DOI: https://doi.org/10.54393/pbmj.v5i4.291

PAKISTAN BIOMEDICAL JOURNAL
https://www.pakistanbmj.com/journal/index.php/pbmj/index
Volume 5, Issue 4 (April 2022)

Original Article

Magnetic Resonance Imaging Findings in Patients above 40 Years of Age, with Neck Pain

Sehrish Yaqoob[1*], Muhammad Zakir1, Imran Yousaf[2], Syed Muhammad Yousaf Farooq[1], Mehreen Fatima[1], Zahra Ahsan[1], Sana Delawar[1], Sarwat Jabeen Tooba[1], Aneela Zaman[1] and Khaleel-Ul- Rehman[1]

[1]University Institute of Radiological Sciences and Medical Imaging Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan
[2]Radiology Department of Shalamar Hospital, Lahore, Pakistan

ARTICLE INFO

Key Words:
MRI, Cervical pain, Vertebral Height, Disc Height, Disc Bulge, Signal Changes T2

How to Cite:
Yaqoob, S. ., Zakir, M. ., Yousaf, I. ., Farooq, S. M. Y. ., Fatima, M. ., Ahsan, Z., Delawar, S. ., Tooba, S. J. ., Zaman, A., & Rehman, K.-U. (2022). Magnetic Resonance Imaging Findings In Patients Above 40 Years of Age, With Neck Pain. Pakistan BioMedical Journal, 5(4). https://doi.org/10.54393/pbmj.v5i4.291

***Corresponding Author:**
Sehrish Yaqoob,
University Institute of Radiological Sciences and Medical Imaging Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan
sahrish676@gmail.com

Received Date: 13th April, 2022
Acceptance Date: 25th April, 2022
Published Date: 30th April, 2022

ABSTRACT

Neck pain considerably influences worldwide. Neck pain is a common finding of cervical spine abnormality. Disc degeneration is associated with progressive age groups. **Objective:** To assess the Magnetic Resonance Imaging findings in patients above 40 years of age, with neck pain. **Methods:** In Shalamar Hospital Lahore, a descriptive study was conducted on MRI Philips MULTIVA 1.5 Tesla. 200 patients above 40 years of age were enrolled in this study with a convenient sampling technique after permission from IRB. All patients were referred by clinicians with neck pain. Both males and females were included. Prior Neck Surgery, Traumatic Spine Fractures, Metabolic Bone Disease Spinal Infection, Rheumatoid Arthritis, Active Malignancy, prosthesis inside the body, or any contra-indication to MRI were excluded. **Results:** Among 200 patients of different age groups, MRI findings were noted that reduced vertebral height, disc height, signal changes T2, and disc bulge present in a patient with neck pain. 1 male patient had reduced vertebral height at the C6 level (0.5%) in 40-60 age group. 105 patients (52.7% males) had reduced disc height, mostly in the 81-100(88.9%) years age group. Reduction of disc height frequently at the level of C5/C6 (45.8%). Signal intensity T2 in the intervertebral disc was reduced in six patients mostly of 81-100 (11.1%) years age group, frequently at the level of C6/C7 (3%). 57 patients (34.4% females) mainly in 81-100 years age group had reduced disc bulge commonly at C4/C5(22.4%) and C5/C6 (22.4%) levels. **Conclusions:** Signal intensity T2 of the intervertebral disc and disc height were reduced in patients of eighty-one to hundred age group and other findings were reduced in patients of forty to sixty age groups i.e., vertebral height and disc bulge.

INTRODUCTION

The cervical spine has a complicated structure made up of seven vertebrae, synovial joints, and disc elements, all collectively held through muscles and ligaments. Pain in the neck is a usual hassle in the human world approximately 67-70% of adults experience it for the duration of their lives. Neck pain considerably influences a massive variety of the population. The incidence is present among mid-aged humans, with around 66% of human beings experiencing pain in the neck and associated signs and symptoms at any point in their lives [1]. The MRI scan of the cervical backbone in 63 asymptomatic patients mentioned those odd findings, together with degeneration and narrowing of the disc, have been discovered in 14% of volunteers' elderly below forty years and 28% of these aged above 40 years [2]. Neck pain, even as of musculoskeletal beginning location is most effective, is commonly self-constrained. There is considerable variability in the epidemiologic studies of neck pain in the world literature. An overall prevalence of 0.4 to 86.8% and an annual prevalence of 30-50 % to 4.8 to 79.5 % are mentioned in the general population. Women and middle-aged individuals are more commonly affected [3-6]. One study reveals that

DOI: https://doi.org/10.54393/pbmj.v5i4.291

the disease is widespread dominantly in males, female to the male ratio of 1:88 over all age groups. Pain in the neck has various causes, approximately a few years in the past, there were no pointers for curing cervical pain. The most essential causes are trauma and degeneration. The presence of complications, radiation of pain to shoulder, numbness in arms and neck stiffness are usual cases related to cervical joint degenerative disease. In the later stages of disc degeneration, loss of disc height and disc bulging are also detected on MRI. MRI provides a non-invasive approach and is considered as the most effective way to diagnose disc degeneration [7]. Intervertebral cervical disc degeneration is the commonest locating in imaging research, and resulting that disc degeneration occurrence will increase with progressive age. The grade and level of cervical disc degeneration greatly advance with age. Non-degenerative causes of pain in neck have been less commonly occurring, but it is an important cause of neck ache [8]. Degeneration of the disc is usual within the mid-cervical spine (C5/C6) and proceeds to advance stages, except for C7/T1 and C2/C3 disc protrusion becomes uncommon at C2/C3. It is characterized by a chain of degenerative adjustments comprising intradiscal tears with osteophytic growths, next disc space loss, and capsular thickening, spur formation and ligamentous hypertrophy. Cervical spine joint degenerative disease occurs more often than not in 4th and 5th many years and is associated with the natural process of aging [9]. In Denmark, the number of cervical MRIs has extended to 18% in comparison to a 4.5% growth in the neck ache occurrence over the recent few years [10]. In China, between years 2003 and 2011, there was almost a 7% rise in the proportion of sufferers with spinal pathologies, out of which almost 55% to 75% of all cases had been regarding the cervical spine [11]. It additionally has been recommended that the use of simple film radiography based entirely on suspicion of deteriorating degenerative changes is not clinically justified. The most advanced diagnostic tool for detecting degenerative pathologies remains the MRI. The immoderate tissue assessment sensitivity of MRI might also provide greater information now not to be had on ordinary roentgenograms or CT examinations. For example, vertebral frame marrow adjustments, which arise with the growing frequency with age and are associated with degenerative disc disease [12]. MRI has incredible sensitivity and specificity for inflammatory strategies, which can be intricate differential issues in patients with degenerative sickness. MRI is now extensively mentioned due to the fact that the imaging modality of preference is to demonstrate deformity and ailment of the intervertebral discs and the spinal column. Its advanced tissue differentiation and capability to see and locate lesions inside the spinal cord, and the intervertebral disc (IVD) and the bone marrow, deliver this advantage over other imaging modalities. It is therefore very useful in examining the etiology of neck pain [13].

METHODS

In the Radiological Department of Shalamar Hospital, Lahore, a descriptive study was conducted from 10th September 2021 to 1st February 2022, by using MRI Philips MULTIVA 1.5 Tesla. 200 patients of the age group above 40 years, all patients referred by clinicians with neck pain, and both males and females were included in this study with a convenient sampling technique. Prior Neck Surgery, Traumatic Spine Fractures, Metabolic Bone Disease Spinal Infection, Rheumatoid Arthritis, Active Malignancy, prosthesis inside the body, or any contraindication to MRI were excluded. The duration of data collection was 4 months. Internationally accepted protocols were followed, and this research was voluntary i.e., if participants choose not to participate, they can withdraw their consent at any time. For the analysis of data, the percentage of qualitative data and quantitative data mean standard deviation was derived. The data were statistically analyzed by SPSS version 21.0 and Microsoft Excel. Moreover, frequencies, SD ratio pie charts, and cross-tabulation were also used for analytical purpose.

RESULTS

Data analysis demonstrated that a total of 200 patients in which different age groups were selected, the minimum age was 40 years. Out of which 110(55%) were males and 90(45%) were females, 1 male patient had reduced vertebral height at C6 level(0.5%) in 40-60(0.7%) age group. Out of 200 patients, 105 (52.7% males and 52.2% females) had reduced disc height, most frequently at C5/C6 level (45.8%). Total of 105patients, 8 patients in 81-100(88.9%), 32 patients in 61-80 (64%) and 65(46.1%) patients in 40-60 years age groups had reduced disc height. Signal changes T2 in intervertebral disc had reduced in 6 patients (3.6% males and 2.2% females) mostly at C6/C7 level (3%). Out of these 6 patients, 3 patients (2.1%), 2 patients (4%) and 1 patient (11.1%) were in 40-60, 61-80- and 81-100-years age groups respectively. In this study of 200 patients, 57(23.6% males and 34.4% females) patients had disc bulge most frequently at C4/C5 (22.4%) and C5/C6 (22.4%) levels with different age groups such as 50 patients (35.5%) in 40-60, 6 patients (12%) in 61-80 age group and 1 patient (11.1%) in 81-100 years age group. 5(2.5%) patients had straightened and the other 54(70.5%) patients had exaggerated curvature. 86(43%) patients had mild, 96(48%) had moderate, 17(8.5%) had the severe intensity of pain, and grading of pain showed that 76(38%) had mild, 81(40.5%) had moderate, 27 (13.5%) had severe pain.

DOI: https://doi.org/10.54393/pbmj.v5i4.291

Variables	categories	Frequency(%)
Age group	40-60 61-81 81-100	141(70.5%) 50(25%) 9(4.5%)
Gender	Female Male	90(45%) 110(55%)
Intensity of pain	Normal Mild Moderate Severe	1(.5%) 86(43%) 96(48%) 17(8.5%)
Grading of Pain	Normal Mild Moderate Severe	16(8%) 76(38%) 81(40.5%) 27(13.5%)
Radiation of Pain	No Right arm Left arm	128(64%) 38(19%) 34(17%)
Curvature	Normal Exaggerated Straightened	141(27%) 54(70.5%) 5(2.5%)
Vertrbral	Normal Reduced	199(99.5%) 1(0.5%)
Disc Height	Normal Reduced	95(47.5%) 105(52.5%)
Signal changes T2	Normal Reduced	194(97%) 6(3%)
Disc bulge	Yes No	143(71.5%) 57(28.5%)

Table 1: Variables and their frequencies

Table 2 shows relation of different age group with vertebral height. In 40-60 years age group 99.3% had normal and .7% had reduced vertebral height. In 61-80 age group 100.0% had normal vertebral height. In 81-100 years age group 100.0% had normal vertebral height.

Variables			Frequency(%)		
			Normal	Reduced	Total
Age group	40-60	Count	140	1	141
		% Within Age	99.3%	0.7%	100%
	61-80	Count	50	0	50
		% Within Age	100.0%	0.0%	100%
	81-100	Count	9	0	9
		% Within Age	100.0%	0.0%	100%
Total		Count	199	1	200
		% Within Age	99.5%	0.5%	100%

Table 2: AGE * Vertebral height Cross-tabulation

Table 3 shows relation of different age group with disc height. In 40-60 years age group 53.9% had normal and 46.1% had reduced disc height. In 61-80 years age group 36.0% had normal and 64% had reduced disc height. In 81-100 years age group 11.1% had normal and 88.9% had reduced disc height.

Variables			Frequency(%)		
			Normal	Reduced	Total
Age group	40-60	Count	76	65	141
		% Within Age	53.9%	46.1%	100%
	61-80	Count	18	32	50
		% Within Age	36.0%	64.0%	100%
	81-100	Count	1	88	9
		% Within Age	11.1%	8.9%	100%
Total		Count	95	105	200
		% Within Age	47.5%	52.5%	100%

Table 3: AGE * Disc height Cross-tabulation

Table 4 shows signal changes T2 of disc in different age groups. In 40-60 age group 97.9% had normal and 2.1% had reduced Signal changes T2. In 61-80 age group 96.0% had normal and 4.0% had reduced Signal changes T2. In 81-100 age group 97.0% had normal and 11.1% had reduced Signal changes T2.

Variables			Frequency(%)		
			Normal	Reduced	Total
Age group	40-60	Count	138	3	141
		% Within Age	97.9%	2.1%	100%
	61-80	Count	48	2	50
		% Within Age	96.0%	4.0%	100%
	81-100	Count	88	11	9
		% Within Age	8.9%	1.1%	100%
Total		Count	194	6	200
		% Within Age	97.0%	3.0%	100%

Table 4: AGE * Signal changes T2 of disc Cross-tabulation

Table 5 shows disc bulges in different age groups. In 40-60 age group 64.5% had normal and 35.5% had Disc bulges. In 61-80 age group 88.0% had normal and 12.0% had Disc bulge. In 81-100 age group 88.9% had normal and 11.1% had Disc bulge.

Variables			Frequency(%)		
			Normal	Reduced	Total
Age group	40-60	Count	91	50	141
		% Within Age	64.5%	35.5%	100%
	61-80	Count	44	6	50
		% Within Age	88.0%	12.0%	100%
	81-100	Count	88	11	9
		% Within Age	8.9%	1.1%	100%
Total		Count	143	57	200
		% Within Age	71.5%	28.5%	100%

Table 5: AGE* Disc bulge Cross-tabulation

DOI: https://doi.org/10.54393/pbmj.v5i4.291

Figure 1: Sagittal slice of MRI cervical spine shows disc height reduction and disc degenerative changes at the level of C 5/C6

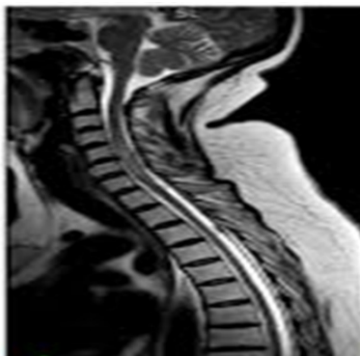

Figure 2: Sagittal slice of MRI cervical spine shows disc degenerative changes with reduced signal intensity T2

DISCUSSION

Our study was designed to evaluate MRI findings in patients above 40 years of age with neck pain. Magnetic resonance imaging is regarded as a consistent modality intended for assessing patients with cervical spine findings. Out of 200 patients, 6 patients had reduced signal intensity T2 of intervertebral disc frequently at C6/C7 level (3%) in the patients with degenerative changes in the cervical spine mostly in the 81-100 age group (11.1%) and its frequency is more in males (3.6%) to that of females (2.2%). As Abdulkarim JA et al., conducted a study in 2013 to find the frequency of degenerative changes in the disc in relation to age which is highly associated with reduced signal intensity on T2W images [14]. In younger age groups, signal intensity is greatly reduced in the upper discs compared with the lower ones. In older patients, changes in signal intensity are reduced less commonly. As in our study, 105 patients had reduced disc height mostly at the level of C5/C6 (45.8%) and frequently in 81-100 years age group (88.9%). Another study stated that lower discs become involved as well as age increases [14,19]. Mustafa et al., concluded in their study that the most affected disc location was C4/C5 (27.7%) [15]. Kolstad et al., conducted a study to find the correlation on MRI among degeneration of cervical disc and disc height [16]. As a result, it was found that the progressive disc degeneration classified by MRI was significantly correlated with reduced disc height as measured on radiographs. Another MRI finding in our study was reduced vertebral height. Only 1(0.5%) male patient had reduced vertebral height in our sample at the level of C6 (0.5%) in 40-60(0.7%) age group. Kim et al., conducted a study on 70 years old patients, in which vertebral height was remarkably decreased at a lower level [17]. The congenital narrowing is very uncommon but degenerative narrowing is commonest, usually occurs over age 60, and is age-related. Disc bulges were reduced in 57 patients out of 200 sample sizes of this current study usually occurring in females (34.4%). The most common levels of disc bulge were present at C4/C5 (22.4%), C5/C6 (22.4%) and commonly in the patients of 40-60(35.5%) age group. In 2021, Alghamdi et al., did a study on MRI of C-spine to find the repetition rate of Anomalous results with relation to age [18]. The data obtained show that there is a gradual increase in malformations in the lower disc, reaching the highest proportion in 64% of patients with C5/C6 injuries. However, the rate of intervertebral disc bulges increased when peaking between the ages of 20 - 50 years. Bulging and protrusion of disc was the most usual finding with C3-C4 and C4-C5 being the most usual levels of these damages [9]. Age-related physiological/pathological changes in the intervertebral disc had already been described by Coventry et al. Disc bulge most often occurred at the lower level. The most frequent and severe occurrences of disc desiccation, bulge, herniation (protrusion/extrusion/sequestration) and disc height reduction were noted at C4/C5 (79.1%), C4/C5 (12.2%), C5/C6 (59.1%) and C4/C5 (10.4%) respectively [19]. The most common degenerative abnormality on MRI was disc bugle, which accounted for 37.3 % of total degenerative changes. MRI findings were most common at the C5/C6 level [20].

CONCLUSIONS

Signal intensity T2 of the intervertebral disc and disc height were reduced in patients of eighty-one to hundred age group and other findings were reduced in patients of forty to sixty age group i.e., vertebral height and disc bulge. Whereas in this study, disc bulge was mostly present in females and other findings were noted in males such as; signal changes in T2, vertebral height, and disc height (reduced in the cervical spine).

REFERENCES

[1] Rudy IS, Poulos A, Owen L, Batters A, Kieliszek K and Willox J et al. The correlation of radiographic findings and patient symptomatology in cervical degenerative joint disease: a cross-sectional study. Chiropr Man Therap. 2015;23:9. doi: 10.1186/s12998-015-0052-0.

[2] Suzuki A, Daubs MD, Hayashi T, Ruangchainikom M, Xiong C and Phan K et al. Patterns of Cervical Disc Degeneration: Analysis of Magnetic Resonance

DOI: https://doi.org/10.54393/pbmj.v5i4.291

Imaging of Over 1000 Symptomatic Subjects. Global Spine J. 2018;8(3):254-259. doi: 10.1177/2192568217719436.

[3] Hogg-Johnson S, van der Velde G, Carroll LJ, Holm LW, Cassidy JD and Guzman J et al. The burden and determinants of neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine (Phila Pa 1976). 2008;33(4 Suppl):S39-51. doi: 10.1097/BRS.0b013e31816454c8.

[4] Hoy DG, Protani M, De R and Buchbinder R. The epidemiology of neck pain. Best Pract Res Clin Rheumatol. 2010;24(6):783-92. doi: 10.1016/j.berh.2011.01.019.

[5] Fejer R, Kyvik KO and Hartvigsen J. The prevalence of neck pain in the world population: a systematic critical review of the literature. Eur Spine J. 2006;15(6):834-48. doi: 10.1007/s00586-004-0864-4.

[6] El-Sayed AM, Hadley C, Tessema F, Tegegn A, Cowan JA Jr and Galea S. Back and neck pain and psychopathology in rural sub-Saharan Africa: evidence from the Gilgel Gibe Growth and Development Study, Ethiopia. Spine (Phila Pa 1976). 2010;35(6):684-9. doi: 10.1097/BRS.0b013e3181b4926e.

[7] Olarinoye-Akorede SA, Ibrahim MZ and Kajogbola G. Cervical Spine MRI findings in the evaluation of persistent neck pain in a Nigerian Tertiary Hospital. Nigerian Journal of Basic and Clinical Sciences. 2018;15(1):29. DOI: 10.4103/njbcs.njbcs_37_17.

[8] Karki DB, Panta OB and Gurung G. Non degenerative disease in MRI cervical spine of symptomatic patients. Journal of College of Medical Sciences-Nepal. 2015;11(4):203.doi.org/10.3126/jcmsn.v11i4.14320.

[9] Safdari M, Safdari Z, Sadeghi Ferezghi S, Shirdeli M, Safdari Z and Pishjoo M. Cervical Magnetic Resonance Imaging (MRI) Findings in Patients with Neck Pain A Cross Sectional Study in Southeast of Iran. International Journal of Medical Investigation. 2018;7(3):25-31.

[10] Moll LT, Kindt MW, Stapelfeldt CM and Jensen TS. Degenerative findings on MRI of the cervical spine: an inter- and intra-rater reliability study. Chiropr Man Therap. 2018;26:43. doi: 10.1186/s12998-018-0210-2.

[11] Waheed MA, Hasan S, Tan LA, Bosco A, Reinas R and Ter Wengel PV et al. Cervical spine pathology and treatment: a global overview. J Spine Surg. 2020;6(1):340-350. doi: 10.21037/jss.2020.01.12.

[12] Modic MT, Ross JS and Masaryk TJ. Imaging of degenerative disease of the cervical spine. Clinical orthopaedics and related research. 1989;(239):109-20.

[13] Vetti N, Kråkenes J, Ask T, Erdal KA, Torkildsen MD and Rørvik J et al. Follow-up MR imaging of the alar and transverse ligaments after whiplash injury: a prospective controlled study. AJNR Am J Neuroradiol. 2011;32(10):1836-41. doi: 10.3174/ajnr.A2636.

[14] Abdulkarim JA, Dhingsa R and L Finlay DB. Magnetic resonance imaging of the cervical spine: frequency of degenerative changes in the intervertebral disc with relation to age. Clin Radiol. 2003;58(12):980-4. doi: 10.1016/s0009-9260(03)00255-1.

[15] Mustapha Z, Okedayo M, Ibrahim K, Abba Ali A, Ahmadu MS and Abubakar A et al. Cervical spine MRI findings in patients presenting with neck pain and radiculopathy. Int Res J Basic Clin Stud. 2014;2(2):20-6. DOI: 10.14303/irjbcs.2014.016.

[16] Kolstad F, Myhr G, Kvistad KA, Nygaard OP and Leivseth G. Degeneration and height of cervical discs classified from MRI compared with precise height measurements from radiographs. Eur J Radiol. 2005;55(3):415-20. doi: 10.1016/j.ejrad.2005.02.005.

[17] Kim KH, Park JY, Kuh SU, Chin DK, Kim KS and Cho YE. Changes in spinal canal diameter and vertebral body height with age. Yonsei medical journal. 2013;54(6):1498504.doi.org/10.3349/ymj.2013.54.6.1498.

[18] Alghamdi A and Alqahtani A. Magnetic Resonance Imaging of the Cervical Spine: Frequency of Abnormal Findings with Relation to Age. Medicines (Basel).2021;8(12):77.doi:10.3390/medicines8120077.

[19] Gabkwet AE, Igoh EO, Gwom PM, Taiwo FY, Salaam AJ and Danjem SM et al. Pattern of cervical disc changes in patients with non-traumatic neck pain: a review of cervical MRI scan findings. International Journal of Advances in Medicine. 2021;8(11):1638-1643. doi.org/10.18203/2349-3933.ijam20214125.

[20] Ubaid RM and Al-Najjar SA. Magnetic resonance imaging findings of patients with neck pain in Erbil City. Zanco Journal of Medical Sciences (Zanco J Med Sci). 2020;24(1):96-106. doi.org/10.15218/zjms.2020.013.