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Original Article

Impact of Balance Training and Coordination Exercises in Post Hemiplegic Stroke Patients; A Cross Sectional Study

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ABSTRACT

A medical condition that occurs due to interrupted blood supply to the brain leading to restricted oxygen supply to the tissues resulting in cell death is known as "stroke". It is considered as a second leading cause of death globally and a major cause of disabilities for the patients surviving from its fatality. Monoplegia, Diplegia, Hemiplegia, Quadriplegia, hemiparesis are all the different gifts of the stroke given to multiple patients suffering from it. **Objective:** The aim of the study was to evaluate the difference between the hemiplegic stroke patients who have undergone physical therapy treatment in contrast to those patients who have not taken any physical therapy treatment. **Methods:** Cross sectional study design was selected for the performance of the research. Research setting was a Government Sector Hospital. Specific balance and coordination exercises were given to the hemiplegic stroke patients and their effect was observed in the term of their recovery speed. Out of sample of 40 individuals, some have taken physical therapy rehabilitation with varying number of sessions and intensity of exercises while in contrast, some have not taken any physical therapy from scratch following stroke. Brunel Balance Assessment (BBA) scale was measured in relation to the effect of exercises given to the patients. **Results:** The data analysis has shown significant improvement in balance and different fine motor movements in post training group as compared to those who have not taken physical therapy rehabilitation. Data analysis has clearly shown that percentage of improvement in the condition of patients is directly related to the frequency of exercise given to them in their post stroke period. The BBA scale was having higher values in the patients undergoing physical therapy rehabilitation as compared to the patients who have not undergone any sort of physical therapy rehabilitation. **Conclusion:** Balance and coordination exercises have impact in the post hemiplegic stroke patients.

INTRODUCTION

A stroke is a clinical presentation illness of quickly evolving symptoms or signs of focused loss of brain function without any other obvious cause than that of vascular origin, however the loss of function may occasionally be widespread (applied to patients in deep coma and to those with subarachnoid haemorrhage). The symptoms are fatal or persist for more than 24 hours [1]. The following four mechanisms can be used to classify atherothrombotic strokes in major arteries: in situ thrombosis, artery-to-artery embolism, hemodynamic infarct, and branch atheromatous disease. Ischemic strokes can manifest through two or more complex processes rather than just one [2]. With a worldwide prevalence of 76 – 119 per 100,000 people each year, stroke is a significant health concern for the entire world. Up to 50% of stroke victims still experience lasting symptoms despite recent breakthroughs in stroke treatment. Balance issues in stroke survivors are linked to a higher risk of falling, fracturing, melancholy, anxiety, and even mortality. They are also more prone to experience these conditions after a stroke. In order to enhance balance function in stroke survivors, effective therapies are urgently needed [3]. In

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the United States, stroke is the sixth most common cause of death and a major contributor to long-term disability. Any component of post-stroke therapy that strives to lessen disability and encourage involvement in daily activities has been generally characterised as stroke rehabilitation. CVA recovery is a practice with the goals of preventing function from deteriorating, improving function, and achieving the highest level of independence (monetarily, socially, emotionally, and practically) within the confines of the ongoing deficits [4]. Also, balance impairments lead to disturbance in steadiness, symmetry and dynamic stability. Loss of balance and postural asymmetry is going to be the major hurdle in the early rehab care of patients [5]. Because of reduced arm and hand function and poor walking abilities, 20% of sufferers still require institutional care three months following the beginning of the stroke, suggesting dependence on others to complete their daily duties [6]. Sensory and motor deficits derived from neurological injury, such as paralysis, impaired balance or spasticity, are the most common impairments and are the basis of the resulting degree of physical disability [7]. Stroke, which primarily affects older people, is the leading cause of long-term impairment. Patients with strokes may endure cognitive, cognitive, or neurological abnormalities, and recuperation from the disease takes practice and experience since individuals must perform physical therapy sessions often and insistently [8]. After a stroke, sitting is the first position to accomplish because it is necessary for the majority of daily tasks like feeding, transporting, and taking a shower 93% of patients can achieve independent sitting balance for one minute within six days after the start of a stroke [9]. Balance dysfunction is one of the main impairments seen in this population. According to reports 83% of stroke patients have balance issues, which include gait issues such slow movement patterns and changes in distinct gait stages that affect the possibility of falling [10]. Due to the distinctive, intricate combination of systems used to control balance, significant task-specific rehabilitation is necessary. Another factor that has been absent from most research is an examination of the issues surrounding the ideal amount of exercise aimed to maximise balance and reduce falls [11]. Despite the fact that people are frequently sedentary after a stroke, higher levels of physical activity are linked to greater balance, walking ability, and physical fitness even in elevated chronic stroke patients [12]. Spite of the techniques in the management of acute and hyper acute stroke, patients typically still require rehabilitation [13]. The best rehab protocols include different balance and coordination challenges required to attain intact postural reactions [14]. There is a need for more potent interventions following a stroke, according to a meta-analysis of interventions to enhance standing balance that found no training approach to be superior [15]. Movement is restricted because to muscle weakness on the affected side, which in turn compromises equilibrium and strolling abilities. Therefore, obstacles for the rehabilitation of stroke patients are hampered by muscle strength and postural balance [16]. However, in the chronic recovery stage, the unbalanced postural activity of sufferers during sitting and standing is frequently reinforced, maintained, or very briefly lessened. Poor sensory inputs, such as a reduced awareness of the midline, can also contribute to lopsided posture [17]. Most of the patients suffering from stroke do not undergo physical therapy rehabilitation based on balance and coordination training programs. In contrast, those patients who have undergone physical therapy treatments return more quickly towards the activity of daily livings and their balance and coordination is more enhanced as compared to the other patients. For early recovery, it is necessary to adopt preventive measures and recovery strategies from the stroke. The aim of the research was to study the difference between the hemiplegic stroke patients who have undergone physical therapy treatment in contrast to those patients who have not taken any physical therapy treatment. Moreover, no gender discrimination was made.

METHODS

We adopted a cross sectional study design in which patients from Pakistan were taken as our research purpose and they were suffering from hemiplegic stroke. Different government hospitals were visited in the premises of Lahore. The patients of hemiplegic stroke were included in study. The patients of two to six months were included with a follow up of four months' physical therapy rehabilitation. During this study, the patients were informed about the research and its purpose with details and they were all independent for their participation in the research whether they wanted to fill the forms or not with their personal data and information. The data of all the participants in this research study were kept highly confidential. Two basic selection methods were used for inclusion and exclusion of the patients. Hemiplegic patients of stroke, patients of age ground ranging from 45 to 65, and both male and female patients were included in the trial, whereas, patients below the age limit of 45 and patients suffering from hemiparesis were excluded from the trial. The population of this study consisted of all hemiplegic stroke patients ranging from 45 to 65 years of age. Brunel Balance Assessment scale was utilised and the results were then analysed by using SPSS version 21.0. Frequencies and percentages of each patient for every question were then recorded and compared with each other. Following balance evaluation strategies were

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utilised for patient assessment, including heel raises (not holding on), side stepping (holding on), side stepping (not holding on), heel raises (holding on), heel to toe walking, single leg standing, backwards walking, squats against gym wall, single leg knee extension, seated leg lifts, reaching, weight shifting (side to side), ankle dorsiflexion, bridging, sit to stand, weight shifting (forward to backward), stride length changing (from small to large), and walking sideways

RESULTS

The total sample size is of 40 individuals. The numbers of patients taking physical therapy at first month are 12. Those who have taken physical therapy at 2nd month are 5 while those who have taken physical therapy at 4th month are 3. In contrast, those patients who have not taken any physical therapy are 20. Table 1 shows the balance factors alternate with grades of improvement. Table 2 and 3 depicts the different balance strategies including static sitting, dynamic sitting, supported standing, static standing balance, dynamic standing, static and dynamic double stance and changing base of support (step-up) test during 1st and 4th month of rehabilitation. More improvement was seen in patients taking more physical therapy rehabilitation as compared to patients who were taking no or less physical therapy rehabilitation. The number of patients who have improved with moderate physical therapy lies between the other two values i.e. "Most frequently" and "Less frequently". It is completely evident that less improvement was seen in the patients taking less or no physical therapy. The Chi square value is independent of the P=0.05.

Balance Strategies	Grades of Improvement frequency (%)			
	Better IMP	Good IMP	Little IMP	No IMP
Effect of balance training on effected limb	12(30%)	2(5%)	3(7.5%)	23(57.5%)
Gait recovery after physical therapy sessions	8(20%)	4(10%)	7(17.5%)	7(17.5%)
Reorganization of sensory and motor system	7(17.5%)	5(12.5%)	6(15%)	6(15%)
Change in the quality of life	8(20%)	4(10%)	9(22.5%)	9(22.5%)
Effect of weight bearing training	7(17.5%)	2(5%)	4(10%)	4(10%)
Effect of conventional gait training	6(15%)	5(12.5%)	5(12.5%)	5(12.5%)
Effect of repetitive passive rehabilitation	7(17.5%)	3(7.5%)	8(20%)	8(20%)

Table 1: Rehabilitation Protocols with Timeframe

Balance Strategies	Never Exercise		Normal Exercise		More frequently Exercise		chi-square	Sig V
	Yes	No	Yes	No	Yes	No		
Static sitting-	4(10%)	8(20%)	6(15%)	5(12.5%)	8(20%)	9(22.5%)	1.094	0.579
Dynamic sitting-sitting	7(17.5%)	5(12.5%)	8(20%)	3(7.5%)	16(40%)	1(2.5%)	5.364	0.068
Supported standing-	4(10%)	8(20%)	8(20%)	3(7.5%)	11(27.5%)	6(15%)	4.273	0.118
Static standing balance	7(17.5%)	5(12.5%)	7(17.5%)	4(10%)	13(32.5%)	4(10%)	1.158	0.560
Dynamic standing	9(22.5%)	3(7.5%)	8(20%)	3(7.5%)	16(40%)	1(2.5%)	2.784	0.249
Static double stance	5(12.5%)	7(17.5%)	8(20%)	3(7.5%)	16(40%)	1(2.5%)	9.707	0.008
Dynamic Double stance	7(17.5%)	5(12.5%)	8(20%)	3(7.5%)	16(40%)	1(2.5%)	5.364	0.068
Changing base of support-step up test	10(25%)	2(5.0%)	10(25%)	1(2.5%)	16(40%)	1(2.5%)	0.923	0.630

Table 2: Balance strategies with grades of improvement n=40 During 1st Month

Balance Strategies	Never Exercise		Normal Exercise		More frequently Exercise		chi-square	Sig V
	Yes	No	Yes	No	Yes	No		
Static sitting-	2(25%)	10(25%)	4(10%)	7(17.5%)	6(15%)	11(27.5%)	1.455	0.483
Dynamic sitting-sitting	5(12.5%)	7(17.5%)	5(12.5%)	6(15%)	13(32.5%)	4(10%)	4.388	0.111
Supported standing-	3(7.5%)	9(22.5%)	6(15%)	5(12.5%)	11(27.5%)	6(15%)	4.561	0.102
Static standing balance	5(12.5%)	7(17.5%)	6(15%)	5(12.5%)	12(30%)	5(12.5%)	2.462	0.292
Dynamic standing	5(12.5%)	7(17.5%)	5(12.5%)	6(15%)	15(37.5%)	2(5.0%)	8.390	0.015
Static double stance	4(10%)	8(20%)	5(12.5%)	6(15%)	13(32.5%)	4(10%)	5.847	0.054
Dynamic Double stance	5(12.5%)	7(17.5%)	6(15%)	5(12.5%)	15(37.5%)	2(5.0%)	7.435	0.024
Changing base of support-step up test	8(20%)	9(22.5%)	2(5.0%)	2(5.0%)	16(40%)	1(2.5%)	3.767	0.159

Table 3: Balance strategies with grades of improvement n=40 During 4th Month

DISCUSSION

The review has exhibited that after stroke assault, blend of equilibrium preparing and coordination practices gives tremendous number of advantages and re-establish stroke patients more rapidly. Portability improves by doing practices for 30 minutes 3 to multiple times in seven days. While our examination shows that equilibrium and coordination practices in post preparing bunch show huge improvement when contrasted with the people who have not taken any actual restoration. Patients who participate in restoration practices have much better improvement in equilibrium and coordination when contrasted with the people who takes part in these activities less regularly. In this assessment, two gatherings were made in which one gathering did a 6-month practice and the other one did association testing. A half year after the satisfaction of the arrangement program, there was a basic improvement not settled for the limit of the strong balance of the patients in the pre-arranged assembling. On the other hand, at the half year follow-up, there was no immense qualification in standing balance rehearses between the pre-arranged assembling and the benchmark bunch. Si-Nae Jeon, PT, MS1 and his colleagues in their study signifies on the dynamic balance of stroke patients, it was indicated that ankle joint strategy exercises with and without visual feedback were effective. A visual feedback group (VFG) and a visual disuse group (VDG) were randomly and evenly assigned to 26 stroke patients in this study (VDG). For six weeks, they engaged in 30-minute ankle joint therapy activities three times a week. When stroke patients conducted ankle joint strategy exercises to enhance balance, visual feedback training had a positive effect on balance [18]. While our investigation shows that balance and coordination rehearses in post hemiplegic stroke show immense improvement when appeared differently in relation to the people who have not taken any recovery works out. What's more patients who take part in recuperation practice frequently have much better improvement when stood out from the people who

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participate in these exercises less routinely. Kyeongjin Lee (2020) in his study examine the effects of postural control using EMG-triggered functional electrical stimulation (FES) on stroke patients' ankle muscle activation, dynamic balance, and static balance. The experimental group (n = 25) and the control group (n = 24) were randomly assigned to 49 patients (>6 months after stroke) [16, 19]. This investigation relied upon the balance getting ready practices in which patients mature enough 40 to 60 years of age were picked. 40 patients were picked who went through works out. We have isolated two social events. One is requested as a survey pack and the other one is organised as a benchmark bunch. One social affair performed one hour out of each day 5 days/week and for a long while. Balance Training was added to the audit get-together's standard program like consistently/5 days/week and 20 minutes of balance getting ready for an extensive time span. Pre-treatment and post-treatment examinations were performed for security using the Biodex Balance System. Twelve weeks right after completing the treatment programs, the survey social event's harmony planning assessments improved essentially. KyoChulSeo et al. (2015) stated that the effectiveness of ramp gait exercise on the dynamic balance of stroke patients with PNF. In altogether, 30 stroke survivors took part in the trial, were evenly divided into the experimental, and control groups by randomisation. The experimental group participated in a 30-minute exercise programme and a 30-minute ramp gait training session with PNF [20]. Our assessment shows that equilibrium and coordination rehearses in post hemiplegic stroke patients show colossal improvement when appeared contrastingly similar to individuals who have not taken any genuine recuperation. Additionally, patients who check out recovery practice as frequently as conceivable have much better improvement when stood separated from individuals who take part in these exercises less.

CONCLUSION

Mostly patients recover and comes back towards their routine life after getting full therapy sessions from clinical set up. Hence, we conclude that situation of every patient vary according to their severity of lesion. Those who actively participate and perform regular exercises on initial basis, have faster recovery rate. The investigations have showed that the balance and coordination improves with the physical therapy rehabilitation and both are equally important for the recovery of hemiplegic stroke patient.

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