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Research Article

Effect of Wobble Board Exercises on Balance in Stroke Patients

Maheswar L.*, U. Ganapathy Sankar

Deparment Of Occupational Therapy, SRM College of Occupational Therapy.

To determine the effectiveness of wobble board exercises on balance in stroke patients. Methods: The study employed a Quasi- experimental pre-post-test design. Forty-eight participants (N = 48) were recruited based on the inclusion and exclusion criteria through convenience sampling and were divided into experimental (n = 24) and control group (n = 24). The experimental group participants received wobble board exercises intervention whereas control group participants received conventional occupational therapy intervention for 12 weeks. Berg Balance Scale (BBS) and Foursquare step test (FSST) were used for pre-test and post-test. Results: There was statistically significant difference in BBS and FSST scores between pre and post-test scores in experimental and control groups. Further analysis indicated that the experimental group showed greater improvements than the control group. Conclusion: The study concluded that the wobble board exercises intervention was effective in improving balance in stroke patients. Further, this study stated the improvement of static and dynamic balance through the wobble board exercises intervention as a supportive knowledge to the literature and as an adjunct to conventional occupational therapy intervention.

Keywords: Wobble board exercises, Balance and Stroke

INTRODUCTION:

The term "stroke" was likely first introduced into medical terminology in 1689 by William Cole. Stroke is classically defined as a neurological deficit arising from an acute focal injury to the central nervous system (CNS) due to vascular cause, including cerebral infarction, intracerebral haemorrhage (ICH) and subarachnoid haemorrhage (SAH). It is a major cause of disability and death worldwide. An ischemic stroke occurs due to a lack of blood and oxygen supply to the brain, while a haemorrhagic stroke results from bleeding or leaky blood vessels. Stroke patients experience sensorimotor deficits that impact their balance. This balance impairment significantly affects their ability to perform activities of daily living (ADL) independently and it is a major risk factor for falls. Balance refers to the capability to keep the centre of gravity within the base of support with minimal postural movement. Managing human balance involves a complex process that integrates visual, vestibular, and somatosensory information to the central nervous system. Approximately 83% of stroke survivors experience balance impairments. Various rehabilitation therapies have been used to improve balance in stroke patients, including whole body vibration, mirror therapy, gym-based exercises, boxing therapy, technology-based rehabilitation interventions and dual-task training in both aquatic & land environments. A wobble board is an instrument with an unsteady surface that allows a person to stand on it. It has proven effectiveness in enhancing counter-movement strategies for maintaining balance in healthy individuals. Exercises on a wobble board improves the ankle and hip strategies, which are important for postural control. Biomechanical ankle platform system training, which includes balance training on wobble boards and other unstable surfaces, is extensively used by therapists for stroke rehabilitation, athletic training for ankle injuries and proprioceptive improvement. These boards are designed to permit varying motions that stimulate balance through both anticipatory and reactive mechanisms, utilizing the proprioceptive function of the ankle joint to enhance balance. The aim of the

study to find the effectiveness of wobble board exercises on balance in stroke patients

METHODS:

The study design was a Quasi experimental study. Instruments and assessment tools used for study such as berg balance and four-square step tests. Equipment used wobble board 40cm diameter with rocker base 20cm in radius and parallel bar for support. The data collection procedure participants 48 were recruited from the hospital and community settings based upon the inclusion and exclusion criteria. They were randomly allocated into 24 in the control group and 24 in the experimental group. The purpose of the study was described to the participants and their consent was obtained. Berg Balance Scale (BBS) was used to screen the balance problem. Pre-test was done using Berg Balance Scale and Foursquare step test. Participants in the experimental group received wobble board exercises intervention in sitting and standing position for about 20 minutes and conventional occupational therapy for 10 mins, 2 days/week for 6 weeks. Participants in the control group received conventional occupational therapy intervention for about 30 mins. After 6 weeks, participants were screened for post-test scores using BBS & FSST and compared with pre-test scores. Data were analysed using the 29.0 version of SPSS.

RESULTS:

The results depicted that there was a statistically significant difference in pre-test and post-test scores of BBS and FSST in control group and experimental group. When compare to pre-test scores of BBS and FSST between control and experimental groups. The results showed that there was no statistically significant difference in pre-test scores of BBS and FSST ($p = 0.708$; $p = 0.176$) between control and experimental groups. When compare to post-test scores of BBS and FSST between control and experimental groups. The results showed that there was statistically significant difference in post-test scores of BBS and FSST ($p = 0.000$, $p = 0.001$) between control and experimental groups.

DISCUSSIONS:

To compare the pre-test scores of the Berg Balance Scale (BBS) and the Foursquare Step Test (FSST) between the experimental and control groups. Table 1 and Figure 1, there was no statistically significant difference between the pre-test scores of BBS and FSST in both groups. This indicates that there was no difference in baseline performance between the control and experimental groups. This showed that there was an equal distribution of samples among groups with almost equal mean difference in BBS and FSST and it indicates that the group were homogenous before intervention. Hence the comparison of the post-test scores can be done after the intervention. Comparing the post-test scores of the Berg Balance Scale (BBS) and the Foursquare Step Test (FSST) between the experimental and control groups. Table 2 and Figure 2, there was a statistically significant difference between the post-test scores of BBS and FSST in the two groups. The results indicate a statistically significant difference in both static and dynamic balance in stroke patients between the control and experimental groups. Hence, the alternate hypothesis was accepted. The wobble board exercises intervention was designed to be step-wise, brief, and easier to practice and retain as compared to conventional occupational therapy. This design contributed to greater improvements observed in the wobble board exercises. The reason for this significant improvement in experimental group could be the enhancement of core muscle strength, as exercises on a wobble board require the contraction of core muscles. Research supports that core strengthening programs, which emphasizes balance and coordination through exercises on unstable surfaces like wobble boards, lead to progression Sharma et al., 2019. Improvement in these strategies can explain the increase in scores for certain components of the Berg Balance Scale that require them, such as forward reach, picking up an object from the floor, standing with feet together, and standing on one foot. The overall results of the study show significant changes in experimental group, with mean improvements of (-3.578) in the experimental group and (5.353) in the control group. Madhuranga et al., 2019 contributes to the current study by highlighting the study on hemiplegic patients to improve balance through wobble board exercises following ischemic strokes in the middle cerebral artery territory. The control group received conventional therapy, while the intervention group received wobble board training combined with conventional therapy. Thirty (n=30) patients were randomly assigned to

either the intervention group (n = 15) or the control group (n = 15). The intervention group showed a greater improvement in mean balance scores compared to the control group. The study concluded that wobble board exercises, when combined with conventional therapy, are safe and effective in restoring functional balance in patients with hemiplegia following ischemic strokes.

Table 1:

Pre Test		Mean	Std. Deviation	t – Value	P – Value
BBS	Control	26.75	4.326	-0.377	0.708 NS
	Experiment	27.33	6.218		
FSST	Control	18.83	2.014	1.374	0.176 NS
	Experiment	17.54	1.978		

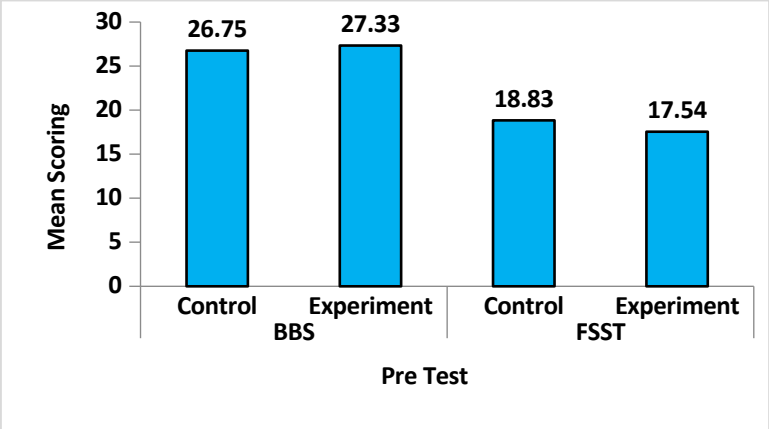


Figure 1:

Table 2:

Post Test		Mean	Std. Deviation	t – Value	P – Value
BBS	Control	35.88	6.010	-3.578	0.000 S
	Experiment	41.50	4.818		
FSST	Control	15.58	3.586	5.353	0.001 S
	Experiment	11.29	1.601		

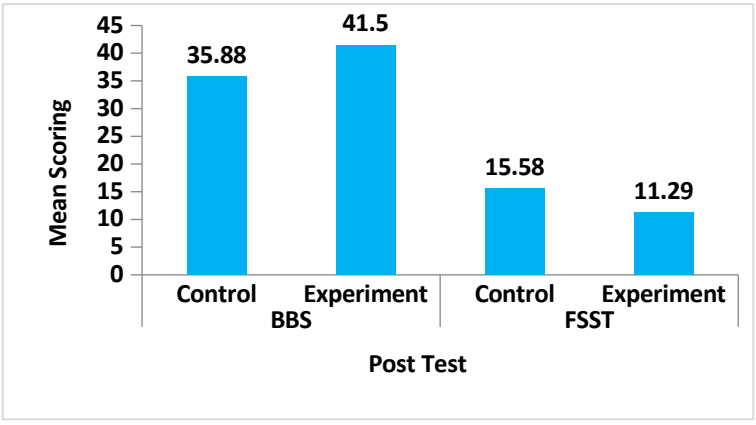


Figure 2:

LIMITATIONS:

The study had several limitations. The convenience sampling method was used. The study setting was moved from hospitals and rehabilitation centres to the community, which made recruitment and intervention delivery more difficult. As a result, the study might not accurately reflect the wider population of stroke survivors in the community. Additionally, participants found it challenging to follow the home-based conventional occupational therapy program.

CLINICAL IMPLICATION:

Wobble board exercises enhance balance in individuals with stroke. This intervention is cost-effective, readily available, and can be used in various settings. Additionally, it is accessible to patients across different economic backgrounds. The study findings suggest that occupational therapists can use wobble board exercises as a supplementary therapy to conventional occupational therapy to improve balance in stroke survivors.

CONCLUSION:

The result depicts that the wobble board exercises and conventional occupational therapy intervention led to significant improvements in the overall scores of the outcome measures. Further it concluded that wobble board exercises were more effective to enhanced both static and dynamic balance, as well as performance in balance-challenging everyday activities like sitting, standing and walking. The study recommended that wobble board exercises as an effective protocol for improving balance in stroke patients.

ETHICAL CLEARANCE:

The ethical clearance number is SRMIEC-ST0523-600.

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