

The Effectiveness of Proprioceptive Training & Exercise Therapy in Improving the Balance of Ambulatory Hemiplegics.

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Introduction:

Impairment resulting from stroke such as sensory, motor and impairment in postural control and balance pose a threat to physical safety and can lead to fear of one's safety with self imposed restriction on activities of daily living. Stroke causes problems across multiple systems, including motor control, upper extremity function, gait, and balance.¹

This study aims to systematically explore the efficacy of proprioceptive training coupled with Exercise Therapy in improving balance control for Adult Hemiplegics.

Balance is defined as a complex process involving the reception and integration of sensory inputs, planning and execution of movements, to achieve a goal requiring upright²

Proprioception is defined as interpreting stimuli originating in muscles, joints and other internal tissues that give information about the position of one body part in relation to one-another.³

Balance is diminished in people with hemiplegia and hemiparesis. Postural sway for patients with hemiplegia can be twice that of their age-matched group. Symmetry of weight bearing is also impaired following stroke, with patients bearing as much as 61% to 80% of their body weight through their nonparetic lower extremity⁴

Literature Review

Canadian researchers David Behm PhD and colleagues published a comprehensive review and position stand on the use of instability to train the core. Research has shown that exercises performed on unstable surfaces produce higher levels of muscle activation in both the core and extremity muscles compared to stable surfaces.⁵

Twelve weeks of ankle muscles strengthening and balance exercise program was effective to increase one-leg standing time and tended to decrease the frequency of falls among the elderly^{6,7}

Aims/Objectives :

- To study the effectiveness of balance training in ambulatory hemiplegics on stability trainer.
- To Improve the balance of Ambulatory Hemiplegics.
- To achieve independence from ,walking with Walking Aids(eg:Cane) in Ambulatory Hemiplegics.

Research Design :

- Pre & Post Test Experimental Study Design

Sampling :

- The subjects will be selected through Systematic Random Sampling Techniques .

Sample Size:

Approx 30 stroke patients between 4 mths to 100 mths post onset are included in the study.

Duration of Study:

- 4 weeks.

Inclusion Criteria:

- Diagnosed Cases of Stroke
- Functional and community ambulators with or without ankle foot orthosis and cane.
- Patients with history of Hemiparesis due to stroke and limited ambulation.
- Patients who are able to accept and eligible to undertake balance training on a stability trainer.

Exclusion Criteria:

- No perceptuo – cognitive deficits like hemispatial
- neglect, attention, and memory deficits.
- Any significant radiological findings such as fracture of lower limb.
- Wernicke’s or Global aphasia
- Patients who have complications of foot like Diabetic Foot

Instrumentation/Material Used

- **Equipments needed for Assessment**
 - Ruler 2 standard chairs (one with arm rests, one without)
 - Footstool or step
 - Stopwatch or wristwatch
 - 15 ft walkway
- **Equipments needed for Treatment**
 - Patients record sheets
 - Stability Trainers(Green,Blue,Black)
 - Chair
 - Watch

Procedure

30 stroke patients ranging between 4 mths to 100 mths post onset were included in the study. All subjects were community and functional ambulators. They were assessed on Timed Get Up and Go Test(GUG) They were divided into control group and experimental group. Control group patients were offered 14 Exercises to improve balance devoid of Proprioceptive Training on Stability Trainers and Experimental Group were offered 14 exercises to improve balance with **Proprioceptive Training on Stability Trainers**. And Pre And Post Experiment Assessment. 14 exercises were performed on 4 challenge levels(single green, single blue, green on green, blue on green, green on blue, blue on blue) of Stability Trainer depending on their performance. They were on 4 weeks training programme with each challenge level lasting for days of duration each.

Assessment:

Timed Get Up and Go Test (GUG Test Scale)

The patient is seated comfortably in a firm chair with arms and back resting against a chair. The patient is then instructed to rise and stand momentarily, & then walk 3 m towards the wall at normal walking speed, turn without touching the wall, return to the chair, turn and sit down. Performance on the original GUG test is scored using a Five Point Ordinal scale ranging from 1, Normal (No risk of falls) to 2, Very Slightly Abnormal; 3, Mildly Abnormal (Increased Risk of Falls); 4, Moderately Abnormal; and 5, Severely Abnormal (high risk of falls).

Comparison of Mean TUG/GG (Pre & Post) in studied groups

TUG(GG) Score Range	Group A (No. of Subjects & Percentage Participation)		Group A (No. of Subjects & Percentage participation)	
	Pre	Post	pre	Post
1	0 (0.0%)	9 (60.0%)	0 (0.0%)	11 (73.3%)
2	9 (60.0%)	5 (33.3%)	8 (53.3%)	3 (20.0%)
3	3 (20.0%)	1 (6.7%)	5 (33.3%)	1 (6.7%)
4	3 (20.0%)	0 (0.0%)	2 (13.3%)	0 (0.0%)
Total	15	15	15	15

Table 4.2 Comparison of Mean TUG (GG) (Pre & Post Intervention)

TUG(GG) score	Group A		Group B	
	Pre Intervention	Post Intervention	Pre Intervention	Post Intervention
Mean ±SD	2.60 ±0.828	1.47 ±0.640	2.60 ±0.737	1.33 ±0.617
Significance	t=8.50: P<0.0001		t=6.141: P<0.0001	

Group A-Control Group and Group B-Experimental Group

Result & Discussion

Description

These tables show the comparison of Pre and Post GGS score in both studied groups. In group A 60% cases were found the scale of 2 which decreased to 33.3% in the post-intervention assessment and 0%

cases in scale of 1 during the Pre Intervention Assessment which rose to 60% in the Post Intervention assessment. In Group B (Experimental Group), 53.3% cases were found in the scale of 2 which decreased to 20% in Post Intervention Assessment. 0% cases were found in the scale of 1 which rose to 73.3% in the post-intervention assessment.

Conclusion:

The relearning of postural control through proprioceptive-training is believed to be an effective therapy for improving balance control. It is thought that by proprioceptive training, they will become more aware of the body's displacements and orientation in space.

Stability Trainer provides an unsteady surface that challenges the body to maintain balance. During the exercise intervention with Stability Trainer,

Sensory inputs are manipulated by altering the support surface and environments

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