0%

Table 4: Moral Frequencies

		Responses	
		N	Percent
Doctor-patient Confidence and Trust	High	59	24%
	Moderate	122	49.6%
	Minimum	59	24%
	None	6	2.4%
Total		246	100.0%

Table 5: Physiotherapist Relationship with Other Health Professional Frequencies ; Doctor-patient Confidence and Trust

		Responses	
		N	Percent
Rate of Agreement	High	68	27.6%
	Moderate	123	50.0%
	Minimum	45	18.3%
	None	10	4.1%
Total		246	100.0%

Table 6: Opinions Frequencies

DISCUSSION

Most of the respondent were female with master degree and having 1 year experience age ranging 25-30 years this shows the increasing trend of female with master degree joining the field. Most of them having less than 1 year experience due to hand available respondent and senior

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with high experience are busy in clinical setups and it easy to approach same age. Physical therapy course was the major source for respondents. The similar finding has been seen especially important ethics and practice [20-26]. Overall the results of study relating to physical therapy practice are quite varied. As a conclusive impression, all the elements that require financial support or personal effort apparently, beyond duty personal involvement, the respondents found below standard in ethical considerations, however, where the patient's involvement is more than physical therapy or organization, the ethics found peeked high. Decision Regarding the Choice to Treat show moderate response. Further the respondents who were showing good ethical content in one aspect were even below average of standard in other questions. This may be due to confusion in completing questionnaire. Or there is conflict in concepts of ethical standard in our course. The majority of students are Muslims. Islam is a religion well known for its lessons of ethical conduct in all aspects. Although the respondents have completed these course from their Primary to Intermediate level of study in different ways. The syllabus taught in graduation is International, with altogether different cultural values. There comes up conflict at first line. Conflict in understanding the differences. Conflict in management, conflict in rights and responsibilities. The other major factor is the culture and customs here. This is especially important when the financial support system also taken into account. Here in Pakistan, all the finances have to be borne by family or patients himself/ herself. While in other resource countries, mostly the patients are insured to get financial support from Government or Insurance agencies. So it is understood for doctors and physicians to reimburse the services. But in Pakistan it is point of confusion that weathers such patients to provide services on their own or refuse because neither the hospital nor any agency will reimburse the services. That is why the ethical conduct found below standard when it was talking about finances and services. There is no surety about the support from government later on. Further it is common trend found to ignore terminally ill patients in regard of greater virtue that the patients with more hope of survival be served and resources may be saved. International literature shows, however, the results with less conflict in standards of ethics [27-32]. Such as Another study was performed with aim to identify ethical issues which physiotherapists generally face in their private practice and to find out their possible solutions. 39 studies were analyzed which address ethical issues in private practice. Physical therapy community must reflect issues so that physiotherapists can be supported by education, research and good governance-in providing the best possible care for their patients [33]. This showed that even in these countries where the resources and money not a problem, the ethical issues existed.

CONCLUSION

There found moderate to minimum level of issues in ethical practice among physical therapists practicing in clinical setups. There has been found high level of space in coordination with other health professional in clinical facility. However, the most of the aspects relating to ethical practice are conflicted

REFERENCES

[1] Guccione AA. Ethical Issues in Physical Therapy Practice a Survey of Physical Therapists in New England. Physical Therapy. 1980;60(10):1264-72. doi.org/10.1093/ptj/60.10.1264

[2] Greenfield BH, Jensen GM. Understanding the lived experiences of patients: Application of a phenomenological approach to ethics. Physical Therapy.2016 ;90(8):1185-97.doi.org/ 10.2522/ptj.20090348

[3] Doherty RF, Purtilo RB. Ethical Dimensions in the Health Professions-E-Book: Elsevier Health Sciences; 2015.

[4] Laliberté M, Williams-Jones B, Feldman DE, Hunt M. Ethical Challenges for Patient Access to Physical Therapy: Views of Staff Members from Three Publicly-Funded Outpatient Physical Therapy Departments. Narrative inquiry in bioethics. 2017;7 (2):157-69.doi.org/10.1353/nib.2017.0046

[5] Kent J, Farrell A-M, Soothill P. Routine administration of Anti-D: the ethical case for offering pregnant women fetal RHD genotyping and a review of policy and practice. BMC pregnancy and childbirth. 2014;14(1):87.doi.org/10.1186/1471-2393-14-87

[6] Jacquemin D, Pujol N, Aubry R, Choteau B, Desmedt M, Guirimand F, et al. Transgression: Constructing an ethical clinical practice. MEDECINE PALLIATIVE. 2015;14(2):91-7.doi.org/10.1016/j.medpal.2015.01.006

[7] Hudon A, Drolet M-J, Williams-Jones B. Ethical issues raised by private practice physiotherapy are more diverse than first meets the eye: recommendations from a literature review. Physiotherapy Canada. 2015;67(2):124-32.doi.org/ 10.3138/ptc.2014-10

[8] Horn R, Parker M. Opening Pandora's box? ethical issues in prenatal whole genome and exome sequencing. Prenatal diagnosis. 2017.doi.org/ 10.1002/pd.5114

[9] Hartvigsson T, Munthe C, Forsander G. Error trawling and fringe decision competence: Ethical hazards in

DOI: https://doi.org/10.54393/pbmj.v5i5.436

monitoring and address patient decision capacity in clinical practice. Clinical Ethics. 2018:14777509177 49955.doi.org/10.1177/1477750917749955

[10] Gunn J, Taylor P. Forensic psychiatry: clinical, legal and ethical issues: CRC Press; 2014.doi.org/ 10.1201/b15462

[11] Ahluwalia P, Cameron D, Cockburn L, Ellwood L, Mori B, Nixon SA. Analyzing international clinical education practices for Canadian rehabilitation students. BMC Med Educ. 2014;14(187):1472-6920. doi.org/10.1186/1472-6920-14-187

[12] Anderson L, Cadogan A, Borich M, Schneiders A, Snelling J. New Zealand sports physiotherapy code of conduct. Br J Sports Med. 2015;49(14):961-4. doi.org/10.1136/bjsports-2015-095022

[13] Arora M, Harvey LA, Hayes AJ, Chhabra HS, Glinsky JV, Cameron ID, et al. Effectiveness and cost-effectiveness of telephone-based support versus usual care for treatment of pressure ulcers in people with spinal cord injury in low-income and middle-income countries: study protocol for a 12-week randomised controlled trial. BMJ Open. 2015;5(7): 2015-008369.doi.org/10.1136/bmjopen-2015-008369

[14] Bagozzi RP, Yi Y, Phillips LW. Assessing construct validity in organizational research. Administrative sciencequarterly.1991:42158.doi.org/10.2307/239 3203

[15] Barnitt R, Partridge C. Ethical reasoning in physical therapy and occupational therapy. Physiotherapy Research International. 1997;2(3):178-94.doi.org/10. 1002/pri.99

[16] Borisenko O, Beige J, Lovett EG, Hoppe UC, Bjessmo S. Cost-effectiveness of Barostim therapy for the treatment of resistant hypertension in European settings. J Hypertens. 2014;32(3):681-92.doi.org/10. 1097/HJH.0000000000000071

[17] Calvo-Lobo C, Pacheco-da-Costa S, Hita-Herranz E. Efficacy of Deep Dry Needling on Latent Myofascial Trigger Points in Older Adults with Nonspecific Shoulder Pain: A Randomized, Controlled Clinical Trial Pilot Study. J Geriatr Phys Ther. 2015;19:19.

[18] Froberg A, Alricsson M, Ahnesjo J. Awareness of current recommendations and guidelines regarding strength training for youth. Int J Adolesc Med Health. 2014;26(4):517-23.doi.org/10.1515/ijamh-2013-0329

[19] Gambino M. Fevered Decisions: Race, Ethics, and Clinical Vulnerability in the Malarial Treatment of Neurosyphilis, 1922-1953. Hastings Cent Rep. 2015;45(4):39-50.doi.org/10.1002/hast.451

[20] Nieswiadomy RM, Bailey C. Foundations of nursing research: Pearson; 2017.

[21] Moss JD. What are the ethical concerns of inadequate clinical calibration of dental practitioners within the same group practice? The Journal of the American Dental Association. 2017;148(5):351-2. doi.org/10.1016/j.adaj.2017.02.001

[22] Morton PG, Fontaine D, Hudak C, Gallo B. Critical care nursing: a holistic approach: Lippincott Williams & Wilkins; 2017.

[23] Moon BL. Ethical issues in art therapy: Charles C Thomas Publisher; 2015.

[24] McLennan S, Kahrass H, Wieschowski S, Strech D, Langhof H. The spectrum of ethical issues in a Learning Health Care System: a systematic qualitative review. International Journal for Quality in Health Care. 2018.doi.org/10.1093/intqhc/mzy005

[25] Masters K. Role development in professional nursing practice: Jones & Bartlett Publishers; 2015.

[26] LoBiondo-Wood G, Haber J. Nursing Research-E-Book: Methods and Critical Appraisal for Evidence-Based Practice: Elsevier Health Sciences; 2017.

[27] Rosety-Rodriguez M, Fornieles G, Camacho-Molina A, Rosety I, Diaz AJ, Rosety MA, et al. [A short-term training program reduced acute phase proteins in premenopausal women with metabolic syndrome]. Nutr Hosp. 2013;28(5):1604-9.

[28] Salbach NM, O'Brien K, Evans C, Yoshida K. Dissemination of student research in a canadian master of science in physical therapy programme. PhysiotherCan.2013;65(2):1547.doi.org/10.3138/ptc.2 012-18

[29] Schneiders AG. Blood, sweat and tears: reclaiming the ethical high ground in sports physiotherapy: Br J Sports Med. 2015 Jul;49(14):904. doi: 10.1136/bjsports -2015-095013. Epub 2015 May 27.doi.org/10.1136/ bjsports-2015-095013

[30] Setchell J, Watson B, Jones L, Gard M, Briffa K. Physiotherapists demonstrate weight stigma: a cross-sectional survey of Australian physiotherapists.JPhysiother.2014;60(3):15762.doi.org/10.1016 /j.jphys.2014.06.020

[31] Sobrinho MT, Guirado GN, Silva MA. Preoperative therapy restores ventilatory parameters and reduces length of stay in patients undergoing myocardial revascularization. Rev Bras Cir Cardiovasc. 2014;29(2):221-8.

[32] Stoddard FJ, Jr Ryan CM, Schneider JC. Physical and psychiatric recovery from burns. Surg Clin North Am. 2014;94(4):863-78.doi.org/10.1016/j.suc.2014.05.007

[33] Miller FG, Emanuel EJ, Rosenstein DL, Straus SE. Ethical issues concerning research in complementary and alternative medicine. Jama. 2004;291(5):599-604.doi.org/10.1001/jama.291.5.599

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Original Article

Effects of Neurodevelopmental Therapy on Gross Motor Function and Postural Control in Children with Spastic Cerebral Palsy: A Randomized Controlled Trial

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ABSTRACT

Cerebral palsy (CP) is one of the most prevalent childhood-onset causes of permanent disability affecting gross motor functioning and postural control ability. **Objective:** To determine the effects of neurodevelopmental treatment on the gross motor function postural control among children with spastic CP. **Methods:** A single-blinded randomized controlled trial was carried out at Sher e Rabbani Hospital, Department of Pediatric Rehabilitation, Sheikhupura. 66 children fulfilling the inclusion criteria were recruited using the non-probability sampling technique. Participants were divided into two groups, Group A which received beurodevelopmental techniques along with routine physical therapy while Group B received only routine physical therapy treatment. To collect data, Gross motor function measure scale (GMFM-88) and posture and postural ability scale (PPAS) were employed as outcome measures. **Results:** Repeated measure *ANOVA* and an *independent t-test* were executed for parametric data after assuming normality. Pairwise comparison of both groups demonstrated that gross motor function was significantly improved from baseline to 4th, 8th, and 12th week after applying NDT treatment *(p-value≤ 0.05)*. Pairwise comparison of both groups revealed that postural ability post NDT treatment and significant improvement was observed after 12 weeks in comparison to baseline. While within-group comparison at different follows up for gross motor function measure and postural control also expressed *p≤ 0.05* as significant. **Conclusions:** Children with spastic CP who received Neurodevelopmental Therapy along with conventional physical therapy treatment showed significant improvements in gross motor function and postural control as compared to the control group..

INTRODUCTION

One of the most prevalent childhood-onset causes of the physical disability that is permanent and found in one child out of 500 newborns and impacting 17 million individuals globally is cerebral palsy (CP) [1,2]. As a neurodevelopmental disorder, CP is characterized by abnormalities in the development of the muscles, the capacity to walk and move, and the ability to do other motor tasks. Even though indicative signs and symptoms may be present at a younger age, the clinical aspects of this entity change and the particular CP syndrome may not be recognized until 3–5 years of age [3,4]. With a global prevalence of 2.1/1000 live births, Spastic CP is a frequent physical impairment among children [5,6]. A basic concern is whether these children would benefit from being diagnosed earlier and getting early specialized interventions [6,7]. The neurodevelopmental treatment technique is an intensive therapy method used by trained occupational therapists to help children with Spastic CP regain their independence [8]. Using and regulating the central nervous system's neural-based motor responses is the goal of the NDT method. The NDT method is still evolving, and it is currently referred to as an approach rather than a method. It outlines the principles of delivering a normal mobility experience to CP children in order to reduce motor-sensory disruptions and increase

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functional independence through tasks. It also emphasizes the child's own growth and cognitive qualities, among other key milestones [9,10]. The primary objective of the neurodevelopmental therapy method (NDT-Bobath) for children with CP is to give them as much independence as possible. The prevention of aberrant motor functions and the enhancement of normal motor synergy during functional activities of daily living are secondary goals of NDT. NDT has been shown to benefit children with CP in a variety of studies [11,12]. Neurodevelopmental therapy was provided to a first group (n=15) with a mean age of 4.9 years and a second group (n=13) with a mean age of 4.4 years in a quasi-experimental design carried out by Labaf and colleagues in 2015. All individuals were assessed using the GMF Measure. It took three months of weekly one-hour sessions to complete the course of treatment. We found substantial differences between baseline and post-treatment values in at least two of the groups [9]. Children with spastic diplegic CP had their trunk control, gross motor function, and balance tested in a recent research by Sah et al., based on neurodevelopmental therapy (TOA-NDT) principles. (SDCP). In the TOA-NDT group, all of the above outcomes were improved [13]. Tekin et al., published a study in 2018 which evaluated the effects of an 8-week postural and balance training session based on Neurodevelopmental Treatment principles over postural control and balance. All subjects demonstrated statistically significant gains in gross motor function after the treatment session (p-value≤ 0.05). Balance and independence in doing everyday tasks improved statistically significant for the subjects (p-value≤ 0.05)[14]. It is the purpose of NDT to promote normal patterns and inhibit aberrant patterns in motor disturbances caused by injury to the central nervous system in order to improve posture and motions performed with abnormal muscle tone [15-17]. It was the goal of this research to examine the effects of Neurodevelopment Therapy on gross motor function and postural control in children with spastic CP. Whereas NDT is a 'problem-solving hands-on approach used to manage and treat children having functional limitations, mobility issues or postural control problems as a result of damage to their central nervous system [18]. GMF is defined as the skills that prerequisite whole-body movement involving body's major muscles to conduct daily tasks like standing, walking, sprinting, and jumping. However, postural control is the ability to maintain, acquire, or restore a state of equilibrium during any position or activity [19].

METHODS

This Randomized Controlled Trial (RCT) was conducted at Sher e Rabbani Hospital's pediatric Rehabilitation Department in Sheikhupura, Pakistan after obtaining the consent of participants. The trial was started on June 17, 2021, and was completed on December 15, 2021. After considering a 20% dropout rate, a total sample size of 33 was estimated for each group using GMF as an outcome measure. The sample size was identified using the WHO sample size calculator (Figure 1).

Sample Size for Comparoing Two Means Input Data			
Confidence Interval (2-sided)		95%	
Power		80%	
Ratio of sample size (Group 2/Group 1)		1	
	Group 1	**Group Difference***	
Mean	90.1	86.3	3.8
Standrad devision	6.62	3.93	
Variance	43.8244	15.4449	
Sample size of Group 1	33		
Sample size of Group 2	33		
Total sample size	66		

Figure 1: Sample Size Power Analysis

A purposive Convenient Sampling Technique was used. Participants aged 2–6 years, both female and male children who were diagnosed with Spastic CP (Spasticity level I) having no other severe abnormalities like seizures were included. Those who received botulinum toxin injections, orthopedic correction surgery, or were mentally retarded, or had a learning handicap were all ruled out of the research. Participants without these conditions were allowed to participate.

Outcome Measures:

GMFM-88: In the GMFM, there are five categories: laying and rolling, sitting, crawling and kneeling, standing, and running. A four-point score scale is used for each category. Reliability, interrater, intra-rater, and internal reliability of the GMFM-88 have all been shown to be high (all >0.99) in independent studies. The correctness of both the material and the framework is also praised as being great.

PPAS: Assessment of postural competency in four different postures is assessed using this seven-point ordinal scale. There are six things in the sagittal and frontal planes that may be used to evaluate the quality of one's posture. There was a significant difference in construct validity and median scores *(p-value≤ 0.05)* between GMFCS levels. A high level of internal consistency (alpha = 0.95-0.96; item-total correlation = 0.55-0.91) and great inter-rater reliability (kappa score = 0.77-0.99) were found in the study [20].

Blinding: The study was single-blinded. The assessor was unaware of the treatment given to both groups.

Randomization: Subjects were randomized into two groups using the lottery method.

Interventions: Group A: Three months of

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neurodevelopment therapy were given to the treatment group (3sessions per week). In addition to passive stretching of the hamstring and gastro-soleus muscles, NDT therapy includes efforts to alleviate spasticity and promote near-normal movement patterns while focusing on motor skills. During each session, the physical therapist supported the patients in different postures, including sitting, crawling, semi-kneeling, and standing, until tone reduction was achieved. Balance and reflex correction were encouraged with the use of a CP ball and tilt board. Group B: For the control group, physical therapists prescribed stretching, passive range-of-motion exercises, and active range-of-motion activities.

Procedure and Follow-up: The participants were assessed on the baseline for comparable variables and then randomly assigned to two groups. Assessment tools used for the purpose were Gross Motor Function Measure-88 and Posture & Postural ability Scale. Data was collected at baseline, 4th week, 8th week, and 12th week. SPSS Version 24(SPSS Inc., Chicago, USA) was used for executing data analysis. The mean and standard deviation (SD) were used to represent numerical data, such as age. There was a frequency distribution for categorical data like gender group (Percentage). Shapiro Wilk and Kolmogorov Smirnov tests were used to check the normality of the data variables at baseline. Gross Motor Function Measure and Posture & Posture Ability Scale mean differences between groups were determined using an independent sample t-test at baseline weeks 4th, 8th, and 12th. Repeated measure *ANOVA* was applied to compare Gross Motor Function Measure (GMFM-88) and the Posture & Posture Ability Scale (PPAS) at three different time points: baseline week 4, week 8, and week 12(Considering *(p-value≤ 0.05)* as significant).

Ethical Concerns: In accordance with IRB-UOL-FAHS/882/2021, the University of Lahore's ethical review board gave its permission. The study was conducted in accordance with the ethical guidelines established by the ethical review board of the The University of Lahore, and all participants' rights were upheld. All participants were required to provide their express written permission, which was included in the consent form. There was no disclosure of any information or data gathered. The trial was registered at *clinicaltrials.gov* as well under ID: NCT05231538.

RESULTS

For both groups (Treatment and Control), the age of patients is shown in Table:1. The treatment group had a mean age of 3.96 years, whereas the control group's average age was 3.84 years, ranging from 2 to 6 years old.

Age of patients (Years)		
Treatment Group	Mean	3.96
	Std. Deviation	0.79
	Minimum	2.0
	Maximum	6.0
Control Group	Mean	3.84
	Std. Deviation	0.90
	Minimum	2.0
	Maximum	6.0
Gender		
Female	N	36
	%age	54.55
Male	N	30
	%age	45.55

Table 1: Demographics of Patients

Table 2 shows that Shapiro Wilk and Kolmogorov-Smirnov tests were conducted to check the normal distribution of data at baseline in both groups. The values of coefficient of alpha for all variables at baseline showed (p-value≤ 0.05).

Variables (Baseline)	Study group	Kolmogorov-Smirnov test		Shapiro-Wilk	
		Statistics	p-value	Statistics	p-value
Score of gross motor measure	NDT	0.089	0.200	0.964	0.336
	Routine therapy	0.100	0.200	0.980	0.782
Total score of posture and postural ability measure	NDT	0.089	0.200	0.964	0.336
	Routine therapy	0.100	0.200	0.980	0.782

Table 2: Normality Test

Repeated measure ANOVA was applied to observe pairwise comparison as demonstrated in Tables 3 and 4. p ≤ 0.05 was considered significant.

(I) GMFM	(J) GMFM	Mean Difference (I-J)	SE	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	.606*	.106	.000	.286	.926
	3	.545*	.138	.004	.1291	.9622
	4	1.667*	.155	.000	.200	.134
2	1	-.606*	.106	.000	-.926	-.286
	3	-.0611	.144	.000	-.495	.3731
	4	.061*	.130	.000	.668	.453
3	1	-.545*	.138	.004	-.962	-.129
	2	.0611	.144	.000	-.373	.4951
	4	.121*	.155	.000	.653	.590
4	1	-1.667*	.155	.000	-2.134	-1.200
	2	-1.061*	.130	.000	-1.453	-.668
	3	-1.121*	.155	.000	-1.590	-.653

Table 3: Pairwise Comparison of Gross Motor Function in Treatment Group

Pairwise comparison of both groups demonstrated that the GMF Measure score and postural ability score were improved after NDT treatment after 4 weeks and much

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improvement was observed after 12 weeks as compared to baseline.

(I) GMFM	(J) GMFM	Mean Difference (I-J)	SE	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-1.636*	.361	.000	-2.652	-.621
	3	-3.333*	.6861	.000	-5.263	-1.403
	4	-5.424*	.064	.000	-8.417	-2.431
2	1	1.636*	.361	.000	.621	2.652
	3	-1.697*	.388	.001	-2.788	-.606
	4	-3.788*	.763	.000	-5.935	-1.641
3	1	3.333*	.686	.000	1.403	5.263
	2	1.697*	.388	.001	.606	2.788
	4	-2.091*	.4141	.000	-3.254	-.927
4	1	5.424*	.064	.000	2.431	8.417
	2	3.788*	.763	.000	1.641	5.935
	3	2.091*	.414	.000	.927	3.254

Table 4: Pairwise Comparison of Postural Ability after NDT Treatment

An independent sample t-test was used to analyze the within-group difference at the baseline and subsequent follow-ups (4th, 8th & 12th weeks) for both variables i.e. GMFM & PPAS. The p-value<0.001 showed significant improvement in both measures as compared to baseline (Tables 5 and 6).

Follow-up Intervals	t-test for Equality of Means						
	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Score of Gross Motor Function Measure(Baseline)	2.00	64	.04	2.87	1.43	.00	5.75
Score of Gross Motor Function Measure(4th week)	.09	64	.92	.15	1.58	-3.01	3.31
Score of Gross Motor Function Measure(8th week)	-1.49	64	.13	-2.75	1.84	-6.43	.91
Score of Gross Motor Function Measure(12th week)	-2.19	64	.03	-4.84	2.20	-9.26	-.43

Table 5: Independent t-test for Gross motor function measure

Follow-up Intervals	t-test for Equality of Means						
	T	df	Sig. (2-tailed)	Mean Difference	SE Difference	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Total Score of PPAS (Baseline)	2.00	64	.04	2.87	1.43	.00	5.75
Total Score of PPAS (4th week)	.09	64	.92	.15	1.58	-3.01	3.31
Total Score of PPAS (8th week)	-1.49	64	.13	-2.75	1.84	-6.43	.91
Total Score of PPAS(12th week)	-2.19	64	.03	-4.84	2.20	-9.26	-.43

Table 6: Independent t-test for Postural Ability Measure

DISCUSSION

This research examined the effects of neurodevelopment therapy and normal physiotherapy on gross motor function and postural abilities in spastic children aged 2 to 6 years. Children with CP had their gross motor function assessed using the gross motor function scale (GMFS). There are five different levels of movement assessed by the GMFM: laying down and rolling over to kneeling to standing to walking to running. Assessment of postural control was carried out with the Posture and Postural Ability Scale (PPAS). Postural competency in standing, sitting, supine and prone postures may be assessed on an ordinal scale of zero points. The quality of posture in the frontal plane is assessed using six items, while the quality of posture in the back is assessed using the additional item. Shapiro Wilk and Kolmogorov-Smirnov tests were used to ensure that the data in both groups were normal. The null hypothesis was accepted and the alternative hypothesis was rejected because the coefficients of alpha for all variables were greater than 0.05. In a pairwise assessment of gross motor function in the control group, p-value≤ 0.05 is statistically significant. There were substantial improvements in gross motor function from baseline through week 4, week 8, and week 12, according to a pairwise comparison of both groups. In this research, postural control comparisons across groups were shown to be statistically significant at numerous follow-ups. In a pairwise comparison of both groups, postural ability improved considerably after four weeks of treatment and after 12 weeks of treatment compared to baseline. However, the neurodevelopment approach had much better results than normal physiotherapy in terms of

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improving postural control. Iran's Ebnesina Rehabilitation Clinic in Tehran conducted a three-month research on CP youngsters in which NDT was employed as a therapy and the patients were monitored. There was a significant improvement after applying the neuro-development therapy method, according to the study's findings [21]. Ketelaar et al., performed an experimental study after applying Neuro-development techniques to CP children, and the results indicated that sitting, rolling, and kneeling positions changed. These results are in accordance with what was found in the research [22]. More research on the Neurodevelopment therapy approach for children with CP has shown that this strategy has outstanding effects on children who have spastic CP. 'Children's GMFM-88 and TUG scores improved considerably between the first and final measures of the NDT intervention, and this improvement was maintained for one month. Because of this, neurodevelopmental treatment has been shown to be effective in increasing gross motor function and postural ability in the present investigation [23]. There was an 8-week NDT treatment research conducted in Turkey on children with CP. According to the results, CP children's gross motor function and balance improved considerably (p 0.05) in the course of treatment (p-value≤ 0.05). The postural control measure score improved significantly after NDT was used on patients (p-value≤ 0.05). The findings of this study were relevant to current studies [24]. Neurodevelopmental therapy's impact on trunk control, balance, and gross motor function in children with spastic diplegic CP was examined by Sah AK et al., in a randomized controlled trial in 2019. (SDCP). When it comes to increasing trunk control, balance, and gross motor function, NDT principles outperformed typical physical therapy methods, according to the research. According to the findings of the present research, NDT treatment results in better outcomes than regular physical therapy [9]. Researchers reported comparable outcomes, with statistically significant improvements in motor function, functional independence, and balance scores after eight weeks of Bobath treatment. Functional motor abilities, daily living independence, and balance are all improved in children with CP with Bobath treatment [25]. Gross motor skills in the youngsters treated by Turker et al., improved as well. Gross motor skills, daily living independence, and health-related quality of life all improved in CP patients who underwent treatment. With neurodevelopmental therapy (NDT) alone or with typical rehabilitation therapies, postural alignment was improved (i.e. joint mobility, muscular strengthening, and mobility activities) [25]. The neuro-developmental therapy for children with spastic CP improves all elements of rough motor function. However, additional randomized controlled studies on rehabilitation strategies are required [25]. The outcomes of this study are undeniably favorable, but further research is required to repeat the findings and to investigate other concerns associated with the treatment's effectiveness. Investigators found it difficult and time-consuming to acquire and analyze all of this data, which is a fault in the study's design. The interpretation of the GMFM final score has also proved problematic. COVID-19 restrictions hampered researchers' ability to reach patients directly and showed a number of communication barriers and non-compliance issues that need to be addressed in future studies.

CONCLUSIONS

In conclusion, children with spastic cerebral palsy who received both neurodevelopmental treatment and regular physical therapy had improvements in their gross motor performance and postural control. Neurodevelopmental therapy outperformed the standard of care group in terms of improvement. There was a significant variation in the gross motor function test's

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different elements. The ability to lie, sit, crawl, roll, kneel, and stand were all much improved, but the ability to walk, run, or leap remained unchanged.

REFERENCES

[1] Graham HK, Rosenbaum P, Paneth N, Dan B, Lin JP, Damiano DL et al. Cerebral palsy. Nat Rev Dis Primers. 2016 Jan 7;2:15082. doi: 10.1038/nrdp.2015.82.

[2] Van Naarden Braun K, Doernberg N, Schieve L, Christensen D, Goodman A, Yeargin-Allsopp M. Birth Prevalence of Cerebral Palsy: A Population-Based Study. Pediatrics. 2016 Jan;137(1):1–9. doi:10.1542/peds.2015-2872.

[3] Carvalho A, Brites C, Mochida G, Ventura P, Fernandes A, Lage ML et al. Clinical and neurodevelopmental features in children with cerebral palsy and probable congenital Zika. Brain Dev. 2019 Aug;41(7):587-594. doi: 10.1016/j.braindev.2019.03.005.

[4] Gulati S, Sondhi V. Cerebral Palsy: An Overview. Indian J Pediatr. 2018 Nov;85(11): 1006-1016. doi: 10.1007/s12098-017-2475-1.

[5] Morgan C, Darrah J, Gordon AM, Harbourne R, Spittle A, Johnson R et al. Effectiveness of motor interventions in infants with cerebral palsy: a systematic review. Dev Med Child Neurol. 2016 Sep;58(9):900-9. doi: 10.1111/dmcn.13105.

[6] Herskind A, Greisen G, Nielsen JB. Early identification and intervention in cerebral palsy. Dev Med Child Neurol. 2015 Jan;57(1):29-36. doi: 10.1111/dmcn.12531.

[7] Türker D, Korkem D, Özal C, Günel MK, Karahan S. The effects of neuro-developmental (Bobath) therapy based goal directed therapy on gross motor function and functional status of children with cerebral palsy. International Journal of Therapies and Rehabilitation Research. 2015;4(4):9-20. doi: 10.5455/ijtrr.00000060.

[8] Conway MD. Neurodevelopmental treatment for children with hemiplegic cerebral palsy: clinical guidelines for occupational therapists: Boston University. 2020.

[9] Labaf S, Shamsoddini A, Hollisaz MT, Sobhani V, Shakibaee A. Effects of Neurodevelopmental Therapy on Gross Motor Function in Children with Cerebral Palsy. Iran J Child Neurol. 2015 Spring;9(2): 36-41.

[10] Besios T, Nikolaos A, Vassilios G, Giorgos M, Tzioumakis Y, Comoutos N. Effects of the neurodevelopmental treatment (NDT) on the mobility of children with cerebral palsy. Open Journal of Therapy and Rehabilitation. 2018 Nov 30;6(04):95. DOI: 10.4236/ ojtr.2018 .64009.

[11] Baumann J, Gassmann K, Masjosthusmann S, DeBoer D, Bendt F, Giersiefer S et al. Comparative human and rat neurospheres reveal species differences in chemical effects on neurodevelopmental key events. Arch Toxicol. 2016 Jun;90(6):1415-27. doi: 10.1007/s00204-015-1568-8.

[12] Sadowska M, Sarecka-Hujar B, Kopyta I. Cerebral Palsy: Current Opinions on Definition, Epidemiology, Risk Factors, Classification and Treatment Options. Neuropsychiatr Dis Treat. 2020 Jun 12;16:1505-1518. doi: 10.2147/NDT.S235165.

[13] Sah AK, Balaji GK, Agrahara S. Effects of Task-oriented Activities Based on Neurodevelopmental Therapy Principles on Trunk Control, Balance, and Gross Motor Function in Children with Spastic Diplegic Cerebral Palsy: A Single-blinded Randomized Clinical Trial. J Pediatr Neurosci. 2019 Jul-Sep;14(3):120-126. doi: 10.4103/jpn.JPN_35_19.

[14] Tekin F, Kavlak E, Cavlak U, Altug F. Effectiveness of Neuro-Developmental Treatment (Bobath Concept) on postural control and balance in Cerebral Palsied

DOI: https://doi.org/10.54393/pbmj.v5i5.418

children. J Back Musculoskelet Rehabil. 2018;31(2):397-403. doi: 10.3233/BMR-170813.

[15] Salazar Fajardo JC, Kim R, Gao C, Hong J, Yang J, Wang D et al. The Effects of tDCS with NDT on the Improvement of Motor Development in Cerebral Palsy. Journal of Motor Behavior. 2021 Dec 10:1-0. doi.org/10.1080/00222895.2021.2016572.

[16] Dewar R, Love S, Johnston LM. Exercise interventions improve postural control in children with cerebral palsy: a systematic review. Dev Med Child Neurol. 2015 Jun;57 (6):504-20. doi: 10.1111/dmcn.12660.

[17] Hadders-Algra M, Boxum AG, Hielkema T, Hamer EG. Effect of early intervention in infants at very high risk of cerebral palsy: a systematic review. Dev Med Child Neurol. 2017 Mar;59(3):246-258. doi: 10.1111/ dmcn. 13331.

[18] Zanon MA, Porfírio GJM, Riera R, Martimbianco ALC. Neurodevelopmental treatment approaches for children with cerebral palsy. Cochrane Database Syst Rev. 2018 Aug 3;2018(8):CD011937. doi: 10.1002/ 14651858.CD011937.

[19] Low DC, Walsh GS, Arkesteijn M. Effectiveness of Exercise Interventions to Improve Postural Control in Older Adults: A Systematic Review and Meta-Analyses of Centre of Pressure Measurements. Sports Med. 2017 Jan;47(1):101-112. doi:10.1007/s40 279-016-0559-0.

[20] Rodby-Bousquet E, Persson-Bunke M, Czuba T. Psychometric evaluation of the Posture and Postural Ability Scale for children with cerebral palsy. Clin Rehabil. 2016 Jul;30(7):697-704. doi: 10.1177/ 0269 215515593612.

[21] Lee KH, Park JW, Lee HJ, Nam KY, Park TJ, Kim HJ et al. Efficacy of Intensive Neurodevelopmental Treatment for Children With Developmental Delay, With or Without Cerebral Palsy. Ann Rehabil Med. 2017 Feb;41(1):90-96. doi: 10.5535/arm. 2017.41.1.90.

[22] Unger M. The role of the abdominal muscles in pelvic positioning and lower limb function in children with spastic type cerebral palsy. 2011.

[23] Tekin F, Kavlak E, Cavlak U, Altug F. Effectiveness of Neuro-Developmental Treatment (Bobath Concept) on postural control and balance in Cerebral Palsied children. J Back Musculoskelet Rehabil. 2018;31(2):397-403. doi: 10.3233/BMR-170813.

[24] Molenaers G, Calders P, Vanderstraeten G, Himpens E. The evidence-base for conceptual approaches and additional therapies targeting lower limb function in children with cerebral palsy: a systematic review using the international classification of functioning, disability and health as a framework. Journal of rehabilitation medicine. 2012;44(5):396-405.

[25] Kim MR, Lee BH, Park DS. Effects of combined Adeli suit and neuro-developmental treatment in children with spastic cerebral palsy with gross motor function classification system levels I and II. Hong Kong Physiother J. 2015 Nov 7;34:10-18. doi: 10.1016/j.hkpj.2015.09.036.

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Original Article

Awareness, Knowledge and Satisfaction of Physiotherapy Treatment in Cerebral Palsy Children's Parents

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ABSTRACT

Cerebral palsy (CP) is a neurological ailment that includes a variety of signs and symptoms, some of which might be associated with neurodegenerative or metabolic problems, especially those that begin in the first two years of life. It can be caused by a variety of factors. Children with disabilities' families have grown increasingly active in their care and have taken on the role of primary caregiver. Early detection and intervention of problems to minimize developmental delays. **Objectives:** To assess the awareness, knowledge and satisfaction about physical therapy in parents of cerebral palsy children visiting hospitals in Lahore **Methods:** Cross-sectional study was conducted at visiting hospitals in Lahore from November 2021 to April 2022 through a non-probability convenient sampling technique. A total of 81 parents were selected for this study. The data was assembled by using a self-made questionnaire. **Results:** Parents of 35 (43.2%) children were aware of physiotherapy while 46 (56.8%) came to know about physical therapy treatment after coming to the hospital setting. The majority, 51(63%) parents were aware of physiotherapy treatment because of child specialist referral. 64(79%) children were taking physiotherapy treatment on daily basis. 45.7% of parents were extremely satisfied, 38.3% were very satisfied and 0% were not satisfied with physiotherapy treatment. **Conclusions:** It was concluded that the majority of parents were not aware of physical therapy before visiting the respective setting or having a session with a physiotherapist and the majority of parents were satisfied by the physiotherapy treatment given to their children.

INTRODUCTION

Cerebral Palsy (CP) is one of the most frequent physical and developmental impairments in children [1]. CP has numerous etiologies, resulting in a brain injury that affects posture, and balance. It affects two to three out of every 1,000 live births [2]. It is a neurodevelopmental condition marked by anomalies in muscle tone, mobility, and motor skills, which are linked to brain damage in the developing brain [3]. CP is now described as "a collection of permanent impairments of movement and posture development that cause activity limitation and are related to non-progressive problems in the developing fetus or infant's brain." CP is frequently accompanied by sensory, perceptual, cognition, communication, and behavioral impairments, as well as epilepsy and secondary musculoskeletal problems [4]. CP is a neurological- ailment that includes a variety of signs and symptoms, some of which might be associated with

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neurodegenerative or metabolic problems, especially those that begin in the first two years of life. It can be caused by a variety of factors [5]. According to European data, the average occurrence of CP is 2.08 per 1000 live births. There are four types of risk factors for CP: preconception, prenatal, perinatal, and postnatal [6]. There would be emerging evidence in recent years that small age individuals with CP can acquire several secondary health issues that generally develop later in life [7]. Multiple comorbid, such as visual, hearing, and intellectual defacement, as well as epilepsy, are usual in kids with CP, necessitating a multi-disciplinary approach to care and support throughout their lives. They are more likely to have health problems [8]. Caring for a kid with a disability like CP puts an emotional burden on parents, which can lead to mental health problems in the future [9]. Caregivers of children with CP encounter particular responsibilities and obstacles, with possible negative impressions on both caregiver and child's psychological well-being [10]. The strain of caring for children with CP is an underappreciated issue. In addition to their psychological issues, the parents are socially alienated, unable to participate in social activities, stigmatized, and have difficulties in their families and communities [11].

Children with disabilities' families have grown increasingly active in their care and have taken on the role of primary caregiver. Children with CP sometimes demand more participation from their caretakers due to the varying degrees of the disorder [12]. Individuals with non-ambulatory CP have distinct activities connected with personal care, positioning, communication, social engagement, comfort, and emotions that have a role in determining their overall fitness and qualities of life (CP) [13]. Early interference services are meant to satisfy the developmental requirements of children and guardians aged from newborn to five years. Early detection and intervention of problems to lessen developmental delays, decrease' the development of secondary impairments, and enhance family competency in caring for their child are the goals of these services, which are tailored to the requirements of the child and families. The use of early intervention to help newborns with or at risk of CP improve motor and cognitive skills; however, long-term outcomes of the intervention have yet to be determined [14]. When newly acquired abilities are applied to a child's everyday routine, they can enable increased engagement in meaningful activities [15]. Water-based activities should be added in addition to traditional modes of therapy, to ensure long-term gross motor function improvements [16]. As the primary caregivers of a child with CP, mothers face difficulties that affect their health and well-being. Working together and communicating openly is essential for mothers to successfully support their children in living their best lives [17]. The most common motif noted was that people's perception of the role of physiotherapy in the treatment of CP was confined to only exercises, stretching, and training, rather than the true extent of its involvement in developmental aid and functional independence. Because of their previous experience with physiotherapy service arrangements, the parents picked physiotherapy over conventional medical therapy [18]. Physiotherapy' is an important part of the management of CP, and it includes a variety of therapeutic therapies aimed at increasing physiological and functional outcomes. Physiotherapy' is frequently utilized and advised by all members of the healthcare teams [19]. For kids with disabilities, a family-centered home program is fundamental to their progress [20]. This research was conducted to assess the awareness about physiotherapy in parents of CP children.

METHODS

This descriptive cross-sectional study was conducted at visiting hospitals in Lahore from November 2021 to April 2022 via a non-probability convenient sampling technique. The sample size was 81 parents of cerebral palsy children visiting hospitals in Lahore for physiotherapy treatment. Children from 2 to 7 years old suffering from cerebral palsy, and children who had spastic diplegia, spastic quadriplegia, and ataxic were included in this study. Children which had polio, clubfoot deformity, Down syndrome, Congenital Heart Disease (CHD), any fracture on limbs, and parents with mental abnormality (dementia) were excluded from this study. The self-administered questionnaires were distributed to parents for data collection. Data (demographic and medical) was collected directly from parents and caregivers of patients by asking questions about awareness of physiotherapy. Consent was obtained from parents/guardians. Data were analyzed through SPSS version 21 and Microsoft excel.

RESULTS

Out of 81 parents interviewed, 35 participants (43.21%) were male and 46 (56.79%) were female. 26 children (32.1%) were less than 1 year old, 42 were between 1 to 6 years (51.9%) and 13 children were 7 to 12 years (16.0%). Among 81 participants, there were: 46 participants (56.8%) were not aware of physical therapy before visiting the respective setting, 25 participants (30.9%) were aware but did not have a chance to get it, 9 participants (11.1%) were aware, and had a few sessions while just 1 participant (1.2%) was getting physiotherapy sessions for a long time. Regarding knowledge, 61.7% of the parents had knowledge about

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therapy comprising of physical activities and exercises for several disorders, 8.6% had knowledge about therapy is given by using some heating and electrical modalities, 28.4% believed to be both (Table 1). 51 participants (63.0%) came to know about physical therapy from a child specialist doctor, 8 (9.9%) said that they were suggested by a neuro-physician, 5 people (6.2%) said that they came to know by media sources and 17 participants (21%) were suggested by those patients who were already taking physiotherapy treatment, the relationship of parents and caregiver from where they knew about physiotherapy (Table 2). About the level of satisfaction, 45.7% parents were extremely satisfied, 38.3% were very satisfied, 14.8% very moderately satisfied and 1.2% were slightly satisfied (Figure 1).

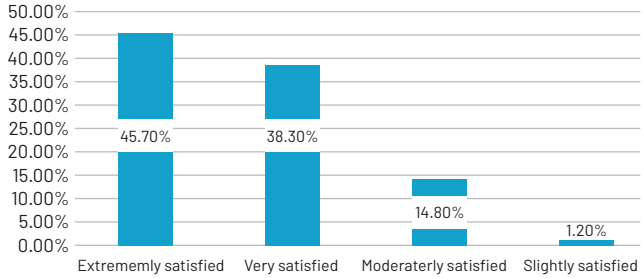

Figure 1: Satisfaction of parents by physiotherapy treatment of their cerebral palsy children

Knowledge of Cerebral Palsy and its physiotherapy treatments in parents	
Knowledge	**Frequency (%)**
A therapy comprising of physical activities and excercise for several	50 (61.7)
A therapy is given by using some heating and electrical modalities	7 (8.6)
Both a and b	23 (28.4)
Some other reviews	1 (1.2)
Total	81 (100)

Table 1: Knowledge of Cerebral Palsy and its physiotherapy treatment in parents

Descriptive statistics for a source of a awareness and frequency of physical therapy treatment			
Source of Awareness (%)		**Frequency of physiotherapy sessions (%)**	
From a child specialist doctor	51 (63)	Daily	64 (79)
From a neuro-physician doctor	8 (9.9)	Whenever it is feasible	8 (9.9)
From media	5 (6.2)	Not taking proper sessions	9 (11.1)
From someone who was already getting it	17 (21)	Total	81 (100)
Total	81 (100)		

Table 2: Descriptive statistics for a source of awareness and frequency of physical therapy treatment

DISCUSSION

CP is a term used that has been used from time to the set for children with motor impairments [20]. CP is a serious condition that has far-reaching effects on children and their families [22]. Ramanandi VH and Panchal DN conducted research to check the perception, acceptance, and hopes of the Father and Mother of cerebral palsy' in Gujrat [18]. A vast range of psychosocial issues is experienced by the mother and father of youngsters with CP. As an important peer of the rehabilitation team, physiotherapists come in regular and long-term contraction with the household and caregivers of the CP child. This makes the bigger authority of a physiotherapist from other than just dealing with sensory-motor rehabilitation of a CP infant to recognize needs and expectations and counsel the caretaker, mother, and father or household as and when required. Studies like this can provide precious facts for designing a family-centered care program for kids with CP. In another study, the primary standards which symbolize ranges of awareness, acceptance, and expectations in caregivers of teens with cerebral palsy' in Gujrat were assessed. Different kinds of expectations were seen from the parents which they were needed to be clarified [18]. It was observed that out of 81 participants, 72 parents (88.9%) were satisfied with the physiotherapy treatment given to their child while on the other hand, while 9 parents (11.1%) were not satisfied. This shows they need more care to be satisfied. A study conducted by Rabiatul on An Ergonomic Perspective of User Need on Physio-Treadmill (PhyMill) Criteria: Knowledge and Awareness of Cerebral Palsy among Future Parents show Participants were asked to complete a self-administered questionnaire that included general information, awareness of cerebral palsy, product criteria, and thoughts. About 55% of individuals have a low degree of awareness, and 69% have no awareness of CP treatment, according to the findings. The lack of awareness and knowledge of the condition and its treatment among potential parents was highlighted in this study [23].

CONCLUSION

It was concluded that the majority of parents were not aware of physical therapy before visiting the respective setting or having a session with a physiotherapist, and the majority of parents were satisfied by the physiotherapy treatment given to their children.

REFERENCES

[1] Michael-Asalu A, Taylor G, Campbell H, Lelea LL and Kirby RS. Cerebral Palsy: Diagnosis, Epidemiology, Genetics, and Clinical Update. Adv Pediatr. 2019;66:189-208. doi: 10.1016/j.yapd.2019. 04.002.

[2] Gulati S and Sondhi V. Cerebral Palsy: An Overview. Indian J Pediatr. 2018;85(11):1006-1016. doi: 10.1007/s12098-017-2475-1.

[3] Vitrikas K, Dalton H and Breish D. Cerebral Palsy: An

DOI:https://doi.org/10.54393/pbmj.v5i5.417

Overview. Am Fam Physician. 2020;101(4):213-220.
[4] MacLennan AH, Lewis S, Moreno-De-Luca A, Fahey M, Leventer RJ and McIntyre S et al. Genetic or Other Causation Should Not Change the Clinical Diagnosis of Cerebral Palsy. J Child Neurol. 2019;34(8):472-476. doi: 10.1177/0883073819840449.
[5] Appleton RE and Gupta R. Cerebral palsy: not always what it seems. Arch Dis Child. 2019;104(8):809-814. doi: 10.1136/archdischild-2018-315633.
[6] Sadowska M, Sarecka-Hujar B and Kopyta I. Cerebral Palsy: Current Opinions on Definition, Epidemiology, Risk Factors, Classification and Treatment Options. Neuropsychiatr Dis Treat. 2020;16:1505-1518. doi: 10.2147/NDT.S235165.
[7] Heyn PC, Tagawa A, Pan Z, Thomas S and Carollo JJ. Prevalence of metabolic syndrome and cardiovascular disease risk factors in adults with cerebral palsy. Dev Med Child Neurol. 2019;61(4):477-483. doi: 10.1111/dmcn.14148.
[8] Zuurmond M, O'Banion D, Gladstone M, Carsamar S, Kerac M and Baltussen M et al. Evaluating the impact of a community-based parent training programme for children with cerebral palsy in Ghana. PLoS One. 2018;13(9):e0202096. doi: 10.1371/journal.pone.0202096.
[9] Barreto TM, Bento MN, Barreto TM, Jagersbacher JG, Jones NS and Lucena R et al. Prevalence of depression, anxiety, and substance-related disorders in parents of children with cerebral palsy: a systematic review. Dev Med Child Neurol. 2020;62(2):163-168. doi: 10.1111/dmcn.14321.
[10] Irwin L, Jesmont C and Basu A. A systematic review and meta-analysis of the effectiveness of interventions to improve psychological wellbeing in the parents of children with cerebral palsy. Res Dev Disabil. 2019;95:103511. doi: 10.1016/j.ridd.2019.103511.
[11] Vadivelan K, Sekar P, Sruthi SS and Gopichandran V. Burden of caregivers of children with cerebral palsy: an intersectional analysis of gender, poverty, stigma, and public policy. BMC Public Health. 2020;20(1):645. doi: 10.1186/s12889-020-08808-0.
[12] Pretorius C and Steadman J. Barriers and facilitators to caring for a child with cerebral palsy in rural communities of the Western Cape, South Africa. Child Care in Practice. 2018;24(4):413-30. doi.org/10.1080/13575279.2017.1347146.
[13] Kolman SE, Glanzman AM, Prosser L, Spiegel DA and Baldwin KD. Factors that Predict Overall Health and Quality of Life in Non-Ambulatory Individuals with Cerebral Palsy. Iowa Orthop J. 2018;38:147-152.
[14] Fiss AL and Jeffries L. Early Intervention Services for Young Children with Cerebral Palsy. Cerebral Palsy. 2020:2455-72. DOI: 10.1007/978-3-319-74558-9_153.
[15] Ryan JL, Levac DE and Wright FV. Reliability of the Motor Learning Strategies Rating Instrument in physiotherapy intervention for children with cerebral palsy. Dev Med Child Neurol. 2019;61(9):1061-1066. doi: 10.1111/dmcn.14177.
[16] Ballington SJ and Naidoo R. The carry-over effect of an aquatic-based intervention in children with cerebral palsy. Afr J Disabil. 2018;7(0):361. doi: 10.4102/ajod.v7i0.361.
[17] Smith M and Blamires J Dr. Mothers' experience of having a child with cerebral palsy. A systematic review. J Pediatr Nurs. 2022;64:64-73. doi: 10.1016/j.pedn.2022.01.014.
[18] Ramanandi VH and JM PD. A qualitative study to conceptualize levels of awareness, acceptance and expectations in parents of children with cerebral palsy in Gujarat, India. International Journal of Contemporary Pediatrics. 2018;5(2):6.
[19] Das SP and Ganesh GS. Evidence-based Approach to Physical Therapy in Cerebral Palsy. Indian J Orthop. 2019;53(1):20-34. doi: 10.4103/ortho.IJOrtho_241_17.
[20] Jayashree KR, Kovela RK, Thakur A and Priya PR. Effectiveness of Mother as a Rehabilitative Aid (MARA) Program in the Recovery of Children with Cerebral Palsy-An Assessor blinded Randomized Controlled Trial. Indian Journal of Public Health Research & Development. 2020;11(6):419-24.
[21] Panteliadis CP. Cerebral palsy: a multidisciplinary approach. Springer. 2018.
[22] Tsibidaki A. Family functioning and strengths in families raising a child with cerebral palsy. Res Dev Disabil. 2020;106:103767. doi: 10.1016/j.ridd.2020.103767.
[23] Ariffin RA, Adib MA, Shalahim NS, Daud N and Hasni NH. An ergonomic perspective of user need on physio-treadmill (PhyMill) criteria: knowledge and awareness of cerebral palsy among future parents. InJournal of Physics: Conference Series 2020;1529(5):52071.

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Original Article

Prevalence of Psychosocial Issues among Internally Displaced Children by Military Wars in District Khyber

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ABSTRACT

Internally Displaced Persons (IDPs) are those who have been forced to leave their homes to avoid the impacts of armed war, violence, and other forms of violence. Human rights violations or natural or man-made calamities have occurred, but they have not passed an internationally recognized state border. **Objective:** To identify the psychosocial effects created by military wars on the internally displaced children of District Khyber, Khyber Pakhtunkhwa, Pakistan **Methods:** For this purpose, 300 children were selected randomly, out of which 150 were males and 150 were females. These 300 children belonged to the middle and the secondary school of the same District and were internally displaced because of military wars. Data was collected using PTSD Checklist-Civilian Version (PCL-C) questionnaire and demographic information sheet and responses were recorded and analyzed using a SPSS version 24 software. **Results:** The *p-value* of less than 0.001 indicated that children belonging to year 2002 were victimized of war the most and had severe psychosocial effects. The factors such as loss of housing, family, finances, employment and the lack of accessibility to health care services had direct correlation with the increase in psychosocial impacts. **Conclusion:** It is concluded that females and children of middle and secondary schools were most affected.

INTRODUCTION

Internally Displaced Persons (IDPs) are those who have been forced to leave their homes to avoid the impacts of armed war, violence, and other forms of violence [1]. It is a well-accepted fact that experiences of childhood and adolescent age group have a significant effect on the psychosocial health which remains with people even when they are grown up adults [2]. Out of few causes that disturbs the psychosocial health of populations, the wars are considered as one of the major reasons [3]. They have been seen to affect the mental health of all age groups because of the injuries, deaths, illness, malnutrition and disabilities. Many studies have reported that wars bring several indirect contributory factors which affects the psychosocial health of people especially children [4]. A study highlighted that apart from injuries, killing and disabilities, there are other reasons that account for the disturbed psychosocial health [5]. Moreover, children who are forcefully asked to join wars and serve as soldiers are stigmatized and discriminated in the societies which makes them devoid of any basic rights. All these factors lead to the loss of hope and enthusiasm in the life ultimately making those depressed individuals and grown up adults [6]. The middle and secondary school children are at high risk of developing psychosocial effects because of wars mostly because of the deployment and the morbidities [7]. The military wars and the fear associated with it tends to

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increase the stress in civilians and the local communities [8]. The ways in which both genders were observed to respond to the war and its psychosocial impacts was different. Girls were usually seen to be more emotionally disturbed and channelized their emotions for the expression of things that were causing them harm and disturbing their overall wellbeing whereas; in contrast, boys were seen to internalize the feelings, were found to be less expressive and less vocal about what was disturbing them and this caused the behavioral changes and disturbances in their personalities [9]. The effects that one gets to see and suffer, they may subconsciously spread that to other people in the population and among different age groups, and children are the ones who are most affected [10]. Military wars change the family dynamics, children functioning which later affects the adult functioning as well when these children will be observed to grow in adults over the course of the study and will have poor developmental outcomes [11,12]. Many studies highlighting the effects of military wars on population generally but there had been a limited number which focuses on the mental health of children in particular. Therefore, the current study is addressing the prevailing gap and focusing on the psychosocial effects of military wars on the children. The study also presented a comparative analysis of genders which is most vulnerable and affected. Thus, this study aims to improve the psychosocial health of those children who are affected by the brutality of military wars so that their lives can be made better and healthy individuals are seen to grow as adults with more positive mental health.

METHODS

The research is cross sectional study as data was collected by using a questionnaire and survey for collection of responses. The study site for the research was Internally Displace Children (IDC) of District Khyber. Both the private and government sector schools were selected from different SES and family background to give a diverse pool for the generalization of results. Data was analyzed using SPSS version 24. From District Khyber 300 internally displaced children were selected for the study (n=300) out of which 150 were boys (n=150) and 150 were girls (n=150). The sample size was calculated by using Open-Epi software. Inclusion criteria for the sample selection was those children who were internally displaced and who belonged to District Khyber. Those children were excluded from the study who were either did not born at the time of war or either didn't witnessed being internally displaced. Also, those children were excluded who belonged to the same families to avoid contamination of results or reporting of same kind of effects. The demographics sheet was used to obtain the respondents basic information age, gender, class (grade) of study, orphan status, number of siblings, and home living arrangement. The questionnaire was designed accordingly to achieve the objective, there were 17 questions. All the questionnaire was filled through interviewing or filled by the participants. The questionnaire was designed using demographic sheet for the collection of demographic and background data. PTSD Checklist – Civilian Version (PCL-C) was used for the collection of data on psychosocial impacts and mental health inventory. These data collection tools were validated and had national and international significance. All the ethical considerations were kept in mind before and during conducting the study. The ethics review committee of the respective organization was approached for the approval, consent was made ensured and participants were allowed to leave the study anytime they wanted. The schools were randomly selected with random ages. The same schools were contacted and consent was taken from the school management, guardian and parents of the children. Those children who showed the will to be part of the study were selected as final participants. The entire study took place within the time duration of 6 months.

The anatomical zones were classified on MAUC criteria

"Zone H = central face, eyelids, eyebrows, nose, lips, chin, ear, periauricular sulci, temple, hands, feet, ankles, genitalia, nipples, and nail units"

"Zone M = cheeks, forehead, scalp, neck, jawline, and a pretibial leg"

"Zone L = trunk and extremities excluding areas included in Zone H"

The Chi-Square test, with a significance threshold of p0.05., was used to determine the relative frequency of MH in the study populations and subgroups.

RESULTS

Table 1 indicated that out of 300 children who were selected and recruited for the study, 33% used to live in a joint family system and 67% used to live in a nuclear family. Both the parents (mother & father) were equally involved in giving the responses and report the behaviors they have been observing in their children.

Variables	Category	F	%
Parents gender	Fathers	50	50.00
	Mothers	50	50.00
Family type	Joint family	33	33.00
	Nuclear family	67	67.00
Child gender	Boys	150	150.00
	Girls	150	150.00
Socioeconomic Status	High	100	100.00
	Middle	100	100.00

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Table 1: Frequencies and percentages of demographic variables of Study(N=100)

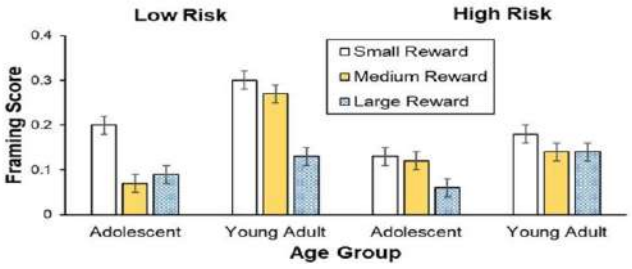

Figure 1: Framing Scores for Different Reward Sizes(N=300)

Table 2 indicated that depression, anxiety and stress scale showed a skewness of 0.22 which means that most of the children who were war affected and were internally displaced showed these symptoms.

Variables	K	α	Range		Skew	Kurt
			Potential	Actual		
DASS 21	.91	33.23(4.33)	10-100	14-89	0.22	0.78

Table 2: Psychometric Properties of the Study Major Variables/ Scales
Note. DASS = Depression Anxiety and Stress Scale

The p-value of less than 0.001 in column 5 indicated that children belonging to year 2002 were victimized of war the most and had severe psychosocial effects as reflected by the table 3. However, the children belonging to year 1998 were least affected in comparison because of their growing age in contrast to their fellow study subjects who were comparatively younger and had weak coping mechanisms. Hence this finding is reflective of the fact that the more a child grows up, the more better coping mechanism he has and less psychosocial impacts of war can be seen on him. Younger children are affected more because of their age and poor coping mechanisms(Table 3).

Variables	1	2	3	4	5
	–	0.67**	0.79*	0.59**	0.69**
2 B	–	–	0.49*	0.74*	0.87**
3 C	–	–	–	0.82***	0.58*
4 D	–	--	–	–	.57**

Table 3: Correlation of study variables(N=300)

The correlation scale identified that the factors such as loss of housing, family, finances, employment and the lack of accessibility to health care services have direct correlation with the increase in psychosocial impacts (Table 4). The girls also highlighted that the cases such as rape, assault and violence also are directly and positively correlated with their disturbed mental health. There were a few disagreements or difference of opinions in responses of girls and boys because their perception, attitudes and experiences varied on individual basis but both the genders agreed to these common and generalized reasons which had affected them more during the war time.

Item No.	Item-total Correlation	Item No.	Item-total Correlation
1	0.73	6	0.67
2	0.65	7	0.68
3	0.68	8	0.69
4	0.66	9	0.67
5	0.69	10	0.69

Table 4: Item-total Correlation of Scale(N=50)

DISCUSSION

The study revealed that the wars and conflicts have been seen to affect girls at most in comparison to boys. To affect the society, it is the easiest approach to destroy and disturb the females as they are the foundational pillars of every family. They are more vulnerable because of the poor socioeconomic and unequal status in the society [13]. In addition, as males are responsible to look after the families as head, this added stress and burden in them. Males are able to cope with the stress in a better way as they had an opportunity to socialize, meet with people and had adequate options for recreation and rehabilitation as compared to females. This helps them in combating mental health stressors and leads a healthy life [14]. Considering that Pakistan is a developing country where already women are provided lesser opportunities and where minimal attention is given to the psychosocial health of women, those females who are affected by wars are restricted to their homes and have reduced mobility owing to the societal and cultural backgrounds [15]. Therefore, the government should pay special consideration to this area for making this place a better one for the females, a place which is safe and secure, both physically and mentally [16-18]. Out of all the participants, 33% used to live in a nuclear family. The children of such families reported that they had minimal chances of interaction with people around them, had limited access to the neighbors because of the conflict and unfavorable situations and had limited access to coping mechanisms because of the limited family size. Also, the children from such families reported that both the parents had been busy during wartime to ensure adequate food and health supply for their kids and this adds on to their overall work load which gave them minimal options to spend effective time with their children thus affecting their mental health as well. In contrast, children living in joint family system, 66% reported that they had better options for recreational facilities as they tend to get more time with their siblings and cousins and if one member of the family was busy, the other guardians and the elders were present to address their needs and requirements timely. This did not only help them during the war time to be less stressful and depressed and but also proved to help in coping

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mechanisms after the war was over in comparison to children to whom such help was absent [19]. Many children, especially girls reported that they find difficulty to adjust in new environment as they did not know the language to communicate, they could not go to schools and could not get basic rights of life [20]. They experienced massive rejection and disapprovals from the residents of areas where they were internally displaced [9]. The study participants were also asked about the rehabilitation options and their views on it. Both girls and boys mentioned that rehabilitation is the most important and needed thing. Their suggestions included making rehabilitation a priority for all such children in addition to the provision of basic facilities [21].

CONCLUSION

The study concluded that military wars have major influences on the psychosocial factors of health. They affect almost all age groups, all genders and all ethnicities. The study also signifies that among all the genders, the females were the most affected and the vulnerable group and among all the age groups, children of middle and secondary schools were the most affected. Conclusively, women were the most marginalized and vulnerable groups in the society and their rights and needs go unaddressed during the war times, therefore, it is important that adequate facilities should be provided to them so that they may have better and healthy life after the crisis gets over. Therefore, rehabilitation centers should have adequate facilities for the females where they may get chance to develop their skills, enhance their abilities and improve their quality of life for the better mental health outcomes.

REFERENCES

[1] Kazmi SS, Arshad A. Impacts of Post Traumatic Stress Disorder on the Performance of Pakistan Army Veterans Deployed for War on Terror. American Journal of Psychology and Cognitive Science. 2015;1(2):37-43.

[2] Sogomonyan F, Cooper JL. Trauma faced by children of military families: What every policymaker should know. 2010. doi.org/10.7916/D8HX1NDM.

[3] Raphael Mg. The Psychosocial Effects of War on Children in Eastern Congo. 2019.

[4] Eiroa-Orosa FJ. Understanding Psychosocial Wellbeing in the Context of Complex and Multidimensional Problems. Int J Environ Res Public Health. 2020 Aug 15;17(16):5937. doi: 10.3390/ijerph 17165937.

[5] Smith D. Children in the heat of war. Monitor on Psychology. 2001 Sep;32(8).

[6] Betancourt TS, Keegan K, Farrar J, Brennan RT. The intergenerational impact of war on mental health and psychosocial wellbeing: lessons from the longitudinal study of war-affected youth in Sierra Leone. Confl Health. 2020 Sep 1;14:62. doi: 10.1186/ s13031-020-00308-7.

[7] Flake EM, Davis BE, Johnson PL, Middleton LS. The psychosocial effects of deployment on military children. J Dev Behav Pediatr. 2009 Aug;30(4):271-8. doi: 10.1097/DBP.0b013e3181aac6e4.

[8] Bierman A, Kelty R. The threat of war and psychological distress among civilians working in Iraq and Afghanistan. Social Psychology Quarterly. 2014 Mar;77(1):27-53. doi.org/10.1177/01902725135139 62.

[9] Çelik N, Özpınar S. Children and health effects of war Being a war child... Cumhuriyet Medical Journal. 2017 Dec 1;39(4):639-43. doi.org/10.7197/223.v39i32356. 368921.

[10] Santa Barbara J. Impact of war on children and imperative to end war. Croat Med J. 2006 Dec;47(6): 891-4.

[11] Kadir A, Shenoda S, Goldhagen J, Pitterman S; Section on International Child Health. The Effects of Armed Conflict on Children. Pediatrics. 2018 Dec;142 (6):e20182586. doi: 10.1542/peds.2018-2586.

[12] Betancourt TS, Meyers-Ohki SE, Charrow AP, Tol WA. Interventions for children affected by war: an ecological perspective on psychosocial support and mental health care. Harv Rev Psychiatry. 2013 Mar-Apr;21(2):70-91. doi: 10.1097/HRP.0b013e318283bf8f.

[13] Holdcroft A. Gender bias in research: how does it affect evidence based medicine? J R Soc Med. 2007 Jan;100(1):2-3. doi: 10.1177/014107680710000102.

[14] Shah QA, Nawab B, Mehmood T. The Role of Stakeholders in Post Conflict Peacebuilding in Swat, Pakistan. Lex Localis-Journal of Local Self-Government. 2020 Jan 1;18(1). DOI: 10.4335/18.1.211-229(2020).

[15] Kastrup MC. Mental health consequences of war: gender specific issues. World Psychiatry. 2006 Feb;5(1):33-4.

[16] McGinn T. Reproductive health of war-affected populations: what do we know?. International Family Planning Perspectives. 2000 Dec 1;26(4):174-80. doi.org/10.2307/2648255.

[17] McKay S. The effects of armed conflict on girls and women. Peace and Conflict. 1998 Dec 1;4(4):381-92. doi.org/10.1207/s15327949pac0404_6.

[18] Freh FM. Psychological effects of war and violence on

DOI:https://doi.org/10.54393/pbmj.v5i5.512

children. J Psychol Abnorm Child. 2015;4:e106. DOI: 10.4172/2329-9525.1000e106.

[19] Pearn J. The effect of war and conflict on child health. Journal of Pediatric Gastroenterology and Nutrition. 1998 Aug 1;27(2):245.

[20] Levinthal DA. A behavioral approach to strategy—what's the alternative?. Strategic Management Journal. 2011 Dec;32(13):1517-23. doi.org/10.1002/smj.963.

[21] Gérain P, Zech E. Informal Caregiver Burnout? Development of a Theoretical Framework to Understand the Impact of Caregiving. Front Psychol. 2019 Jul 31;10:1748. doi: 10.3389/fpsyg.2019.01748

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Original Article

Stability of Iodine in Differently iodized Salts

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ABSTRACT

Iodine deficiency is a public health problem worldwide. Iodization of salt is a valuable technique to overcome iodine insufficiency. There are, however, problems in uniform iodization of salt. The study was conducted to investigate comparative stability and uniformity of mixing of iodine in iodized salt fortified with aqueous solution of KIO_3 (powder grade salt) or the same compound added additionally in dry form (granular grade salt). **Objective:** To assess the stability of iodine in differently iodized salts. **Methods:** The research study was conducted in the laboratory of Nutrition, Section of the Food science Division of Nuclear institute for Food and Agriculture (NIFA), Peshawar. Salt samples were prepared in a medium sized salt crushing facility at Lahore. These samples were transported in bulk packing to Nuclear Institute for Food and Agriculture (NIFA), Peshawar. Following 3 types of samples will be prepared; powder grade salt fortified with 50 ppm of iodine as KIO_3 solution using drip system, granular grade salt iodized with the same system without additional KIO_3 (this grade of iodized salt always lacks complete and homogeneous iodization and needs addition of more iodine to attain the 50 ppm level) and granular grade salt iodized with additional KIO_3 to make up the total to 50 ppm. The salt samples were packed in high density polyethylene (HDPE) and low density polyethylene (LDPE) packing separately. Analysis was carried out at the initial stage (0day) and subsequently at monthly interval up to fourth month. By standard iodometric titration all collected salt samples were tested for their iodine levels. Data were statistically analyzed using Statistic version 8.0. ANOVA were worked out by completely randomized design with factorial arrangement. **Results:** Means were separated using Tuckey HSD test. The mean moisture contents of salt packed in LDPE and HDPE varied significantly ($P < 0.05$), salt packed in LDPE showed higher average moisture contents than the salts packed in HDPE. Effect of iodization type was also significant ($P<0.05$) on the moisture contents of the salts. Granular salt iodized with drip and additional dry KIO_3 had the highest moisture contents followed by granular salt iodized with drip system and the lowest moisture content was exhibited by powdered salt iodized with drip system only. The mean moisture contents of salt during different storage intervals were significantly ($P < 0.05$) different from each other, except during third and four month, With the salt showing higher average moisture contents during the last month and lowest in the first month. Effect of iodization type was also significant ($P<0.05$) on the moisture contents of the salt. Granular salt iodized with drip and additional dry KIO_3 had the highest moisture contents followed by granular salt iodized with drip system and the lowest moisture content was exhibited by powdered salt iodized with drip system only. The mean moisture contents of salt during different storage periods were significantly ($P < 0.05$) different from each other, except during third and four month. The salt showed higher average moisture contents during the last month and lowest in the first month. Effect of packing material type was also significant ($P<0.05$) on the moisture contents of the salt. The mean moisture contents of salt packed in LDPE and HDPE varied significantly ($P < 0.05$). However, salt packed in LDPE showed higher average moisture contents than that of salts packed in HDPE. **Conclusions:** The powder salt retained iodine better than the other two salts types used. The iodine retention gradually decreased during storage periods. Among the

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packaging material used the salt in low density polyethylene showed higher moisture content. During storage intervals the average moisture content increased. The granular salt (grade II) showed maximum moisture content among the three salt types.

INTRODUCTION

Iodine is a trace element having atomic mass 126.9 atomic mass unit (amu), present in the outer layer of the earth . Iodine is usually but irregularly dispersed in the earth's surroundings as iodide . Iodide is mostly found in the oceans and iodide ions in salt water corrode to form basic iodine which is unstable and evaporates into the environment and proceeds to the earth by rainwater and finishing the cycle in this approach. In 1813, iodine was primary cut off from seaweed followed by thoughts for cure of goiter . Iodine is necessary constituent of the hormones formed by the thyroid gland. The body of healthy person includes 15-20 mg of iodine in which 70-80 percent is present in the thyroid gland.The need of iodine in the diet goes ahead to iodine shortage which consists of a wide spectrum of mental, goiter and rational deficiency including deaf-mutism, cretinism and paralysis . Iodine deficiency disorder can also lead to miscarriages, infant deaths, stunted growth, abortions, spastic diplegia, congenital anomalies and lesser degrees of neurological defects Iodine absence harmfully affects the physical condition of women, quality of life and as well as economic productivity. Youth and adults require iodine in quantity of 150 µg/day. Worldwide two billion individuals taking inadequate iodine ingestion, in which sub-Saharan Africa and south Asia mostly affected. Salt iodization is done for the control of iodine insufficiency in all the countries, which is gainful way to supply to economic and social improvement. In Europe and USA key dietetic sources of iodine are milk and bread. In constant iodine insufficiency, the iodine substance of the thyroid may fall to less than 20 µg. In iodine sufficient region, the adult thyroid catch about 60 µg of iodine per/day to equilibrium losses and keep amalgamation of thyroid hormone. Salt is a perfect transporter of micronutrients in sight of its almost uniform and universal regional utilization Iodized oil and iodized salt are appropriate for the alteration of iodine insufficiency on a mass weighing machine. For 3-5 years cruel iodine shortage can be corrected by a single dosage of iodized oil Iodized-oil injections are rapidly effective and are recommended as an emergency measure where there is severe deficiency Salt fortification with iodine is stable, inexpensive and effective way of guaranteed enough iodine ingestion. Iodization of salt is a valuable technique towards falling iodine lacking in populations. It is a widespread foodstuff, ingestion is seasonally constant and easily dispersed .

METHODS

Reaction 1: Free Iodine is liberated from salt iodate

Addition of H_2SO_4 in iodated salt sample releases of free iodine present in the salt sample.

KI is added in larger amount to solubilize the iodine that is set free, which isn't soluble in pure water under normal conditions.

Reaction 2: Free Iodine titrated with thiosulfate

In the titration phase sodium thiosulfate consumed the iodine that are freely available in salt sample. The amount of the iodine that is set free from the salt depends on the quantity of thiosulfate used.

Starch is added and it acts as indicator in this reaction, results in production of blue color after reaction with freely available iodine. When added near the end of the titration the disappearance of blue color with moreover titration shows that all of the iodine that has been set free and left been used by thiosulfate.

Reagent Preparation

0.005M Sodium thiosulfate (Na2S203), 2N Sulfuric acid (H2S04), 10% Potassium iodide (KI), Starch indicator solution were Used.

Calculation: % Moisture= $\frac{\text{loss in weight of sample}}{\text{Weight of sample}} \times 100$

Statistical Analysis

Data were statistically analyzed using Statistic version 8.0. ANOVA were worked out by completely randomized design with three factorial arrangement. Means were separated using Tuckey HSD test.

RESULTS

Moisture contents of differently iodized salt packed in two types of packaging materials: The means concerning the moisture content of various salts stored in low density polyethylene (LDPE) and high density polyethylene HDPE are presented in Table 1.The mean moisture contents of salt packed in LDPE and HDPE varied significantly ($P < 0.05$), salt packed in LDPE showed higher average moisture contents than the salts packed in HDPE. Effect of iodization type was also significant ($P<0.05$) on the moisture contents of the salts. Granular salt iodized with drip and additional dry KIO_3 had the highest moisture contents followed by granular salt iodized with drip system and the lowest moisture content was exhibited by powdered salt iodized with drip system only.

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Packing	Salt types			Means
	Powdered	Granular (Grade I)	Granular (Grade II)	
LDPE	0.50±0.14^{d}	1.14±0.38^{a}	1.10±0.16^{ab}	0.91^{a}
HDPE	0.65±0.14^{c}	0.71±0.25^{c}	0.98±0.22^{b}	0.78^{b}
Means	0.58^{c}	0.93^{b}	1.04^{a}	

Table 1: Moisture contents (%) of differently iodized salt packed in two types of packaging

Means with different superscript are significantly different at p< 0.05.

LDPE= Low density polyethylene, HDPE= High density polyethylene

Moisture contents of differently iodized salt during different storage periods : The mean moisture content of differently iodized salt and at different storage intervals are presented in Table 2. The mean moisture contents of salt during different storage intervals were significantly (P < 0.05) different from each other, except during third and four month, With the salt showing higher average moisture contents during the last month and lowest in the first month. Effect of iodization type was also significant (P<0.05) on the moisture contents of the salt. Granular salt iodized with drip and additional dry KIO3 had the highest moisture contents followed by granular salt iodized with drip system and the lowest moisture content was exhibited by powdered salt iodized with drip system only.

Storage	Salt type			Means
	Powder	Granular(Grade I)	Granular(Grade II)	
0	0.18±0.02^{i}	0.44±0.08^{gh}	0.85±0.15^{cde}	0.48^{d}
1	0.23±0.04^{hi}	0.83±0.35^{de}	0.95±0.25^{bc}	0.67^{c}
2	0.52±0.18^{fg}	0.96±0.37^{cd}	1.02±0.12^{bc}	0.83^{b}
3	0.77±0.32^{e}	1.18±0.23^{ab}	1.15±0.12^{ab}	1.03^{a}
4	0.81±0.33^{de}	1.23±0.25^{a}	1.22±0.04^{a}	1.09^{a}
Mean	0.50^{c}	0.93^{b}	1.04^{a}	

Table 2: Moisture contents (%) of differently iodized salt during different storage periods

Moisture contents of salt packed in different packaging materials during different storage periods: The mean values of moisture content of various salt stored in low density polyethylene (LDPE) and high density polyethylene (HDPE) during different storage intervals are presented in Table 3.The mean moisture contents of salt during different storage periods were significantly (P < 0.05) different from each other, except during third and four month. The salt showed higher average moisture contents during the last month and lowest in the first month. Effect of packing material type was also significant (P<0.05) on the moisture contents of the salt. The mean moisture contents of salt packed in LDPE and HDPE varied significantly (P < 0.05). However, salt packed in LDPE showed higher average moisture contents than that of salts packed in HDPE.

Storage	Packing		Mean
	LDPE	HDPE	
0	0.53±0.35^{d}	0.44^{D}±0.26^{d}	0.48^{c}
1	0.80±0.47^{b}	0.54^{CD}±0.28^{cd}	0.67^{c}
2	0.93±0.43^{b}	0.74^{C}±0.14^{c}	0.83^{b}
3	1.00±0.42^{a}	1.05^{A}±0.09^{a}	1.03^{a}
4	1.05±0.42^{a}	1.12^{A}±0.11^{a}	1.09^{a}
Mean	0.86^{a}	0.76^{b}	

Table 3: Moisture contents (%) of salt packed in different packaging materials during different storage periods

Means with different superscript are significantly different at p< 0.05.

Moisture contents of differently iodized salt packed in two types of packaging materials during different storage periods: The moisture content of granular salt grade I packed in LDPE during initial analysis was significantly different from first and second storage periods and non-significantly different from third and fourth month (Table 4).

Packaging type	Storage (Months)	Salt type			Mean
		Powder salt	Granular salt Grade I	Granular salt Grade II	
LDPE	0	0.15±0.01^{p}	0.44±0.08^{klmno}	0.74±0.11^{ghij}	0.53^{e}
	1	0.28±0.05^{klm}	0.51±0.05^{jkl}	0.85±0.22^{efgh}	0.80^{b}
	2	0.66±0.03^{hij}	0.83±0.08^{ijk}	0.91±0.03^{efgh}	0.93^{b}
	3	1.05±0.12^{cdef}	0.98±0.03^{defg}	1.13±0.05^{bcdef}	1.00^{a}
	4	1.11±0.02^{bcdef}	1.01±0.06^{cdefg}	1.25±0.01^{abcd}	1.05^{a}
HDPE	0	0.18±0.02^{p}	0.44±0.10^{klmno}	0.98±0.07^{defgh}	0.44^{e}
	1	0.21±0.02^{nop}	1.14±0.01^{bcdef}	1.05±0.28^{cdef}	0.54^{cd}
	2	0.37±0.04^{klmn}	1.29±0.07^{abc}	1.12±0.06^{bcdef}	0.74^{b}
	3	0.48±0.05^{jklm}	1.37±0.10^{ab}	1.16±0.19^{abcde}	1.05^{a}
	4	0.51±0.04^{jkl}	1.45±0.02^{a}	1.19±0.02^{abcde}	1.12^{a}
Mean		0.51^{c}	0.93^{b}	1.04^{a}	

Table 4: Moisture contents (%) of differently iodized salt packed in two types of packaging materials during different storage periods

Means with different superscript are significantly different at p< 0.05.

LDPE= Low density polyethylene, HDPE= High density polyethylene

Iodine contents of differently iodized salt packed in two types of packaging materials: The means concerning the iodine content of various salts stored in low density polyethylene (LDLE) and HDPE are presented in Table 5. The mean iodine contents of salt packed in LDPE and HDPE varied significantly (P < 0.05), salt packed in HDPE showed higher average iodine contents than the salts packed in LDPE. Effect of iodization type was also significant (P<0.05) on the iodine contents of the salts. Powdered salt iodized with drip system had the highest iodine contents followed by granular salt iodized with drip system only and the lowest iodine content was exhibited by the granular salt iodized with drip additional dry KIO3.

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Packing	Salt type			Means
	Powder	Granular(Grade I)	Granular(Grade II)	
LDPE	28.03±1.19^{b}	27.22±1.83^{c}	27.21±1.47^{c}	27.48^{b}
HDPE	28.89±0.75^{a}	28.19±1.01^{b}	27.41±1.18^{c}	28.16^{a}
Means	28.46^{a}	27.70^{b}	27.31^{c}	

Table 5: Iodine contents of differently iodized salt packed in two types of packaging

Means with different superscript are significantly different at p< 0.05. LDPE= Low density polyethylene, HDPE= High density polyethylene

Iodine contents of differently iodized salt during different storage periods : The mean concerning the iodine content of differently iodized salt and during different storage period are presented in Table 6. The mean iodine contents of salt during different storage periods were significantly(P <0.05)different from each other.

Storage	Salt type			Means
	Powder	Granular(Grade I)	Granular(Grade II)	
0	29.97±0.05^{a}	29.60±0.14^{a}	29.00±0.20^{b}	29.52^{a}
1	28.64±0.56^{bc}	28.45±0.50^{c}	28.10±0.25^{cd}	28.40^{b}
2	28.45±0.57^{c}	27.67±0.48^{de}	27.30±0.21^{f}	27.80^{c}
3	27.86±0.65^{de}	26.75±0.71^{g}	26.74±0.31^{g}	27.12^{d}
4	27.38±0.82^{ef}	26.03±1.11^{h}	25.40±0.58^{i}	26.27^{e}
Mean	28.46^{a}	27.70^{b}	27.31^{c}	

Table 6: Iodine contents of differently iodized salt during different storage periods

Iodine contents of salt packed in different packaging materials during different storage periods: The mean concerning the iodine content of various salt stored in low density polyethylene(LDPE)and HDPE and during different storage period are presented in Table 7. The mean iodine contents of salt during different storage intervals were significantly(P <0.05)different from each other.

Storage	Packing		Mean
	LDPE	HDPE	
0	29.52±0.45^{a}	29.52±0.44^{a}	29.52^{a}
1	28.00±0.18^{c}	28.78±0.44^{b}	28.40^{b}
2	27.54±0.44^{d}	28.08±0.73^{c}	27.80^{c}
3	26.77±0.67^{e}	27.46±0.80^{d}	27.11^{d}
4	25.58±0.92^{f}	26.96±1.00^{e}	26.27^{e}
Mean	27.48^{b}	28.16^{a}	

Table 7: Iodine contents of salt packed in different packaging materials during different storage periods

Means with different superscript are significantly different at p< 0.05.

LDPE= Low density polyethylene, HDPE= High density polyethylene

Retention contents of differently iodized salt packed in two types of packaging materials: The means concerning the retention content of various salts stored in low density polyethylene (LDPE) and HDPE are presented in Table 9. The mean retention contents of salt packed in LDPE and HDPE varied significantly (P<0.05), salt packed in HDPE showed higher average retention content than the salts packed in LDPE [7]. studied the effects of packaging materials on the stability of iodine in iodized salt. He stored the iodized salt in three types of packaging materials HDPE, LDPE and WHDPE. The obtained results showed HDPE retained iodine from iodized salt better than the two other packaging materials used. The percentage of iodine lost at the six month was 22.55 %, (stored in LDPE), 15.12 % (stored in HDPE)and 23.88 % (stored in WHDPE)[19].

Packing	Salt			Mean
	Powder	Granular (Grade I)	Granular (Grade II)	
LDP	91.99±2.21bc	89.96±4.12d	92.27±4.09c	91.41b
EHDPE	95.57±1.92a	94.03±2.65ab	93.14±3.25bc	94.25a
Mean	93.78a	92.00b	92.71b	

Table 9. Retention contents (%) of differently iodized salt packed in two types of packaging.

Means with different superscript are significantly different at p< 0.05.

LDPE= Low density polyethylene, HDPE= High density polyethylene

Retention content of salt packed in different packaging materials during different storage periods: The means concerning the retention content of salts stored in low density polyethylene (LDPE) and HDPE during different storage intervals are presented in Table 9. The mean retention contents of salt packed in LDPE and HDPE varied significantly (P<0.05), salt packed in HDPE showed higher average retention content than the salts packed in LDPE. The salt showing higher average retention level during the 1st month and lowest in the fourth month.

Storage	Packing		Mean
	LDPE	HDPE	
1	95.04±1.20^{b}	97.50±0.65^{a}	96.27^{a}
2	93.29±1.34^{bc}	95.09±1.26^{b}	94.19^{b}
3	90.69±2.04^{e}	93.00±1.56^{cd}	91.84^{c}
4	86.62±2.31^{f}	91.31±2.21^{de}	88.96^{d}
Mean	91.41^{b}	94.22^{a}	

Table 10: Retention content (%) of salt packed in different packaging materials during different storage periods

Means with different superscript are significantly different at p< 0.05.

LDPE= Low density polyethylene, HDPE= High density polyethylene

Retention contents of differently iodized salt during different storage periods: The means concerning the retention content of differently iodized salts during different storage intervals are presented in Table 11.The mean retention contents of salt during different storage periods were significantly (p<0.05) different from each other. The salt showing higher average retention level during the 1st month and lowest in the fourth month. There were non-significant difference in the retention content of granular salt iodized with drip system and granular salt iodized with drip and additional dry KIO3. The highest

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retention was exhibited by the powder salt followed by granular salt iodized with drip and additional dry KIO3 system which is then followed by granular salt iodized with drip system only.

Storage	Salt			Mean
	Powder	Granular (Grade I)	Granular (Grade II)	
1	95.73±1.83^{abc}	96.16±1.79^{ab}	96.91±0.92^{a}	96.27^{a}
2	94.94±1.90^{abcd}	93.50±1.84^{cde}	94.13±0.32^{bcde}	94.19^{b}
3	92.94±2.19^{de}	90.38±2.27^{fg}	92.21±1.10^{ef}	91.84^{c}
4	91.38±2.77^{def}	87.94±3.81^{h}	87.57±1.81^{h}	88.96^{d}
Mean	93.75^{a}	92.00^{b}	92.7^{b}	

Table 11: Retention contents (%) of differently iodized salt during different storage periods

Retention contents of differently iodized salt packed in two types of packaging materials during different storage periods: The retention content of granular salt grade II packed in HDPE during first storage period was significantly different from third and fourth storage period and non-significantly different from second storage period. The retention content of granular salt grade II was non-significantly different from powdered and granular salt grade I. He stored the iodized salt in three types of packaging materials HDPE, LDPE and WHDPE.

Packaging type	Storage (Months)	Salt type			Mean
		Powder salt	Granular salt Grade I	Granular salt Grade II	
LDPE	1	94.10±0.69^{abcde}	94.69±0.7^{abcd}	96.32±0.92^{abc}	95.04^{b}
	2	93.44±1.35^{bcde}	92.20±1.48^{efg}	94.22±0.25^{abcde}	93.29^{bc}
	3	91.10±1.34^{efg}	88.40±0.59^{gh}	92.58±1.04^{cdef}	90.69^{e}
	4	89.32±0.98^{efg}	84.57±1.47^{i}	86.98^{hi}±0.55^{h}	86.62^{f}
HDPE	1	97.35±0.66^{ab}	97.64±1.01^{a}	97.50^{a}±0.44^{a}	97.50^{a}
	2	96.44±0.69^{abc}	94.80±1.08^{abcde}	94.03±0.41^{abcde}	95.09^{b}
	3	94.77±0.38^{abcde}	92.36±0.88^{defg}	91.85±1.24^{efg}	93.00^{cd}
	4	93.44±2.34^{bcde}	91.31±0.35^{efg}	89.17±0.48^{fgh}	91.3^{de}
	Mean	93.75^{a}	92.00^{b}	92.7^{b}	

Table 12: Retention contents (%) of differently iodized salt packed in two types of packaging materials during different storage periods

Means with different superscript are significantly different at p< 0.05.

LDPE= Low density polyethylene, HDPE= High density polyethylene

DISCUSSION

Granular salt iodized with drip and additional dry KIO3 had the highest moisture contents followed by granular salt iodized with drip system and the lowest moisture content was exhibited by powdered salt iodized with drip system only. Diosady and Mannar examined the stability of iodine in typical salts available in 12 countries in a controlled laboratory setting, at high temperature (40°C) and controlled humidity (60 or 100%) for periods up to 12 months [15]. They stored the salt samples in three different types of packaging materials i.e woven high density polyethylene (HDPE) bags, low-density polyethylene (LDPE) film bags, and in open plastic containers. They found that the Packaging affected the levels of moisture present in salt samples. The LDPE film provided an excellent moisture barrier, and maintained the total moisture content in each bag approximately constant. In open containers the absorbed and condensed moisture was retained and contributed to the instability of iodine. Woven HDPE bags allow the flow of air and moisture, behaved similarly to the open containers. Another study assessed the effect of salt moisture content, relative humidity and packaging materials on the stability of iodine. In controlled laboratory setting he examined the typical salts collected from different salt industries for period of six months. The salts containing the higher moisture content lost iodine rapidly. The unrefined salt containing 14% moisture retained only 17.85% iodine of its original after six months of storage. Higher the percentage of iodine retention in salt if lower the moisture content. Salt containing higher moisture content lost iodine at higher rate than the salt contained less moisture content [9]. Haque (2009) assessed the effect of salt moisture content, relative humidity and packaging materials on the stability of iodine. In controlled laboratory setting he examined the typical salts collected from different salt industries for period of six months. The salts containing the higher moisture content lost iodine rapidly. The unrefined salt containing 14% moisture retained only 17.85% iodine of its original after six months of storage. Higher the percentage of iodine retention in salt if lower the moisture content. Salt containing higher moisture content lost iodine at higher rate than the salt contained less moisture content. The packaging materials affect the level of moisture present in salt. The absorbed and condensed moisture was retained in the open container and resulted in instability of iodine, woven high density polyethylene also allowed the flow of air and moisture resulted in loss of iodine. The low density polyethylene provided an excellent moisture barrier [21]. The moisture content of granular salt grade I was significantly different from powdered salt and non-significantly different granular salt grade II in our study. While the moisture content of granular salt grade I packed in LDPE during fourth month was significantly different from the other storage periods and non-significantly different from the third month [10]. The moisture content of granular salt grade I was non-significantly different from powdered and granular salt grade II [11]. The moisture content of granular salt grade II was significantly different from powdered salt and non-significantly different from granular salt grade I. The moisture content of granular salt grade II packed in HDPE during fourth month was non-significantly different from

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other storage periods. The moisture content of granular salt grade II was significantly different from powdered salt and non-significantly different from granular salt grade I [12]. examined the stability of iodine in typical salts available in 12 countries in a controlled laboratory setting, at high temperature (40°C) and controlled humidity (60 or 100%) for periods up to 12 months [13]. They stored the salt samples in three different types of packaging materials i.e woven high density polyethylene (HDPE) bags, low-density polyethylene (LDPE) film bags, and in open plastic containers [14]. They found that the Packaging affected the levels of moisture present in salt samples. The LDPE film provided an excellent moisture barrier, and maintained the total moisture content in each bag approximately constant. In open containers the absorbed and condensed moisture was retained and contributed to the instability of iodine. Woven HDPE bags allow the flow of air and moisture, behaved similarly to the open containers. A study assessed the effect of salt moisture content, relative humidity and packaging materials on the stability of iodine. The low density polyethylene provided an excellent moisture barrier [15]. Effect of iodization type was also significant ($P<0.05$) on the iodine contents of the salts. Powdered salt iodized with drip system had the highest iodine contents followed by granular salt iodized with drip system only and the lowest iodine content was exhibited by the granular salt iodized with drip additional dry KIO3 while a research studied the effects of packaging materials on the stability of iodine in iodized salt. He stored the iodized salt in three types of packaging materials HDPE, LDPE and WHDPE [16]. The mean iodine contents of salt during different storage periods were significantly ($P <0.05$) different from each other. Ranganathan and Narasinga [16] observed iodine losses of about 20% in iodized salt after the period of 12 months. Similarly another analysis performed by them on five types of Indian salt (including powder and crystal) they found iodine losses after 3 months 28-51 %, after 6 months 35-52 %, and up to 66 % after 12 months of period showing losses of iodine over the period of time. Losses from powder salt appeared lower. Similar results were also obtained in our study. A study observed the effect of storage and exposure of salt in Ghana. They observed 10% to 100% losses in iodine levels depending upon storage conditions indicating that losses of iodine occur during storage [17]. The mean iodine contents of salt during different storage intervals were significantly ($P <0.05$) different from each other. The salt showing highest average iodine content during the initial analysis and lowest in the last (fourth month). The mean iodine contents of salt packed in LDPE and HDPE varied significantly ($P < 0.05$), salt packed in HDPE showed higher average iodine contents than that of salts packed in LDPE [18]. Hence WHDPE lost more iodine within six months compared to HDPE and LDPE. Beyene (2010) studied the effects of storage time and packaging materials on the mean iodine content of iodized salt. He stored the iodized salt in three types of packaging materials HDPE, LDPE and WHDPE. Similar results were also obtained in our study that HDPE retained iodine from iodized salt better than the other packaging material used i.e LDPE [19]. Another study found to decrease during storage, the powdered salt and brown crystal salt had iodine in the recommended level. On the contrary, white crystal salt contained only half (7 ppm) that recommended at the retail level (15 ppm). Similarly in our study the iodine retention was maximum in powder salt followed by other two types of salt. He conducted study on iodine losses in iodized salt following different storage periods. They estimated the Iodine retention in three types of iodized salt, powdered salt, white crystal and brown crystal salt at an interval of 15 days following commonly practiced storage methods. Powdered salt had maximum iodine retention (91.16%) followed by brown crystal salt (84.24%) and white crystal salt (76.71%) [20].

CONCLUSION

The iodine content of powder salt was high. During storage period the iodine content decreased. Among the packaging materials used the iodine content was maximum in high density polyethylene. The iodine retention was maximum in high density polyethylene. The powder salt retained iodine better than the other two salts types used. The iodine retention gradually decreased during storage periods. Among the packaging material used the salt in low density polyethylene showed higher moisture content. During storage intervals the average moisture content increased. The granular salt (grade II) showed maximum moisture content among the three salt types.

REFERENCES

[1] Luther III GW. Inorganic chemistry for geochemistry and environmental sciences: fundamentals and applications. John Wiley & Sons; 2016 Aug 1.

[2] Xing S, Hou X, Aldahan A, Possnert G, Shi K, Yi P et al. Iodine-129 in snow and seawater in the Antarctic: level and source. Environmental Science & Technology. 2015 Jun 2;49(11):6691-700. doi.org/10.1021/acs.est.5b01234.

[2] Mellor JW. Supplement to Mellor's Comprehensive Treatise on Inorganic and Theoretical Chemistry: suppl. 3. K, Rb, Cs, Fr. Longmans, Green and Company; 1922.

[4] Ahad F, Ganie SA. Iodine, Iodine metabolism and

DOI:https://doi.org/10.54393/pbmj.v5i5.361

Iodine deficiency disorders revisited. Indian J Endocrinol Metab. 2010 Jan;14(1):13-7.
[5] World Health Organization. The world health report 2000: health systems: improving performance. World Health Organization; 2000.
[6] Child Y. A Review of the Situation in the SEA Region.
[7] Mannar MV, Dunn JT, Micronutrient Initiative, International Council for Control of Iodine Deficiency Disorders, UNICEF. Salt iodization for the elimination of iodine deficiency. ICCIDD, NL; 1995.
[8] World Health Organization. Guidelines on food fortification with micronutrients. World Health Organization; 2006.
[9] Rahman MM. Selenium Biofortification in Lentil (Doctoral dissertation, The University of Western Australia).2014.
[10] Scrimshaw NS, Murray ME, Jeffries MS, Bressani R, City G. close this book Food and Nutrition Bulletin Volume 18, Number 2, 1997 (UNU, 1997, 118 pages). Food and Nutrition Bulletin. 1997;18(2).
[11] Gadekar YP, Sharma BD, Shinde AK, Thomas R, Mendiratta SK. Usage of sodium ascorbate and alpha tocopherol acetate. Fleischwirtsch. Int. 2014;29:52-7.
[12] Singh V, Kaur K. Development, formulation and shelf life evaluation of baby corn soup mix from industrial by-products. Journal of Food Science and Technology. 2020 May;57(5):1917-25. doi.org/10.1007/s13197-019-04227-1.
[13] Diosady LL, Alberti JO, Mannar MV. Microencapsulation for iodine stability in salt fortified with ferrous fumarate and potassium iodide. Food Research International. 2002 Jan 1;35(7):635-42. doi.org/10.1016/S0963-9969(01)00166-1.
[14] Kumar A, Morya S. Packaging of fruits and vegetables. Advances in Horticultural Crop Management and Value Addition. 2018:363.
[15] Diosady LL, Alberti JO, Mannar MV, FitzGerald S. Stability of iodine in iodized salt used for correction of iodine-deficiency disorders. II. Food and Nutrition Bulletin. 1998 Sep;19(3):240-50. doi.org/10.1177/156482659801900306.
[16] Sangakkara AR. Double fortification of salt with folic acid and iodine (Doctoral dissertation). 2011.
[17] Kumar R, Sinha R, Sharma PK, Ivy N, Kumar P, Kant N et al. Bioaccumulation of Fluoride in Plants and Its Microbially Assisted Remediation: A Review of Biological Processes and Technological Performance. Processes. 2021 Dec;9(12):2154. doi.org/10.3390/pr9122154.
[18] Ranganathan S, Karmarkar MG, Krupadanam M, Brahmam GN, Rao MV, Vijayaraghavan K et al. Stability of iodine in salt fortified with iodine and iron. Food and nutrition bulletin. 2007 Mar;28(1):109-15. doi.org/10.1177/156482650702800112.
[19] BEYENE AA. Approved by Examining Board (Doctoral dissertation, ADDIS ABABA UNIVERSITY).2010.
[20] Narasinga Rao BS. Fortification of salt with iron and iodine to control anaemia and goitre: development of a new formula with good stability and bioavailability of iron and iodine. Food and Nutrition Bulletin. 1994 Mar;15(1):1-7. doi.org/10.1177/156482659401500119.
[21] Lanzetta L, Webb T, Zibouche N, Liang X, Ding D, Min G et al. Degradation mechanism of hybrid tin-based perovskite solar cells and the critical role of tin (IV) iodide. Nature communications. 2021 May 14;12(1):1-1. doi.org/10.1038/s41467-021-22864-z

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Original Article

Association of Patellofemoral Syndrome with Prolonged Duration of Sitting among Teachers; A Cross-Sectional Survey

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ABSTRACT

Although there are several etiologies for patellofemoral pain syndrome, prolonged sitting is one of the less well-understood causes. Recently, there has been some discussion about the alignment problems. **Objective:** the study was to determine the association of patellofemoral syndrome with duration of sitting among teachers. **Methods:** This was a Cross-Sectional Study conducted among 278 males 104 (37.4%) and female 174 (university teachers having an age range of 25 to 50 years, spending an average of 4 hours in sitting 62.6%) position and having pain were included in the study, based on convenience sampling technique. Data was collected after taking ethical approval from The University of Lahore by using the SNAPPS (survey instrument for natural history, etiology, and prevalence of patellofemoral pain studies) Questionnaire. SPSS 25 was used to analyze data. **Results:** The descriptive statistics showed a mean and standard deviation to be 30.81± 4.08 for age, 5.39± 1.09 for the sitting duration, 5.233±2.81 for teaching experience, and 22.28±11.48 for patellofemoral pain syndrome. The results showed that there were 12.6% of teachers with no chances of PFPS at the time of data collection, 11.5% with minimal chances, 73% had borderline and 2.9% having early symptoms of PFPS. The results regarding association of PFPS and sitting duration per day showed a significant direction association as shown by p-value 0.01. **Conclusion:** The study concluded that there was a significant association between number of sitting hours and PFPS among teachers. Most prolonged sitters are at more risk for developing patellofemoral pain syndrome. There were no teachers in the advance stage of patellofemoral pain syndrome.

INTRODUCTION

PFPS (Patellofemoral Pain Syndrome) is a generic term that refers to pain that originates in the patellofemoral joint or in the soft tissues surrounding the joint. Kneeling, sitting, climbing stairs, and running are all examples of activities that might aggravate the problem over time. In the past, this condition was referred as anterior knee pain, although this is misleading because pain can be felt throughout the knee joint [1-4]. PFPS has an impact on daily activities. Score less than 83 on Anterior Knee Pain Questionnaire denoted the presence of Patellofemoral pain syndrome. Patients taken from different hospitals of Lahore aged between 18 to 35 years showed prevalence of PFPS higher in females (21.53%) than males (16.58%) [5]. Another study showed high prevalence rates of PFPS in females. Female university athletes were shown to have a significant frequency of patellofemoral pain syndrome. Out of 160 females tested, 21.3% were feeling limp, 65% were feeling pain while walking, all of them were having trouble ascending stairs, 15.6% were being unable to run, and 33.8% were feeling light pain and 45.6% were feeling severe pain [6]. On the contrary to this, the frequency of PFPS was detected through Kujala Scoring questionnaire in sports scientists students of Lahore was found to be higher in males (62.15%) than in females (37.85%). PFP is prevalent among sports sciences students, with 63.54 percent reporting mild or no symptoms of anterior knee pain, 26.74 percent reporting moderate symptoms, and 9.72 percent reporting severe symptoms [7]. Some persons may be impacted by PFPS because of a VMO/VL imbalance in their body. The major cause is muscle atrophy in the VMO, which

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leads in inordinate lateral track of the patella due to lateral ligament residual strain [8]. Hypo mobility of the medial patellofemoral joint sliding or decreased extensibility of the tensor fascia lata, iliotibial tract, or lateral retinaculum, for example, may result in increased lateral joint stress during knee flexion. Inappropriate joint load may remain if movement constraints are not addressed [9-10]. PFPS has a complicated etiology with several risk factors, some of which are controllable and others not. Changes in patellofemoral joint pressure and load caused by impairments in proximal, regional, and distal variables are widely regarded as a role in the development of PFPS. A considerable percentage of people with PFPS experience continuous symptoms and do not see long-term improvements, which might be due to other abnormalities that are not corrected by exercise. Joint and soft tissue mobility issues may contribute to the continuation or progression of pain [11-13]. PFPS may be induced by a patellar trauma, but it is more usually caused by a combination of variables (multifactorial causes), such as patellofemoral overuse and overload, anatomical and biomechanical abnormalities, reduced muscle, imbalance, as well as dysfunction. A combination of these elements is more likely to cause PFPS to worsen and be more resistant to treatment [14-16]. Although there are several etiologies for patellofemoral syndrome, prolonged sitting with knee flexion is one of the possible cause [17-18] which is less explored. Most of the variables previously discussed are associated with traumatic and joint disease. Recently, there has been some discussion about the alignment problems. Teachers are among the members of the population who may be forced to such lengthy periods of sitting. In this manner, it may benefit teachers and the whole community. The objective of study is to determine the association of patellofemoral syndrome with duration of sitting among teachers.

METHODS

This was a Cross-Sectional Study. The study was held at The University of Lahore. Sample size was calculated to be 278 with the help of previous literature [19].

Samle Size for % Frequency in a population (Random Sample)		
Population size	1000	If large, leaves as one million
Anticipated% frequnecy (p)	50	Between 0 & 99.99. if unknown. use %
Confidence Limits as +/- Percent of 100	5	Absoluute precision%
Design effect (for complex sample surveys—DEFF)	1.0	1.0 for random sample

278 male and female university teachers having an age range of 25 to 50 years, and average of 4 hours in sitting position and having pain in knee joint were included in the study by using convenient sampling [20]. Patients having known arthritis, malignancy, knee apmutation were excluded. The diagnosis of anterior knee pain (AKP) or PFPSis problematic because there is no agreed-upon diagnostic criteria. As a result, it's usually a diagnosis made after all other disorders have been ruled out. The region of pain, age, length of symptoms, prevalent aggravating circumstances, manual palpation, and elimination of other illnesses are used to diagnose AKP [21]. So, the data was collected by using the SNAPPS [1] (survey instrument for natural history, aetiology and prevalence of patellofemoral pain studies) Questionnaire after excluding other diagnosis. Data analysis was performed using SPSS version 25.0. Mean and Standard Deviation was calculated for continuous quantitative variables, while for categorical variables frequency and percentages were calculated. Chi square test and cross tabs was performed to analyze the data association and Data was represented in the form of pie charts and bar charts.

RESULTS

The descriptive statistics showed a mean and standard deviation to be 30.82± 4.09 for age, 25.6 + 3.98 for BMI, 5.39± 1.09 for sitting duration, 5.233± 2.81 for teaching experience and 22.28±11.48 for patellofemoral pain syndrome. The results regarding gender showed that there were 37.4% male and 62.6% female teachers. The results regarding marital status showed that there were 53.2% married and 46.8% unmarried teachers. The results regarding PFPS scale showed that there were 12.6% teachers with no chances of PFPS at the time of data collection, 11.5% with minimal chances, 73% borderline PFPS and 2.9% having early symptoms of PFPS. There was no participant in advance stage PFPS(81-100%)[Table I]. The chi square test was applied to determine association of PFPS and sitting duration per day which showed significant association as shown by p value 0.01. Most prolonged sitters were at borderline of developing PFPS[Table II].

Variable		Mean + S.D	f(%)
Age		30.82±4.09	
BMI		25.6 + 3.98	
Average sitting duration per day		5.4±1.1	
Teaching experience		5.33±2.81	
Gender (n=278)	Male		104 (37.4)
	Female		174 (62.6)
Marital Status (n=278)	Married	22.28±11.48	148 (53.2)
	Unmarried		130 (46.8)
PFPS Score (n=278)	Total score		
	No PFPS (0-20% Score)		35 (12.6)
	Minimal PFPS (21 -40% Score)		32 (11.5)
	Borderline PFPS (41-60% Score)		203 (73.0)

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	Early PFPS (61-80%Score)		8 (2.9)

Table 1: Demographic characteristics and PFPS Score of Participants

		No PFPS (0-20% Score)	Minimal PFPS (21-40% Score)	Borderline PFPS	Early PFPS (61-80% Score)		P-Value
Average sitting duration per day	2 hours	26	4	40	0	70	0.01
	5 hours	5	12	73	0	90	
	6 hours	0	8	43	4	55	
	7 hours	4	8	47	4	63	
Total		35 (12.6%)	32 (11.5%)	203 (73.0)	8 (2.9)	278	

Table 2: Association of Average Daily Sitting Duration to PFPSScore

DISCUSSION

A substantial number of patients with PFPS participated in this research, and it is the first time that the frequency of PFPS with extended sitting has been reported. Our results agree with those of earlier investigations. A study by Ndonye, Matara & Muriithi (2019) looked into the prevalence of musculoskeletal illnesses in Kenyan primary school teachers in Machakos County. Knee pain prevalence was the second most impacted pain after low back pain with 57.6 percent teachers affected from it. The age factor, teaching for more than four hours while sitting, working with a head-down posture, and absence of back support on chairs were all positively associated risk factors with the musculoskeletal pains in the teachers [22]. Another research investigated the negative consequences of sitting among Iranian office workers. Results revealed that there's a link between sitting for long periods of time (more than 8 hours a day) and fatigue during the workday, reduced job satisfaction, hypertension, and musculoskeletal symptoms in different body areas of the office workers. 42 percent of office workers with prolonged sitting were found to be suffering from knee pain. Thus, sitting had a negative impact on office workers. Results of the study by Daneshmandi, et al (2017) are in line with the results of the current study [23]. Sedentary time is a significant factor for office workers. This sedentary period may have musculoskeletal effects on office workers, in addition to cardio-vascular and metabolic health hazards. During two hours of extended sitting, acute unfavorable consequence of clinically significant increase in thigh pain was discovered in the study by Baker, et al (2018). The observed changes show that prolonged sitting may cause musculoskeletal discomfort, and that taking breaks to break up extended periods of sitting is advisable. The study by Baker, et al (2018) considered 2 hours of working as prolonged sitting in contrary to the present study which undertook 4 hours as prolonged sitting period [24]. Lee, et al. (2019) stated that sedentary behavior which lasted longer more than 10 hours was linked to chronic knee pain. Obese people who have a low level of physical activity and spend more time sitting are more prone to develop chronic knee pain. Findings of the study suggested that reducing general sedentary behavior, particularly among people with chronic knee pain, should be promoted. A high level of physical activity is recommended, especially for women over 50 and those who are obese. The study by Lee, et al (2019) has concurrent findings with the current study by showing effects of prolonged sitting on causing knee pain [25]. A study was conducted by Collins, et al. (2016) to evaluate the prevalence and characteristics of sitting pain in patients of patellofemoral pain syndrome. More than half of the study participants (54%) had problems in extended sitting and 26 percent patients stated pain in sitting after exercise. Patients having sitting pain were mostly females and were having lesser BMI and greater degree of pain [20]. Findings of Collins, et al. (2016) are in contrast to the findings of Lee, et al. (2019) where obesity contributed to knee pain instead of contribution of lower BMI to knee pain. Kim (2019) performed a study to see if there was a link between sitting duration and orthopedic issues in Korean seniors. Obesity was found to be strongly linked to sitting time in both men and women. Knee joint pain was found to be substantially linked with sitting duration of 7.5 hours per day. Findings are in line with the present study where prolonged sitting had contributed to the development of PFPS [26]. The strength of our study is that no previous study has investigated the association of prolonged standing with PFPS till yet. Majority of studies have evaluated the frequencies of different musculoskeletal symptoms with prolonged sitting but not specifically PFPS.

CONCLUSION

The study concluded that there was significant association between number of sitting hours and PFPS among teachers. Most prolonged sitters are more risk for developing patellofemoral pain syndrome. There were no teachers in advance stage of patellofemoral pain syndrome.

REFERENCES

[1] Brady WS, Boonprakob Y, Kwangsawad T, Buahong A, Asawaniwed P, Khachornsaengcharoen N, et al. Thai version of the Survey Instrument for Natural History, Aetiology and Prevalence of Patellofemoral Pain: Cross-cultural validation and test-retest reliability. Asia Pac J Sports Med Arthrosc Rehabil Technol. 2021 Jun 11; 26:1-7. doi: 10.1016/j.asmart.2021.05.005.

[2] Sutlive TG, Golden A, King K, Morris WB, Morrison JE, Moore JH, et al. Short-term effects of trigger point dry needling on pain and disability in subjects with patellofemoral pain syndrome. Int. J. Sports Phys.

DOI:https://doi.org/10.54393/pbmj.v5i5.439

Ther. 2018 Jun;13(3):462-473. doi.org/10.26603/ijspt20180462
[3] Sisk D, Fredericson M. Update of Risk Factors, Diagnosis, and Management of Patellofemoral Pain. Curr Rev Musculoskelet Med. 2019 Dec;12(4):534-541. doi: 10.1007/s12178-019-09593-z.
[4] Samani M, Ghaffarinejad F, Abolahrari-Shirazi S, Khodadadi T, Roshan F. Prevalence and sensitivity of trigger points in lumbo-pelvic-hip muscles in patients with patellofemoral pain syndrome. J Bodyw Mov Ther. 2020 Jan;24(1):126-130. doi: 10.1016/j.jbmt.2019.10.012.
[5] Mujahid Z, Afzal W, Ahmad A, Gilani SA, Akram F, Ashiq A. Prevalence of patellofemoral pain disorder or anterior knee pain in both genders ages between 18-35. Rawal Medical J. 2019 Jan 1;44(1):86-8.
[6] Ameer T, Batool S, Tanvir A, Yousafzai MS. Frequency of Patellofemoral Pain in Female Athletes of Different Universities. Pak J Physical Therapy. 2021 Aug 14:22-6.
[7] Ali S, Sajjad SA, Niaz M, Rana AA, Waseem M. Prevalence of PFPSAmong Sports Sciences Students in Lahore. Pakistan Biomedical Journal. 2022 Jan 31;5(1): 154-9.doi.org/10.54393/pbmj.v5i1.281
[8] Hott A, Brox JI, Pripp AH, Juel NG, Paulsen G, Liavaag S. Effectiveness of Isolated Hip Exercise, Knee Exercise, or Free Physical Activity for Patellofemoral Pain: A Randomized Controlled Trial. Am J Sports Med. 2019 May;47(6):1312-1322. doi:10.1177/03635 465 19830644.
[9] Cui LH. Research progress on the etiology and treatment of patellofemoral pain syndrome. Zhongguo Gu Shang. 2017 Jul 1;30(7):680-4.
[10] Petersen W, Rembitzki I, Liebau C. Patellofemoral pain in athletes. Open Access J Sports Med. 2017 Jun 12; 8:143-154. doi: 10.2147/OAJSM.S133406
[11] Maclachlan LR, Collins NJ, Matthews MLG, Hodges PW, Vicenzino B. The psychological features of patellofemoral pain: a systematic review. Br J Sports Med. 2017 May;51(9):732-742. doi: 10.1136/bjsports-2016-096705.
[12] Vora M, Curry E, Chipman A, Matzkin E, Li X. PFPSin female athletes: A review of diagnoses, etiology and treatment options. Orthop Rev (Pavia). 2018 Feb 20;9(4):7281. doi: 10.4081/or.2017.7281.
[13] Bump JM, Lewis L. Patellofemoral Syndrome. InStatPearls [Internet] 2021 May 8. StatPearls Publishing.
[14] Panayiotou Charalambous C. Patellofemoral Pain Syndrome. The Knee Made Easy: Springer; 2022: 579-588.doi.org/10.1007/978-3-030-54506-2_40
[15] McNeilan RJ, Jones GL. Patellofemoral Pain Syndrome. In Orthopedic Surgery Clerkship; Springer, Cham;2017:343-345.doi.org/10.1007/978-3-319-52567-9_74
[16] Liew BXW, Abichandani D, De Nunzio AM. Individuals with PFPShave altered inter-leg force coordination. Gait Posture. 2020 Jun; 79:65-70. doi:10.1016/j.gaitpost.2020.04.006.
[17] Gaitonde DY, Ericksen A, Robbins RC. Patellofemoral pain syndrome. Am Fam Physician. 2019 Jan 15;99(2):88-94.
[18] Motealleh A, Kordi Yoosefinejad A, Ghoddosi M, Azhdari N, Pirouzi S. Trunk postural control during unstable sitting differs between patients with PFPSand healthy people: A cross-sectional study. Knee. 2019 Jan;26(1):26-32. doi: 10.1016/j.knee.2018.10.002
[19] AG Dean, KM Sullivan & Soe MM. Sample Size Estimation: Open Source Epidemiologic Statistics; 2021 [Available from: Open Source Epidemiologic Statistics].
[20] Collins NJ, Vicenzino B, van der Heijden RA, van Middelkoop M. Pain During Prolonged Sitting Is a Common Problem in Persons With Patellofemoral Pain. J Orthop Sports Phys Ther. 2016 Aug;46(8):658-63. doi: 10.2519/jospt.2016.6470.
[21] Leibbrandt DC, Louw Q. The development of an evidence-based clinical checklist for the diagnosis of anterior knee pain. S Afr J Physiother. 2017 Mar 31;73(1):353. doi: 10.4102/sajp.v73i1.353.
[22] Ndonye NA, Matara NJ, Muriithi IA. Predictors of work-related musculoskeletal disorders among primary school teachers in Machakos County, Kenya. Int. J. Prev. Med. 2019; 8(2):29-40.
[23] Daneshmandi H, Choobineh A, Ghaem H, Karimi M. Adverse Effects of Prolonged Sitting Behavior on the General Health of Office Workers. J Lifestyle Med. 2017 Jul;7(2):69-75. doi: 10.15280/jlm.2017.7.2.69.
[24] Baker R, Coenen P, Howie E, Williamson A, Straker L. The Short Term Musculoskeletal and Cognitive Effects of Prolonged Sitting During Office Computer Work. Int J Environ Res Public Health. 2018 Aug 7;15(8):1678. doi: 10.3390/ijerph15081678.
[25] Lee SH, Son C, Yeo S, Ha IH. Cross-sectional analysis of self-reported sedentary behaviors and chronic knee pain among South Korean adults over 50 years of age in KNHANES 2013-2015. BMC Public Health. 2019 Oct 26;19(1):1375. doi: 10.1186/s12889-019-7653-9.
[26] Kim SD. Association between sitting time and orthopedic conditions in Korean older adults. Geriatr Nurs. 2019 Nov-Dec;40(6):629-633. doi: 10.1016/j.gerinurse.2019.06.007.

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Original Article

Frequency of Gastrointestinal Diseases Diagnosed on Barium Contrast Studies

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ABSTRACT

Barium is a non-invasive, low-cost imaging technology. Gastrointestinal (GIT) symptoms are common and have significant economic and social implications. **Objective:** To determine the frequency of gastrointestinal diseases diagnosed on barium contrast studies. **Methods:** This research includes 125 participants suffering from Gastrointestinal Diseases. The research was carried out at a secondary care private sector hospital in Gujranwala, Pakistan. The information was gathered between January and April of 2022. All patients who were recommended for barium examinations and those who had never surgery before were included in the study. Images were obtained for research objectives immediately after barium was taken orally. SPSS version 20 was used to enter and evaluate data. **Results:** Out of 125 Patients about 62(49.6%) were male and 63(50.4%) were female. The age ranges from (13-88 years) with a mean age of 48 years. The patients diagnose on barium study shows 11(8.8%) gastric ulcer, 7(5.6%) patients Achalasia, 19(15.2%) Diverticula, 10(8.0%) esophageal stricture, 13(10.4%) esophagitis, 5(4.0%) GERD, 7(5.6%) pyloric stenosis, 5(4.0%) SMA syndrome, 2(1.6%) others, and 46(36.8%) patients had normal radiological findings. **Conclusion:** Barium studies are a sensitive and reliable approach to identifying gastrointestinal problems. The barium studies should reclaim their place as a primary diagnostic tool by complementing endoscopy to provide physicians with information regarding the nature of the lesion.

INTRODUCTION

Although a few diagnostic procedures are typically performed individually for patients with pharyngeal or esophageal symptoms, barium esophagography is a rare and inexpensive test that can compare swallowing function, esophageal, gastroesophageal reflux, and severity and structural irregularities all at the same time [1-3]. The gastrointestinal tract (GI), which travels from the mouth to the anus, suffers from gastrointestinal disorders. When a GI tract is tested, it looks normal, but it doesn't go well. This is called an active disease [4]. In the United States, it is estimated that 11% of the population suffers from chronic digestive disorders, with a rate of up to 35% for those 65 and older [5]. Upper gastrointestinal (GI) infections are more common in people aged 65 and over. The incidence of gastric and duodenal ulcers and their bleeding problems is increasing in adults worldwide [6]. Active dysphagia was a common throat problem between 3.2% and 1.2% of the frequency, respectively [7]. In medicine as a radiocontrast agent, barium sulphate is extensively utilized. Barium swallows are used to assess gastroesophageal congestion, barium food is used for antrum and duodenum testing, and barium follow-up is used for small intestine testing. There are three sorts of barium courses that may be done, each with its own setup adjustment [8]. After the initial examination, the cause of the vomiting may be unknown, and a barium diet test may be needed to confirm the diagnosis and allow treatment to begin without delay and dyspepsia [9,10]. A solid

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gastroscope was used for depression, did not provide a complete abdominal examination, and was not implanted in the duodenum, barium studies have remained undisputed as a major diagnostic procedure in the diagnosis of gastrointestinal disorders over the past 60 years [11]. A barium diet can be used to diagnose gastric ulcers [12]. The presence of small outpunching's (diverticula) in the muscle wall of your large intestine that forms in the weakest parts of the intestine is structural disorder diverticulosis. The sigmoid colon, the most pressurized part of the lower intestine, is the most common. Diverticular disease is most prevalent in Western countries, affecting 10% of those over the age of 40 and 50% of those over the age of 60. Gastroesophageal reflux disease (GERD) is a chronic disorder that comprises symptoms and mucosal ulcers caused by the retrograde movement of esophageal material in esophageal dyspepsia. A barium enema is a diagnostic procedure that uses X-rays to diagnose abnormalities in the colon and rectum. Unique barium-containing highlights reveal the structure of the colon and rectum to show a clear view of the X-ray image. Dysphagia is a symptom of esophageal stricture, which is a constriction of the esophagus lumen. Patients frequently report it as swallowing difficulties. The majority of esophageal strictures are caused by peptic stricture as a result of long-term GERD, accounting for 70%-80% of ad1lt cases. The most prevalent cause of esophageal stricture development in the elderly and young children is the ingestion of caustic chemicals. when the oesophagus mucosa exposed the stomach contents.For diagnosing esophageal stricture, barium contrast swallows were reported to have 95% sensitivity. To avoid complications for patients with esophageal stricture, it's important to diagnose it early. With partial or full esophageal blockage A barium meal can be used to diagnose a stomach ulcer. This is a painless and risk-free procedure [12].In the general population, peptic ulcer disease is estimated to affect 5% to 10% of people at some point in their lives [13, 14]. Endoscopy is not necessary to rule out a malignancy when a stricture is clearly visible on radiography. In the assessment of individuals with dysphagia and heartburn symptoms [15]. A barium swallow is used to test the gastroesophageal junction, a barium meal is used to check the antrum and duodenum, and a barium follow-up is used to assess the small bowel [15,10]. The decision between single and double-contrast barium tests is based on the patient's indication. For the barium meal, double-contrast barium tests were done, but for the barium meal follow-up, single contrast barium studies were performed. A double-contrast barium enema is a useful tool for detecting and morphologically defining polyps in the colon [16]. The esophagus or gastric cardia can cause esophageal dysphagia. It can be caused by structural issues including strictures and webs, as well as motility abnormalities such as achalasia. Compared to endoscopy, radiological assessment of dysphagia offers several advantages, including the capacity to evaluate both structural and motility abnormalities. Unless mucosal damage is evident [17]. Oral barium administration is also beneficial in the diagnosis of small intestine volvulus. A complete obstruction is usually appropriately recognized, indicating the proper treatment, which is almost always early surgical intervention in nearly all cases. However, if barium emulsion enters the peritoneal cavity, this is a cause for concern [18].

METHODS

This research included 125 participants suffering from Gastrointestinal Diseases..The study was conducted at the secondary care private sector hospital of Gujranwala, Pakistan. The data were collected between January 2022 and April 2022. The data included all patients advised for barium studies and the patients with no prior surgery. Images were collected for research purposes shortly after the oral administration of barium. Images taken shortly after the Barium examination indicated a significant pathological condition. Radiography equipment and an x-ray machine are used to obtain GIT radiographs. A double-contrast barium meal is a type of contrast radiography that involves taking x-rays of the esophagus and stomach with two different types of contrast to make the structures easier to see. In the mouth, a solution containing barium (a radiocontrast) was swallowed. A small layer of high-density barium was applied to the surface, and the hollow portion distended with gas. Radiographs were obtained in AP and Lateral Positions. Data were entered and analyzed on SPSS version 20.0.

RESULTS

Table 1 explains that the study comprised 125 patients with an average age of 48.3 years. (Age range: 13-88 years).

Age of the patients	Minimum	Maximum	Mean+SD
Yrs	13.00	88.00	48.3120+15.8

Table 1: Age of patients

Among these, 62 (49.6%) were male and 63 (50.4%) were female, Table 2.

Gender of the patients	Frequency	Percent
Female	63	50.4
Male	62	49.6
Total	125	100.0

Table 2: Gender of the patients

Table 2 explains multiple signs and symptoms observed in patients are dyspepsia 81(31.9%), vomiting 67(26.4%), weight loss 21(8.3%), dysphagia 34(13.4%), painful

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swallowing 21(8.3%), and heartburn 30(11.8%).

Signs and symptoms	Frequency	Percent
Dyspepsia	81	31.9
Vomitting	67	26.4
Weight loss	21	8.3
Dysphagia	34	13.4
Painful swallowing	21	8.3
Heart burn	30	11.8
Total	254	100.0

Table 3: Signs and symptoms of the patients

Table 3 illustrate the types of studies carried out having a frequency of Barium Swallow in 101(80.8%), barium meal and follow through 9(7.2%), barium enema 10(8.0%), and distal lopogram 5(4.0%). Findings of gastrointestinal barium studies includes normal 46(36.8%),

Type of barium study	Frequency	Percent
Barium swallow	101	80.8
Barium meal and follow-through	9	7.2
Barium enema	10	8.0
Distal loopogram	5	4.0
Total	125	100.0

Table 4: Type of barium study

Achalasia 7(5.6%), diverticula 19(15.2%), esophageal stricture 10(8.0%), esophagitis 13(10.4%), gastric ulcer 11(8.8%), GERD 5(4.0%), pyloric stenosis 7(5.6%), SMA syndrome 5(4.0%), and others 2(1.6%) as explained in Table 4.

Age of the patients	Minimum	Mean+SD
Normal	46	36.8
Achalasia	7	5.6
Diverticula	19	15.2
Esophageal stricture	10	8.0
Esophagitis	13	10.4
Gastric ulcer	11	8.8
GERD (gastro esopheagel reflux disease)	5	4.0
Pyloric stenosis	7	5.6
Superior mesenteric artery syndrome	5	4.0
Others	2	1.6
Total	125	100.0

Table 5: Findings of gastrointestinal barium studies

DISCUSSION

The double-contrast upper gastrointestinal series is a medically and financially sound alternative to endoscopy for examining patients with dyspepsia or other gastrointestinal symptoms who have not responded to an empirical trial of medicinal treatment [19]. Most clinically relevant abnormalities in the upper gastrointestinal tract may be detected with contrast imaging. Barium swallow exams, according to a group of researchers, enable for the early detection of numerous illnesses such as gastric or esophageal disease [20, 21]. As a result, the barium sulfate-coated region on the x-ray film will appear white. Colon blockage or possible gastrointestinal tract perforation are contraindications to barium. Barium has no obvious negative effects [10]. According to a study by Vincent et al, double-contrast barium is a reliable approach for diagnosing gastrointestinal problems, with a sensitivity of 99% [22]. On barium scans, the intramural changes are visible. On barium meal, duodenal cap cicatrization is clearly visible. H. pylori eradication from the stomach and duodenum eliminates gastritis and duodenitis and significantly minimizes ulcer recurrence. In three methods, barium contrast tests may be utilized to illustrate the GIT. Mucosal films are created by introducing a little amount of barium into the folds of the mucosa in a collapsed viscous. These images are very useful for revealing fold abnormalities in the conditions. After the viscous has been distended with barium, barium-filled images are obtained. These views are very useful for highlighting contour anomalies, rigidity, and filing irregularities [9]. Standardization is required for relatively precise barium sulfate suspension mixing. Perforations have increased due to the increased usage of gastrointestinal fibreoptic endoscopy [24]. Esophageal perforations are four times more prevalent than gastric or duodenal perforations, and they can happen during diagnostic and therapeutic endoscopic procedures [9]. The Findings of current gastrointestinal barium studies includes normal 46(36.8%), Achalasia 7(5.6%), diverticula19 (15.2%), esophagealstricture 10(8.0%), esophagitis13(10.4%) gastric ulcer 11(8.8%), GERD 5(4.0%), pyloric stenosis 7(5.6%), SMA syndrome 5(4.0%), and others2(1.6%). David J. Ott and David W. Gelfand conducted retrospective research in North Carolina. On barium examination of the esophagus, they looked at 80 individuals who had an esophageal stricture. There were 35 ladies and 45 men in the group, with ages ranging from 24 to 84. Overall, 76 out of 80 strictures were radiographically identified with a sensitivity of 95 percent. Seventy-seven of the 76 strictures found were of the short type (75 percent). The sensitivity of a well performed barium esophagogram is comparable to that of endoscopy in detecting esophageal stricture [25]. A study conducted by Muhammad Nawaz and Muhammad Jehanzaib in 2008 in Peshawar, Pakistan conducted a descriptive study. The study comprised 115 individuals with peptic ulcer disease symptoms who were randomly assigned to this diagnostic approach. To establish whether the peptic ulcer was malignant or cancerous, barium diet tests were utilized. Endoscopy and/or surgery were used to confirm the diagnosis in all of these individuals. According to the findings, 80 of the 115 patients are male and 35 are female. Their ages varied from 27 to 75 years old. There were 52 people with duodenal

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ulcers, 30 with gastric ulcers, and 33 with normal radiological effects. Radiological evidence of malignant ulcers was found in 6 out of 30 patients with gastric ulcers. It has been concluded that the effectiveness of Barium diet tests in the diagnosis of peptic ulcers is good, and this method can diagnose most peptic ulcers [14].

CONCLUSIONS

Barium studies are a sensitive and reliable approach to identifying gastrointestinal problems. The barium studies should reclaim their place as a primary diagnostic tool by complementing endoscopy by provide physicians with information regarding the nature of the lesion. For acid peptic conditions, barium studies, particularly barium meal, are an excellent screening and diagnostic approach.

REFERENCES

[1] Skandalakis JE, Skandalakis LJ, Skandalakis PN. Esophagus. Surgical Anatomy and Technique: Springer; 2000 Jan;71(8):954-71.doi.org/10.1007/978-1-4615-7993-9-6.

[2] Ellis H. Anatomy of the stomach. Surgery (Oxford). 2011 Nov;29(11):541-543. doi.org/1 0.1016/j. mpsur.2011.08.003

[3] Orzech N, Navarro OM, Langer JC. Is ultrasonography a good screening test for intestinal malrotation?. Journal of pediatric surgery. 2006 May 1;41(5):1005-9. doi.org/10.1016/j.jpedsurg.2005.12.070

[4] Levine MS, Rubesin SE, Laufer I. Barium esophagography: a study for all seasons. Clinical Gastroenterology and Hepatology. 2008 Jan;6(1):11-25. doi.org/10.1016/j.cgh.2007.10.029

[5] Smith E. Epidemiology of gastrointestinal disorders. Canadian Family Physician. 1978;24:1007. doi.org/10.1016/S0016-5107(78)73511-X

[6] Parkman HP, Doma S. The importance of gastrointestinal motility disorders. Practical gastroenterology. 2006 Sep;30(9):23.

[7] Sperber AD, Bangdiwala SI, Drossman DA, Ghoshal UC, Simren M, Tack J, et al. Worldwide prevalence and burden of functional gastrointestinal disorders, results of Rome Foundation global study. Gastroenterology. 2021 Jan;160(1):99-114. E3.doi.org/10.1053/j.gastro.2020.04.014

[8] Kupershmidt M, Varma D. Radiological tests in investigations of atypical chest pain. Australian family physician. 2006 May;35(5).

[9] Bhatti MA, Rahim A, Sardar S, Siddiqui MA, Khan MM. Efficacy of Double Contrast Barium Meal Examination in Diagnosis of Acid Peptic Diseases. Pakistan Journal Of Medical & Health Sciences. 2018 Jul;12(3):1182-1185.

[10] Debi U, Kumar I, Sharma V, Sinha A, Singh L, Kishor K, et al. Role of barium study in various gastric malignancies. Trop Gastroenterol. 2019;40(1):246-255.

[11] Kempenich JW, Sirinek KR. Acid peptic disease. Surgical Clinics. 2018 Oct;98(5):933-944.

[12] Nawaz M, Jehanzaib M, Khan K, Zari M. Role of barium meal examination in diagnosis of peptic ulcer. J Ayub Med Coll Abbottabad. 2008 Dec;20(4):59-61.

[13] Xie X, Ren K, Zhou Z, Dang C, Zhang H et al. The global, regional and national burden of peptic ulcer disease from 1990 to 2019: a population-based study. BMC gastroenterology. 2022 Dec;22(1):1-13.doi.org/10.1186/s12876-022-02130-2

[14] Gupta S, Levine MS, Rubesin SE, Katzka DA, Laufer I et al. Usefulness of barium studies for differentiating benign and malignant strictures of the esophagus. American Journal of Roentgenology. 2003 Mar;180(3):737-744. doi.org/10.22 14/ajr.180. 3.1800737

[15] Nin CS, Marchiori E, Irion KL, Paludo ado, Alves GRT, Hochhegger DR, et al. Barium swallow study in routine clinical practice: a prospective study in patients with chronic cough. Jornal Brasileiro de Pneumologia. 2013 Jun;39:686-691. doi.org/10.1590/S1806-37132013000600007

[16] Peyvasteh M, Askarpour S, Ostadian N, Moghimi MR, Javaherizadeh H. Diagnostic accuracy of barium enema findings in Hirschsprung's disease. ABCD Arquivos Brasileiros de Cirurgia Digestiva (São Paulo). 2016 Jul;29:155-158. doi.org/10.1590/0102-6720201600030007

[17] Falk GW. Role of barium esophagography in evaluating dysphagia. Cleveland Clinic journal of medicine. 2009 Feb;76(2):105.

[18] Rosman AS, Korsten MA. Meta-analysis comparing CT colonography, air contrast barium enema, and colonoscopy. The American journal of medicine. 2007 Mar;120(3):203-210. e4. doi.org /10.1016 /j.amjmed.2006.05.061

[19] Lingala S, Moore A, Kadire S, Shankar S, Das K, Howden CW.Unusual presentation of duodenal ulcer presenting with duodenal intussusception. ACG Case Reports Journal. 2018;5 5: e25. doi: 10.14309/crj.2018.25

[20] Kahrilas PJ, Kim HC, Pandolfino JE et al. Approaches to the diagnosis and grading of hiatal hernia. Best practice & research Clinical gastroenterology. 2008 Aug;22(4):601-616. doi.org/10.1016/j.bpg.2007.12.007

[21] 21.Soila P, Palmgren O, Thomander K. The value of barium filling of the oesophagus in radiophotography (rp) of the chest. Acta tuberculosea et pneumologica Scandinavica. 1964;45:1-13.

DOI: https://doi.org/10.54393/pbmj.v5i5.511

[22] Levine MS. Ten questions about barium esophagography and dysphagia. Gastroenterology Clinics. 2018 Sep;47(3):449-473. doi.org/10.1 016/j.gtc.2018.04.001
[23] Conteduca V, Sansonno D, Lauletta G, Russi S, Ingravallo G, Dammacco F. H. pylori infection and gastric cancer: state of the art. International journal of oncology. 2013 Jan;42(1):5-18. doi.org/10.3892/ijo.2012.1701
[24] Sagawa T, Kakizaki S, Iizuka H, Onozato Y, Sohara N, Okamura S, et al. Analysis of colonoscopic perforations at a local clinic and a tertiary hospital. World Journal of Gastroenterology: WJG. 2012 Sep;18(35):4898. doi: 10.3748/wjg.v18.i35.4898
[25] Ishihara R. Prevention of esophageal stricture after endoscopic resection. DigestiveEndoscopy. 2019 Mar;31(2):134-145.

DOI:https://doi.org/10.54393/pbmj.v5i5.437

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Original Article

Spectrum of Aplastic Anaemia: Presentation, Etiology and Overall Survival-A Tertiary Care Hospital Experience

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ABSTRACT

Aplastic Anemia (AA) is a hematological disorder with immune pathophysiology. There is a decrease in bone marrow precursors and cellularity which lead to a peripheral decline in at least two cell lines. The incidence of AA is higher in the Asian population as compared to that in the west. **Objective:** To highlight the disease spectrum of aplastic anemia patients from the clinical presentation and etiological factors to the disease outcome and overall survival. **Methods:** It was a descriptive cross-sectional study. The study was conducted at Hematology Department King Edward Medical University from March 2017 to March 2020.All the patients of both genders, diagnosed with AA on peripheral smear and bone marrow trephine biopsy findings were included and those with inherited AA, Myelodysplastic syndrome (MDS), acute leukemias and myelofibrosis were excluded from the study. After taking consent of university review board, all the data including personal information, detailed past history for risk factors, drug history, medical history, physical examination, investigations, performance score, treatment details and outcome of included patients were obtained using self-designed questionnaires for individual patient. The patients were followed up, the results were recorded and data was analyzed using SPSS V22. **Results:** The study included total 91 patients of AA out of which 46(50.5%) were males, 45(49.5%) were females. The peak incidence was seen in the age range 15-30 years. The patients were divided into three groups according to the severity of which moderate aplastic anemia was present in 19(20.9%) patients, severe AA was seen in 42(46.2%) patients and very severe AA was seen in 30(33%) patients. The etiological factors seen included idiopathic 61.5%, hakim medication 14.3%, infections 12% drugs 9.8% and radiation exposure 2.1%. It was observed that the patients with severe AA presented with high ECOG score. Total 59 patients died in one year causing mortality rate of 64.8%. Highest mortality rate was seen in very severe AA **Conclusions:** Aplastic anemia has life detrimental outcome with high mortality rate if left untreated can be provided to the patients since it is one of the high incidences hematological disorder in Asian population.

INTRODUCTION

Aplastic Anemia is approximately 1-1.5 % higher in Southeast Asia. It is ranked 2nd in prevalence in hematological disorders in Pakistan [1,2]. An immune mechanism is considered as the underlying mechanism for the development of AA in most idiopathic cases. Involvement of T-lymphocytes has been suggested due to the overexpression of HLA DR 2 in the diagnosed patients. This implies the role of immunosuppressants in the treatment of aplastic anemia. In other cases, factors attributing to the disease include drugs mainly sulphonamides, chloramphenicol, penicillin, carbamazepine, allopurinol, pesticide, and radiation exposure [3,4]. Hepatitis-associated AA follows acute illness by virus. The symptoms of the disease are attributed to the decrease in the cell lines. These include bleeding, pallor, generalized fatigue, dyspnea, fever, recurrent infections, epistaxis, bruises over the body, and so on [5,6]. On the basis of severity, AA is divided into three categories. Non-severe disease has neutrophil count < 1.5×109/L, platelet count <100×109/L and hemoglobin < 10 g/dL. The severe disease includes two of three blood counts of an absolute neutrophil count < 0.5×10 9 /L, platelet count <

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20×10 9 /L, and reticulocytes <1% whereas very severe disease has extreme neutropenia (<0.2×10 9 /L) [7]. AA affects Asians 2 to 3 times more than persons in other parts of the world [8]. For successful treatment of AA, early diagnosis and treatment, as well as long-term monitoring, are critical [9]. In a developing country like Pakistan, the prevalence of AA is much higher as compared to developed countries. Unfortunately, few definitive studies are conducted here to find the association of etiological factors. This study has highlighted the disease spectrum of AA patients from the clinical presentation to the disease outcome and overall survival. It aims at finding the various etiological factors which may influence or contribute to the development of AA.

METHODS

It was a descriptive cross-sectional study conducted at Hematology Department King Edward Medical University from March 2017 to March 2020. All the patients of both genders, diagnosed with AA on peripheral smear and bone marrow trephine biopsy findings were included in our study. To diagnose AA, Camitta and modified Camitta criteria for severe AA [7] were followed which include: 1. Absolute neutrophil count (ANC) < 500/UL, 2. Platelet count <20,000/UL 3. Retic count < 1% corrected or < 20,000 cell /UL. 4. Bone marrow cellularity < 25% according to age. The patients with suspected inherited aplastic anemia on the basis of clinical criteria and laboratory investigations were excluded from the study. Similarly, patients who had Myelodysplastic syndrome (MDS), acute leukemias and myelofibrosis were excluded from the study by observing parameters like dysplasia in all three cell lineages, blast percentage, pearls iron test and trichrome reticulin stain. After taking consent of University review board, all the data including personal information, detailed past history for risk factors, drug history, medical history, physical examination, investigations, performance score, treatment details and outcome of included patients were obtained using self-designed questionnaires for individual patient. The CBC and peripheral smear findings including hemoglobin levels, ANC, platelet and retic count and bone marrow biopsy findings were obtained. Bone marrow aspirate and trephine biopsy were examined by two expert hematologists on two different occasions to exclude observational bias. Findings including morphology, cellularity and architecture of bone marrow were observed. Immunohistochemistry was done to exclude the presence of any other disease. The standard treatment as per the institute's policy was started with cyclosporin and ATG, depending upon the availability. Supportive treatment was given to the patients as per requirement. The patients were followed up, the results were recorded and data was analyzed using SPSS V22. Descriptive analysis was done for categorical variables like age, gender using mean SD. Continuous variables were assessed using percentages. ECOG score was calculated and presented in the form of graph and Kaplan meirre survival curve was obtained to look for overall survival.

RESULTS

The study included total 91 patients of AA out of which 46(50.5%) were males, 45(49.5%) were females with male to female ratio 1.02:1. The mean age of all patients was calculated to be 30 years SD 17 years and median was 21 years. The mean age for male and female patients was 25 +/- 16 years and 22 +/- 11.2 years respectively. The peak incidence was seen in the age range 15-30 years. The patients were divided into three groups according to the severity of aplastic anemia in which moderate aplastic anemia was present in 19 (20.9%) patients, severe AA was seen in 42 (46.2%) patients and very severe aplastic anemia was seen in 30 (33%) patients. The distribution of severity of aplastic anemia and age groups is described in table 1. The clinical presentation, examination findings and laboratory investigations of all patients are summarized in Table 2.

Aplastic anemia	Age groups			Total N%
	1-15 years, N%	15-30 years, N%	>30 years, N%	
Moderate (MAA)	06 (20%)	13 (28.3%)	None	19(20.9%)
Severe (SAA)	16 (53.3%)	23 (50%)	03 (20%)	42 (46.2%)
Very severe (VSAA)	08 (26.7%)	10 (21.7%)	12 (80%)	30(33%)
Total	30 (33%)	46(50.5%)	15(16.5%)	

Table 1: Patients of Aplastic Anemia according to Age groups and Severity.

Variables	Present (n)	%
Presenting features		
Fever	60	65.9%
Bleeding (Bruises, petechia, epistaxis)	51	56%
Fatigue/lethargy	45	49.5%
Infection	41	45.1%
Clinical examination		
Pallor	59	64.8%
Bruises/petechia	33	36.3%
Shortness of breath	31	34.1%
Bleeding (nose, gums etc.)	12	13.2%
Etiological factors		
Antibiotics	05	5.5%
Antimalarial	01	1.1%
Idiosyncratic drugs	03	3.2%
Hakeem Medication intake	13	14.3%
Radiation exposure	02	2.1%
HBV	7	7.7%
HCV	3	3.2%
HIV	1	1.1%
Cause not found	56	61.5%
Hematological parameters	Mean	

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HB g/dl	6.22	±0.86
ANC (x 109/L)	0.56	±0.35
Platelet count (x 109/L)	60.4	±25.4
Reticulocyte count (%)	0.04	

Table 2: Clinical presentation, examination findings and laboratory investigations of all patients

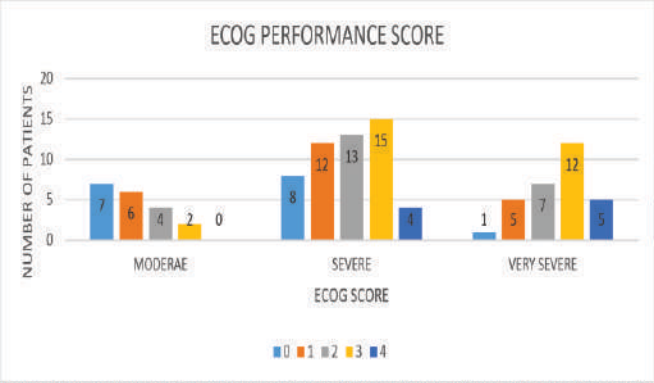

Figure 1: ECOG Performance Scale

The etiological factors were studied as causative factors of acquired aplastic anemia by asking detailed history from patients, duration of infection medication and exposure to causative agents. ECOG performance score was calculated for each patient at presentation, Figure 1. It was observed that the patients with severe aplastic anemia presented with high ECOG score as compared to moderate aplastic anemia patients who presented with lower ECOG score. The drugs taken by patients included penicillin, sulphonamides, antibiotics and allopurinol. Hakeem medication intake was also seen in 13 patients. Viral serology for hepatitis B and C virus infections was positive in 7 and 3 patients respectively, and one patient was diagnosed with HIV with ongoing antiviral therapy (HAART). No other etiological cause was seen in rest of the patients.

Variables		Outcome							
		Death		Spontaneous Remission		Remission		Relapse	
		Count	N %	Count	N %	Count	N %	Count	N %
Age group (years)	1-15	21	70.0	4	13.3	4	13.3	1	3.3
	15-30	25	54.3	6	13.0	12	26.1	3	6.5
	>30	14	93.3	1	6.7	0	0.0	0	0.0
Severity	Moderate	2	10.5	5	26.3	11	57.9	1	5.3
	Severe	29	69.0	5	11.9	5	11.9	3	7.1
	Very severe	29	96.7	1	3.3	0	0.0	0	0.0
Etiology	Drugs	2	22.2	2	22.2	5	55.6	0	0.0
	Infection	8	72.7	1	9.1	1	9.1	1	9.1
	Radiation	2	100.0	0	0.0	0	0.0	0	0.0
	Hakeem medication	9	69.2	1	7.7	2	15.4	1	7.7
	Cause not established	39	69.6	7	12.5	8	14.3	2	3.6

Table 3: Mortality rate of aplastic anemia studied with different parameters including age and severities of the disease

The treatment was given to patients according to institutional policy that included cyclosporin, ATG, MMF, Immunosuppressive therapy, anabolic steroids and supportive therapy according to the condition of the patients and criteria for remission and relapse was followed [10]. Only one of the patients underwent HSCT. Total 59 patients died causing a mortality rate of 64.8% in one-year follow-up. The mortality rate of aplastic anemia was studied with different parameters including age and severities of the disease are depicted in table 3. Highest mortality rate was seen in very severe aplastic anemia patients in which 29 out of 30 (96.7%) patients died even after aggressive treatment followed by severe aplastic anemia in which mortality rate was 69% (29 out of 42). Spontaneous remission criteria were achieved in 11 (12.1%) patients in whom complete hematological remission was achieved in average 3 months. However, in total complete remission was seen in 16 (17.6%) patients out of whom 4 patients relapsed. Around 12 patients were lost to follow up. Out of all the patients with remission, drugs and hepatitis virus infection were the main etiological factors. The Kaplan meiere survival curve was obtained for the included patients and was analyzed according to the severity of the disease Figure 2. The median time of death for patients with 12 weeks for very severe aplastic anemia, 26 weeks for sever aplastic anemia and 38 weeks for moderate aplastic anemia respectively.

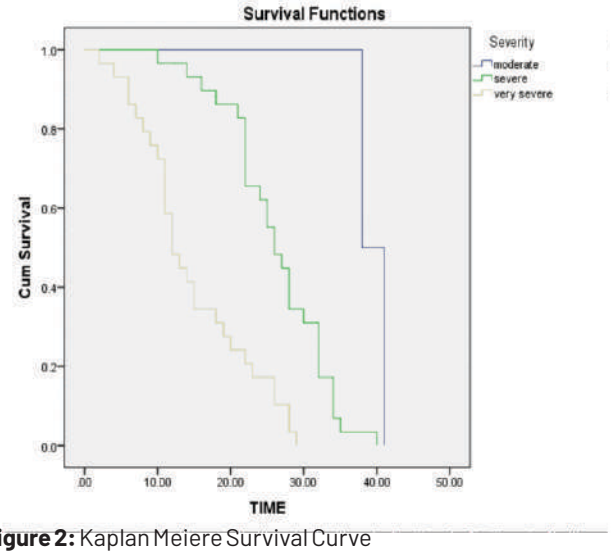

Figure 2: Kaplan Meiere Survival Curve

DISCUSSION

It was a cross sectional study conducted in the Hematology department Mayo Hospital, Lahore. The epidemiological data reveals that the disease is more prevalent in this area with male to female ratio 1.02:1. The male preponderance was also seen in a study conducted in India by Mahapatra et al., [11]. Recently in Pakistan a study of AA by Pervaiz Ahmed et al., was done, that depicted a high male to female ratio [12]. The mean age of all patients was calculated to be 30 years with a peak incidence seen among 15-30 years. The disease is reported in 5 individuals above the age of 60 years. The results were similar to a study by Parvez et al., [2]. The patients were divided into three groups according to the severity of aplastic anemia in which moderate aplastic anemia or non-severe aplastic anemia was

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present in 16 (17.5%) patients, severe aplastic anemia was seen in 48 (52.7%) patients and very severe aplastic anemia was seen in 27 (29.6%) patients in accordance to the study which showed the percentage of SAA is highest 45.2% in population of Pakistan. Several etiological factors in the development of acquired AA have been described in literature review. Most commonly chemicals including pesticide, infections and medical drugs are related with AA. In majority of the patients included in our study, the cause of aplastic anemia was undetermined. Idiopathic aplastic anemia is most likely due to immune activation leading bone marrow destruction. Hakeem medication and infections are among the most common causes found in our patients. Hepatitis B and C are very common in our region. The strongest association of aplastic anemia is seen with hepatitis B virus. The quackery and hakeem medication are still being taken in the suburban and rural areas of Pakistan. The major components of these medication are heavy metals and steroids. Out of 91 patients 13 patients had a history of taking hakeem medication for more than 6 months. Other drugs including antibacterial, antiepileptics, antimalarials or idiopathic drugs were taken by patients presented to us. Idiopathic causes were described as the most common etiological causes in development of aplastic anemia in various studies. Also, hepatitis B and C are considered to be responsible for 5 to 10% of AA cases [13]. Radiation exposure has also been linked to AA and in our study a total 3 patients had a history of radiation exposure. Two of the patients were working as technologist in radiology department. However, the dose and exact duration could not be determined. Exposure to ionizing radiation has been related to disruption of bone marrow architecture. Furthermore, there is a lack of awareness and following of protocols as depicted by studies conducted in Korea and Saudi Arabia [14,15]. The mortality rate is quite high when compared to the western countries. It can be attributed to multiple problems in third world countries like poverty, illiteracy, lost to follow up or lack of medical facilities. Definitive treatment with steroids and cyclosporine was taken by 5 (5%) patients of which 2 presented with very severe disease and died in first few days of treatment. Only one patient had bone marrow transplant done from CMH Rawalpindi and was living a healthy life till death. The highest mortality was seen in the patients who presented with very severe disease. Only one patient with VSAA showed spontaneous remission in our study, similar findings were seen in a study conducted in Agha Khan Hospital in Pakistan [16]. Medical drugs are considered important etiological factors in the development of AA and produce their effects by mediating immune response or generating a toxic reaction [17]. Drug induced AA has been described in nine patients in our study. However, the duration of medication varied among the patients. Treatment of aplastic anemia is indeed a challenge in developing countries. There is a delay in diagnosis and treatment. HSCT has better outcome as compared to immunosuppressive therapy with cyclosporin and ATG, but HSCT has certain limitation and cannot be done in every AA patient [18]. Similarly, a study done in India in 2015 by M Mahapatra described the treatment responses of the AA patients. According to their study, the response of cyclosporin alone and cyclosporin with androgen were 32.2% and 45.5% respectively. However, the rates of bone marrow transplant were better [19,20]. In our study only one patient underwent bone marrow transplant unfortunately. The low socioeconomic status and lack of medical facilities are the major reasons behind this. Furthermore, the established transplant units are also lacking, rendering these rather unapproachable to common people.

CONCLUSION

Aplastic anemia has life detrimental outcome with high mortality rate if left untreated. It is difficult to define the etiology of the disease especially when it comes to molecular levels. However, the management step is even more crucial for developing countries like Pakistan. There is a need to raise awareness on a larger platform so that better treatment facilities can be provided to the patients since it is one of the high incidences hematological disorder in Asian population

REFERENCES

[1] Găman A, Găman G, Bold A. Acquired aplastic anemia: correlation between etiology, pathophysiology, bone marrow histology and prognosis factors. Romanian Journal of Morphology and Embryology 2009;50(4):669-74.

[2] Akram Z, Ahmed P, Kajigaya S, Satti TM, Satti HS, Chaudhary QUN et al. Epidemiological, clinical and genetic characterization of aplastic anemia patients in Pakistan. Annals of hematology 2019 Feb;98(2):301-312. doi: 10.1007/s00277-018-3542-z.

[3] Brodsky RA, Jones RJ. Aplastic anaemia. Lancet. 2005 May 7-13;365(9471):1647-56. doi: 10.1016/S0140-6736(05)66515-4.

[4] Vaht K, Göransson M, Carlson K, Isaksson C, Lenhoff S, Sandstedt A etal. Incidence and outcome of acquired aplastic anemia: real-world data from patients diagnosed in Sweden from 2000-2011. Haematologica. 2017 Oct;102(10):1683-1690. doi: 10.3324/haematol.2017.169862.

[5] Riaz Shah SA, Idrees M, Hussain A. Hepatitis G virus associated aplastic anemia: a recent case from

DOI:https://doi.org/10.54393/pbmj.v5i5.437

Pakistan. Virology journal 2011 Jan 21; 8:30. doi: 10.1186/1743-422X-8-30.

[6] Shallis RM, Ahmad R, Zeidan AM. Aplastic anemia: Etiology, molecular pathogenesis, and emerging concepts. European journal of haematology. 2018 Dec;101(6):711-720. doi: 10.1111/ejh.13153.

[7] Camitta BM, Storb R, Thomas ED. Aplastic anemia (first of two parts): pathogenesis, diagnosis, treatment, and prognosis. The New England journal of medicine. 1982 Mar 18;306(11):645-52. doi: 10.1056/NEJM198203183061105.

[8] Taj M, Shah T, Aslam SK, Zaheer S, Nawab F, Shaheen S et al. Environmental determinants of aplastic anemia in Pakistan: a case-control study. Z Gesundh Wiss. 2016;24(5):453-460. doi: 10.1007/s10389-016-0743-6.

[9] Scheinberg P, Young NS. How I treat acquired aplastic anemia. Blood, The Journal of the American Society of Hematology. 2012 Aug 9;120(6):1185-96. doi.org/10.1182/blood-2016-08-693481.

[10] Brodsky RA, Jones RJ. Acquired aplastic anemia. In The Autoimmune Diseases 2014 Jan 1: 685-694.

[11] 11. Mahapatra M, Singh PK, Agarwal M, Prabhu M, Mishra P, Seth T et al. Epidemiology, Clinico-Haematological Profile and Management of Aplastic Anaemia: AIIMS Experience. J Assoc Physicians India. The Journal of the Association of Physicians of India. 2015 Mar;63(3 Suppl):30-5.

[12] Ahmed P, Chaudhry QUN, Satti TM, Mahmood SK, Ghafoor T, Shahbaz N et al. Epidemiology of aplastic anemia: a study of 1324 cases. Hematology. 2020 Dec;25(1):48-54. doi: 10.1080/16078454.2019.1711344.

[13] Moore CA, Krishnan K. Aplastic Anemia. 2021 Jul 21. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2022 Jan.

[14] Green DE, Rubin CT. Consequences of irradiation on bone and marrow phenotypes, and its relation to disruption of hematopoietic precursors. Bone. 2014 Jun; 63:87-94. doi: 10.1016/j.bone.2014.02.018.

[15] 15.Salama KF, AlObireed A, AlBagawi M, AlSufayan Y, AlSerheed M. Assessment of occupational radiation exposure among medical staff in health-care facilities in the Eastern Province, Kingdom of Saudi Arabia. Indian Journal of Occupational and Environmental Medicine 2016 Jan-Apr;20(1):21-5. doi: 10.4103/0019-5278.183832.

[16] Chaudhry QUN, Ahmed P, Satti TM, Mahmood SK, Ghafoor T, Shahbaz N et al. Epidemiology of aplastic anemia: a study of 1324 cases. Hematology. 2020 Dec;25(1):48-54. doi: 10.1080/16078454.2019.1711344.

[17] Al Qahtani SA. Drug-induced megaloblastic, aplastic, and hemolytic anemias: current concepts of pathophysiology and treatment. International Journal of Clinical and Experimental Medicine 2018 Jan 1;11(6):5501-12.

[18] Young NS, Scheinberg P, Calado RT. Aplastic anemia. Current Opinion in Hematology 2008 May;15(3):162-8. doi: 10.1097/MOH.0b013e3282fa7470.

[19] Mahapatra M, Singh PK, Agarwal M, Prabhu M, Mishra P, Seth T et al. Epidemiology, Clinico-Haematological Profile and Management of Aplastic Anaemia: AIIMS Experience. The Journal of the Association of Physicians of India.2015 Mar;63(3 Suppl):30-5.

[20] Song L, Peng GX, Wu ZJ, Zhang L, Jing LP, Zhou K et al. Treatment of transfusion-dependent nonsevere aplastic anemia with cyclosporine A plus ATG/ALG versus cyclosporine A plus androgen: a retrospective single center study. Zhonghua xue ye xue za zhi= Zhonghua Xueyexue Zazhi. 2016 Nov 1;37(11):946-51. doi: 10.3760/cma.j.issn.0253-2727.2016.11.004.

DOI:https://doi.org/10.54393/pbmj.v5i5.416

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Systamatic Review

Knee Osteoarthritis: A Systematic Review on Different Exercise Therapy Interventions on Knee Adduction Movement

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ABSTRACT

Exercise therapy can be part of a conservative treatment plan for knee osteoarthritis. Knee adduction moments (KAMs) are thought to be reduced with exercise therapy. A large study looked at exercise therapy's effect on KAM and other physical factors in persons with knee osteoarthritis. **Methods:** Searches were performed on the following electronic databases: MEDLINE, Google Scholar, Cochrane Central, EMBASE, and OpenGrey. Study participants with knee osteoarthritis undergoing structured exercise therapy were randomized controlled trials. For every study, we conducted independent analyses to extract data and analyze the bias risks. We calculated the mean differences and 95% confidence intervals for each outcome. **Results:** In the three studies that involved 233 participants, there were no significant differences in KAMs between intervention and control groups. Two of the studies observed improvements in physical function after exercise therapy and one of them demonstrated significant reductions in pain. All three trials favor the intervention group in terms of muscle strength and torque. **Conclusions:** A change in knee adduction time was not associated with the therapeutic benefits of exercise therapy. Exercise therapy for knee osteoarthritis may not be effective if there is no momentary adduction. Dynamic joint loading may result from a shift in neuromuscular control after exercise therapy.

INTRODUCTION

The most common clinical presentations include pain, stiffness, and reduced physical ability, resulting in disability and activity limitations. Recent research has looked at the involvement of biomechanical factors in the development and progression of KOA [1]. When a person has KOA, the KAM is used more commonly as a replacement for the medial tibiofemoral contact force, reflecting the relative force distribution across the joint. KAM differs considerably between participants despite its close relationship to medial tibiofemoral contact forces. There is currently no link between structural disease and pain severity [2,3]. Strengthening exercises for the quadriceps and neuromuscular exercise, as well as hip abductors and adductors, have been utilized to minimize knee joint loading [4]. On the other hand, strengthening hip muscles will correct pelvic imbalances. It is possible for the KAM to increase as a result of the contralateral pelvis dropping and the center of mass shifting from the stance leg. Regardless of the specific ET technique used, the main mission is to restore the correct biomechanics of the lower limbs. Reduced KAM may be one of the reasons for the decrease in pain and impairment. Exercise training has observable clinical benefits, but it is unknown whether it affects the KAM. As a first step, we wanted to determine whether

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exercise therapy's clinical benefits related to changes in KAM in people with KOA [5]. As there were so few studies that evaluated the required outcomes, only studies that measured pain scores and physical function were able to confirm ET's effects on KAM in patients with KOA, and qualitative analysis of ET on these dimensions was conducted.

METHODS

Protocol: The Cochrane Collaboration and a preferred reporting technique for systematic reviews and meta-analyses that fulfill PRISMA standards are used to report systematic reviews.

Sources of data and search technique: The researcher searched EMBASE, MEDLINE, and Cochrane CENTRAL from their creation until November 2020. To find potentially qualifying papers, the search was extended to include systematic reviews and citation monitoring methodologies [6]. To find the grey literature, researchers employed Google Scholar and OpenGrey, a specialized library of technical or research reports, conference papers, and government publications.

Patient	Intervention	Type of study
Osteoarthritis of the knee OR	Train in Strength OR Lift Weights OR Strengthen Your Body WITH Weight-Bearing Exercises OR Lift Weights.	(randomized controlled trial [PT] OR controlled clinical trial [PT] OR randomized controlled trial [MH] OR random assignment [MH]
	A lifting-weights strength-training program OR plyometric exercises OR cycling to stretch-shorten or stretching drill.	single-blind method [mh] OR clinical trial [pt] OR clinical trials [mh] OR ("clinical trials"[tw])
	Exercise Therapy OR Physical Therapy OR Physical Training OR Aerobic Exercise OR Stretch-Shortening Exercise.	The triple (or the tripple) AND the mask (or the blind)) OR the latin square (or the placebos [or the placebos*[tw] or the randomness)))
	Isometric exercise, physical exercise, or a warm-up exercise.	Detailed design [Mh:experiment] OR comparative research [Mh] OR judgment research OR [Mh] review studies
		Study crossovers OR control studies (non-human) OR potential studies (non-human)) NOT (animal studies)))

Table 1: PubMed database literature search strategy

Eligibility for study: Randomized controlled trials (RCTs) were included if they examined physical function, pain, muscular strength, and KAM in patients with KOA regardless of other outcomes [7]. When diseases or injuries cause pain, physical exercise can be recommended for the relief of symptoms [8]. Exercise training is any type of training regardless of intensity, volume, or type of exercise (for example Exercises that improve motor control and strength, like high-load and low-load strengthening exercises). We excluded a study that did not examine any of the three outcomes above, a study that only tested a single bout of exercise, and a study that used multimodal therapies (*e.g.*, foot orthotics, manual therapy, and exercise therapy) [9].

Selection of studies and data extraction: Based on the eligibility criteria as shown in Table 1, we used a common screening checklist for each trial. Studies with titles or abstracts that did not meet the requirements were disqualified [10]. The reviewers discussed their differences regarding study eligibility. To obtain clarifications on studies where there was insufficient information to assess eligibility criteria, the authors were contacted via email. Publications reporting results from the same population when more than one publication reported the same result were excluded [11]. At least twice, authors were contacted by email whenever data was required for synthesis or to assess the quality of a study. Missing data estimation was conducted whenever possible. If insufficient data were present, the study was discarded.

Evidence level and bias risk assessment: To assess bias risk the Cochrane Collaboration's method for measuring bias risk was used. In total, three types of bias were evaluated in the included studies: high, low, and unclear bias. In this case, a funnel plot was not appropriate due to the small number of studies examined [12]. Evidence is defined as the consistency of findings across several high-quality trials or studies; Evidence of moderate quality is consistent findings across multiple low-quality trials; Evidence of limited quality is the consistency of findings among low-quality studies; and none (no trial evidence is available) [13]. According to the reviewer team, high-quality studies could only be considered if each of the five factors was present. The trials were deemed low quality when other biases were present. Consequently, the "unclear" classification was deemed harmful, and the evidence was lowered [14].

Measures of outcome: Kinematic and kinetic analysis is used to create KAM, and body weight is used as a normalization factor. The studies included in this review were conducted with subjects walking barefoot at their own pace. To assess pain, this study used the pain subscale of WOMAC, and to assess physical function, it used the physical function subscale. There was a considerable variation in the numeric scales used for the physical function and pain subscales in trials, but there was no pooling, no modifications were necessary, so the data were reported in their raw form [15].

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Moment of knee adduction	Clinical results	Conclusions
KAM1 has an MD of 0.13 (95 percent CI -0.12 to 0.38)	The pain walking (0-10) scale has an MD of 1.37. (95 percent confidence interval: -2.16 to -0.59)	Increasing strength [16]
	MD -2.40 for inflammatory pain (0-20). (95 percent CI -3.25 to -1.54)	KAM was not affected by these symptoms.
	The function (0-68)3 is 6.17 (95% CI -9.41 to -2.93)	
The md1 value for KAM1 is -0.12 (95% CI -0.38 to 0.82)	MD -0.67 for inflammatory pain (0-20). (95 percent CI -2.03 to 0.69)	The high intensity resistance training did not work [17]
	When function (0-68)3 is considered, MD -2.99 (95 percent CI -7.77 to 1.79)	KAM should be improved relative to controls.
KAM1malalignment MD 0.18 (95 percent CI -0.06 to 0.42)	-1.6 MD (95 percent CI -7.06 to 3.86) for maligned pain (0-20)z	Strengthening quadriceps had no significant effect
The alignment of KAM1 was -0.02. (95 percent credible interval -0.38 to 0.34)	MD -13.9 (95 percent CI -19.24 to -8.55) aligned pain (0-20)z	Participants with either more or less KAM [18]
	Usefulness (0-88) MD 2.20, 3 slandered (95 percent CI 4.39 to 11.07)	Aligned in a neutral or maligned direction
		MD -8.40 is aligned by a function (0-68). (95 percent CI -8.50 to 0.41).

Table 2: Results and conclusions. The original scale is used for all values

Analysis of Data: The biomechanical differences among the workouts included in the study precluded the pooling of data due to clinical heterogeneity. The results were therefore analyzed qualitatively [19].

RESULTS

There were 1917 records produced by manual and automated searches from Oct. to Nov. 2021. A search of gray literature on Google Scholar found 1850 citations, but none on OpenGrey. These two databases contained no relevant articles, other than duplicates already on the list [20]. The title and abstract of the 1803 records were reviewed, with 1770 being discarded. The remaining 33 were subjected to a full-text review, as indicated in figure 1. The qualitative analysis included 233 patients. In all other studies, except for the one that recruited only females, the age ranged from 60.8 to 67.2. The average Body Mass Index ranged from 28.5 to 34.2. Two studies used Kellgren-Lawrence classifications, while the third used Modified Outterbridge classifications.

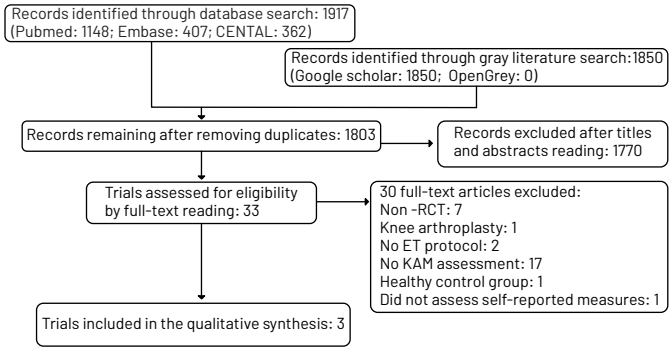

Figure 1: The PRISMA inclusion procedure flow chart

Throughout the included trials, training protocols varied. In a 12-week treatment, patients used ankle cuff weights and elastic bands five times/week to develop hip adductor and abductor muscles [21]. To achieve the goals of the study, patients carried out home workouts as well as visited a physiotherapy clinic seven times to get instructions and measure their load progression. In the exercise program, exercise physiologists focused on knee extension, hip adduction, hip abduction, leg press, and ankle flexion strengthening. As a control group, study participants did not undergo any ET procedures and were advised not to undergo additional treatments [22].

Intervention effects

Exercise's effect on KAM: The KAM did not differ between the strengthening and control groups during the 12-week study and the 95% confidence interval (CI) is between 0.039 and 0.335 Nm/BW * HT% = 0.146. As compared to the control group, KAM in the strengthening group increased by 4.6 percent. In KAM, there were no statistically significant differences between the strengthening and sham-exercise groups [23].

Effect of exercise on physical function and pain: After six months, trial participants had better pain and physical function, with no significant differences between groups. Strengthening participants showed significant pain reduction when compared with controls in the neutrally aligned group [24].

Exercise's effects on muscle strength: Patients in the hip strengthening group had considerably larger hip joint torques and knee extension torques than those in the control group, according to the study. When patients in the strengthening group were compared to those in the sham-exercise group, in terms of knee extension strength, knee flexion, plantar flexion, hip adduction, and hip abduction, identical results were achieved. [25]. In the study, both aligned and maligned individuals who participated in a strengthening program significantly increased their quadriceps strength compared to the control group.

Evaluation of bias and evidence: In general, the interventions in these studies did not perform blinding of therapists and patients [26]. ET positively affects pain, physical function, and muscle strength; however, ET does not have a meaningful effect on KAM (Figure 2).

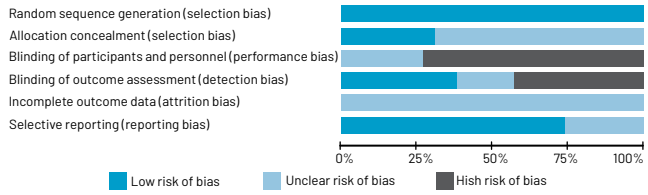

Figure 2: Percentage of each risk of bias item judged by review

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authors for all included studies

DISCUSSION

According to the current systematic study, ET significantly reduces pain, increases athletic ability, and increases muscle strength, but it has minimal impact on KAM. Thus, the clinical effectiveness of different Exercise Therapy procedures did not result in a change in KAM in patients with KOA [27]. ET has been shown to have good clinical effects in several rigorous systematic studies and clinical guidelines; however, this is the first systematic evaluation to show that, even when ET had therapeutic improvements, its dynamic KAM remained unchanged. Only a few studies are included in this review, so conclusions should be interpreted with caution. On the other hand, the results of the study are supported by research that did not meet the inclusion criteria. After eight weeks of strengthening hip abductors, pain and strength improved, but no significant changes were detected in KAM. Data consistently demonstrate that the biomechanical principles underlying exercise efficacy owing to KAM reduction have no validity in the literature. In contrast, the KAM's balance is justified by the ability to induce abduction moments through quadriceps contraction.

Increasing quadriceps power decreases knee flexion, thus decreasing compression loads on the tibia and femur. Before they can be considered clinically as unloading factors in KOA patients, these pathways need to be studied further. The hip abductors have also been proposed as an unloading mechanism. Offloading is done by strengthening the hip abductors on the stance limb and shifting the center of mass towards the swing limb. KAM is only affected by such processes when the hip abductors are weak and there is a contralateral hip drop. Only one study addressing this issue concluded that pelvic drops increased with age. A protective intervention in terms of joint loading was not examined in this review. According to any of the included studies, the KAM did not change significantly after ET, but other parameters should be assessed as well, including muscle strength and neuromuscular control, although each of these may contribute to illness progression. KOA is associated with high BMI levels, which were often observed in the studies included in the analysis. KOA is highly associated with a high BMI, according to previous research. When KOA was moderate, increased BMI was linked to alterations in knee biomechanical characteristics during locomotion in cross-sectional research. Weight loss provides a number of therapeutic benefits. It can lead to joint degeneration, as well as reduced pain and disability, increased walking speed, and improved knee function. Despite an increase in joint stress, over the course of a year, a 16-week weight loss program had excellent clinical improvements but no improvement in structural markers of disease progression. Future research should investigate other mechanisms that explain ET's therapeutic success. In addition, the few studies we included could affect the generalizability of our findings. Because of clinical variability within ET regimens, data pooling was not possible. Due to the absence of control groups in randomized controlled trials, the available evidence may have been diminished. To test the effect of ET on dynamic knee stress, some specific types of biomechanical changes were required - for example, a greater trunk lean or reduced contralateral pelvic drop - rather than considering the entire KOA population. Researchers will be better able to control possible biases in future studies. Evidence quality was lowered by the absence of selective reporting bias and outcome assessor blinding in some of the included studies.ET did not reduce KAM, but it did improve physical function and pain. Aside from reducing dynamic joint load, there may be other mechanisms by which ET affects KOA.

CONCLUSION

A change in knee adduction time was not associated with the therapeutic benefits of exercise therapy. Exercise therapy for knee osteoarthritis may not be effective if there is no momentary adduction. Dynamic joint loading may result from a shift in neuromuscular control after exercise therapy.

REFERENCES

[1] Bokaeian HR, Esfandiarpour F, Zahednejad S, Mohammadi HK, Farahmand F. Effects of an Exercise Therapy Targeting Knee Kinetics on Pain, Function, and Gait Kinetics in Patients With Knee Osteoarthritis: A Randomized Clinical Trial. Adapt Phys Activ Q. 2021 Mar 30;38(3):377-395. doi: 10.1123/apaq.2020-0144.

[2] Cheung RTH, Ho KKW, Au IPH, An WW, Zhang JHW, Chan ZYS et al. Immediate and short-term effects of gait retraining on the knee joint moments and symptoms in patients with early tibiofemoral joint osteoarthritis: a randomized controlled trial. Osteoarthritis Cartilage. 2018 Nov;26(11):1479-1486. doi: 10.1016/j.joca.2018.07.011.

[3] Edd SN, Bennour S, Ulrich B, Jolles BM, Favre J. Modifying Stride Length in Isolation and in Combination With Foot Progression Angle and Step Width Can Improve Knee Kinetics Related to Osteoarthritis; A Preliminary Study in Healthy Subjects. J Biomech Eng. 2020 Jul 1;142(7):074505. doi: 10.1115/1.4046713.

[4] Erhart-Hledik JC, Mahtani GB, Asay JL, Migliore E, Nguyen MM, Andriacchi TP et al. Changes in knee adduction moment wearing a variable-stiffness shoe correlate with changes in pain and mechanically stimulated cartilage oligomeric matrix levels. J Orthop Res. 2021 Mar;39(3):619-627. doi: 10.1002/jor.24770.

[5] Hall M, Bennell KL, Wrigley TV, Metcalf BR, Campbell PK, Kasza J et al. The knee adduction moment and knee osteoarthritis symptoms: relationships according to radiographic disease severity. Osteoarthritis Cartilage. 2017 Jan;25(1):34-41. doi: 10.1016/j.joca.2016.08.014.

[6] Huang C, Chan PK, Chiu KY, Yan CH, Yeung SS, Fu SN. Exploring the relationship between pain intensity and

DOI:https://doi.org/10.54393/pbmj.v5i5.416

knee moments in participants with medial knee osteoarthritis: a cross-sectional study. BMC Musculoskelet Disord. 2021 Aug 12;22(1):685. doi: 10.1186/s12891-021-04587-w.

[7] Hunt MA, Charlton JM, Krowchuk NM, Tse CTF, Hatfield GL. Clinical and biomechanical changes following a 4-month toe-out gait modification program for people with medial knee osteoarthritis: a randomized controlled trial. Osteoarthritis Cartilage. 2018 Jul;26(7):903-911. doi: 10.1016/j.joca.2018.04.010.

[8] Hunt MA, Charlton JM, Felson DT, Liu A, Chapman GJ, Graffos A et al. Frontal plane knee alignment mediates the effect of frontal plane rearfoot motion on knee joint load distribution during walking in people with medial knee osteoarthritis. Osteoarthritis Cartilage. 2021 May;29(5):678-686. doi: 10.1016/j.joca.2021.02.003.

[9] Jackson B, Gordon KE, Chang AH. Immediate and short-term effects of real-time knee adduction moment feedback on the peak and cumulative knee load during walking. J Orthop Res. 2018 Jan;36(1):397-404. doi: 10.1002/jor.23659.

[10] Khan SJ, Khan SS, Usman J, Mokhtar AH, Abu Osman NA. Combined effects of knee brace, laterally wedged insoles, and toe-out gait on knee adduction moment and fall risk in moderate medial knee osteoarthritis patients. Prosthet Orthot Int. 2019 Apr;43(2):148-157. doi: 10.1177/0309364618796849.

[11] Khan SJ, Khan SS, Usman J, Mokhtar AH, Abu Osman NA. Combined effects of knee brace, laterally wedged insoles and toe-in gait on knee adduction moment and balance in moderate medial knee osteoarthritis patients. Gait Posture. 2018 Mar;61:243-249. doi: 10.1016/j.gaitpost.2018.01.024.

[12] Kudo K, Nagura T, Harato K, Kobayashi S, Niki Y, Matsumoto M et al. Correlation between static limb alignment and peak knee adduction angle during gait is affected by subject pain in medial knee osteoarthritis. Knee. 2020 Mar;27(2):348-355. doi: 10.1016/j.knee.2019.11.008.

[13] Li S, Ng WH, Abujaber S, Shaharudin S. Effects of resistance training on gait velocity and knee adduction moment in knee osteoarthritis patients: a systematic review and meta-analysis. Sci Rep. 2021 Aug 9;11(1):16104. doi: 10.1038/s41598-021-95426-4.

[14] Mochizuki T, Omori G, Nishino K, Tanaka M, Tanifuji O, Koga H et al. The medial inclination of the proximal tibia is associated with the external knee adduction moment in advanced varus knee osteoarthritis. Knee Surg Sports Traumatol Arthrosc. 2022 Feb;30(2):574-583. doi: 10.1007/s00167-020-06323-8.

[15] Mohd Sharif NA, Usman J, Wan Safwani WKZ, Siew Li G, Abdul Karim S, Mohamed NA et al. Effects of simple knee sleeves on pain and knee adduction moment in early unilateral knee osteoarthritis. Proc Inst Mech Eng H. 2019 Nov;233(11):1132-1140. doi: 10.1177/0954411919874614.

[16] Fantini Pagani C, Funken J, Heinrich K, Ellermann A, Schmidt-Wiethoff R, Potthast W. Predicting the knee adduction moment after high tibial osteotomy in patients with medial knee osteoarthritis using dynamic simulations. Knee. 2020 Jan;27(1):61-70. doi: 10.1016/j.knee.2019.08.003.

[17] Paterson KL, Bennell KL, Wrigley TV, Metcalf BR, Kasza J, Hinman RS. Effects of footwear on the knee adduction moment in medial knee osteoarthritis: classification criteria for flat flexible vs stable supportive shoes. Osteoarthritis Cartilage. 2017 Feb;25(2):234-241. doi: 10.1016/j.joca.2016.10.001.

[18] Pereira LC, Runhaar J, Favre J, Jolles BM, Bierma-Zeinstra S. Association between changes in the knee adduction moment and changes in knee pain and function in response to non-surgical biomechanical interventions for medial knee osteoarthritis: a systematic review. Eur J Phys Rehabil Med. 2021 Dec;57(6):948-958. doi: 10.23736/S1973-9087.21.06828-3.

[19] Paterson KL, Kasza J, Bennell KL, Wrigley TV, Metcalf BR, Campbell PK et al. Moderators and mediators of effects of unloading shoes on knee pain in people with knee osteoarthritis: an exploratory analysis of the SHARK randomised controlled trial. Osteoarthritis Cartilage. 2018 Feb;26(2):227-235. doi: 10.1016/j.joca.2017.11.002.

[20] Richards R, van den Noort JC, Dekker J, Harlaar J. Gait Retraining With Real-Time Biofeedback to Reduce Knee Adduction Moment: Systematic Review of Effects and Methods Used. Arch Phys Med Rehabil. 2017 Jan;98(1):137-150. doi: 10.1016/j.apmr.2016.07.006.

[21] Robert-Lachaine X, Dessery Y, Belzile ÉL, Turmel S, Corbeil P. Three-month efficacy of three knee braces in the treatment of medial knee osteoarthritis in a randomized crossover trial. J Orthop Res. 2020 Oct;38(10):2262-2271. doi: 10.1002/jor.24634.

[22] Schuster E, Routson RL, Hinchcliff M, Benoff K, Suri P, Richburg C et al. A novel walking cane with haptic biofeedback reduces knee adduction moment in the osteoarthritic knee. J Biomech. 2021 Jan 4;114:110150. doi: 10.1016/j.jbiomech.2020.110150.

DOI:https://doi.org/10.54393/pbmj.v5i5.416

[23] Ulrich B, Hoffmann L, Jolles BM, Favre J. Changes in ambulatory knee adduction moment with lateral wedge insoles differ with respect to the natural foot progression angle. J Biomech. 2020 Apr 16;103:109655. doi: 10.1016/j.jbiomech.2020.109655.

[24] Verlaan L, Boekesteijn RJ, Oomen PW, Liu WY, Peters MJM, Emans PJ et al. Knee adduction moments are not increased in obese knee osteoarthritis patients during stair negotiation. Gait Posture. 2019 Sep;73:154-160. doi: 10.1016/j.gaitpost.2019.07.192.

[25] Wang S, Chan PPK, Lam BMF, Chan ZYS, Zhang JHW, Wang C et al. Sensor-Based Gait Retraining Lowers Knee Adduction Moment and Improves Symptoms in Patients with Knee Osteoarthritis: A Randomized Controlled Trial. Sensors (Basel). 2021 Aug 19;21(16):5596. doi: 10.3390/s21165596.

[26] Whelton C, Thomas A, Elson DW, Metcalfe A, Forrest S, Wilson C et al. Combined effect of toe out gait and high tibial osteotomy on knee adduction moment in patients with varus knee deformity. Clin Biomech (Bristol, Avon). 2017 Mar;43:109-114. doi: 10.1016/j.clinbiomech.2017.02.009.

[27] Yamagata M, Taniguchi M, Tateuchi H, Kobayashi M, Ichihashi N. The effects of knee pain on knee contact force and external knee adduction moment in patients with knee osteoarthritis. J Biomech. 2021 Jun 23;123:110538. doi: 10.1016/j.jbiomech.2021.110538