

# Comparison of Task-Oriented and Bobath-Based Trunk Training on Balance, Functional Abilities and Walking in Ischemic Stroke Patients

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## ABSTRACT

**Aim:** To determine the outcome of task oriented and bobath based trunk training on balance in ischemic stroke patients

**Study design:** Randomized controlled trial

**Place and duration:** Physical Therapy department, Younas health care Hospital Shahdara

**Methodology:** Sixty-six patients rewarding the inclusion and exclusion criteria were assigned in two groups, Group 1 and Group 2. Group 1 was given conventional treatment + Task oriented trunk and Group 2 was given receive Convention treatment + Bobath based trunk training. Participants in both groups were joined in a 12-week physiotherapy session that seen three days a weekly for one sixty minute respectively day. They stayed examined at starting point and after the 12-week mark. Berg Balance Scale and Trunk impairment scale were used as outcome measures.

**Results:** The adjustment score of BBS was 8.93 (6.32-11.54) that helps in investigational set ( $P < 0.001$ ). Furthermore, variation score of the Trunk Impairment Scale between the groups was 3.34 (1.48-4.91). It also helps the Task-oriented group with ( $P < 0.001$ ). However, task-oriented approach is more effective.

**Conclusion:** Exercises performed with task-oriented approach are more effective to improve balance and functions of the patients with ischemic stroke as associated to patients who were treated with Bobath approach. Besides, better improvement has been found on purposeful balance suggesting the surplus effects with task-oriented exercise.

**Keywords:** Stroke, Bobath, Task-oriented, Balance

## INTRODUCTION

Stroke is an abrupt stop in circulation to the brain, resulting in neural impairment that continues at smallest 24 hours. It is the quarter chief source of death and disability trendy the US. Numerous deficit and impairments may arise, including sensory, motor, cognitive and language impairments. Typically, motor impairments are unilateral<sup>1</sup>.

Reversible ischemic neurological deficits, which determination impulsively when brain swelling decreases, however persistent may result in permanent disability. Apart from paralysis of the upper and lower extremities, stroke frequently results in paralysis and impairs the trunk's proactive and reactive control<sup>2,3</sup>.

The literature demonstrates that decreased trunk flexors, extensors, and bilateral rotators strength affects stroke patients on the affected side and on the unaffected side<sup>4,5</sup>. This loss of trunk motor control results in decreased pelvic movement and the formation of an asymmetrical trunk posture, precluding the employment of protective mechanisms against balance loss<sup>6,7</sup>. Thus, lone of the areas of rehabilitation is to reestablish the patient's balance and trunk control in a variety of postures and actions, including sitting, standing, reaching, sit to stand and walking.

Trunk control is highly dependent on the trunk's sensorimotor ability to provide a firm foundation for balance function. Static and dynamic postural control are dependent on the trunk's selective movement control<sup>8</sup>. In unilateral stroke, trunk muscles impairment is multidirectional<sup>9-12</sup>. In CVA patients, back muscle power stayed pointedly decreased aimed at both sided extensors, flexors and rotators when linked to age corresponding group leisurely by hand detained dynamometer<sup>13</sup>. Other studies conclude the same<sup>4,5</sup>. A study shows that specific activities of the trunk are also weakened after stroke<sup>14</sup>.

Several studies have been published on this subject<sup>15,16,17</sup>. Control of the trunk is well recognized to develop from the proximal to the distal aspect of a limb and is a precondition for greater distal limb controller<sup>18,19</sup>. A helpful association among trunk presentation, functional mobility and stability<sup>20</sup>.

Physiotherapy rehabilitation is primarily concerned with regaining control of the upper and lower extremities. Additionally, little is known about the therapies that are most effective at restoring trunk function. Therefore, it is critical to determine the optimal course of therapies that restore its function and so enhance the stroke population's quality of life and health.

Neurodevelopmental treatment (NDT), commonly recognized as the Bobath impression, is one of the leading treatments of stroke rehabilitation today. The trunk is crucial to the Bobath-based therapy approach for hemiplegia. Body can be upright and perform distal functional mobility with good trunk maintain and correct weight transfer. Proximal stability has a direct correlation with the excellence of effort in the head and limbs<sup>3,4</sup>.

Verheyden et al<sup>7</sup> reported that functionally focused actions are required additional useful trunk control. Karthikbabu et al.<sup>8</sup> found that unstable surfaces improved control more effectively. Trunk training increased ambulatory speed, steps, and walk symmetry in another study conducted by the same researchers<sup>9</sup>. Saeys et al<sup>10</sup> stated that trunk exercise, in addition to standard approaches, improved trunk function, equilibrium, and movement.

Affording to a study, contemporary post-stroke treatments enhance muscular power and constancy, expand trunk range of motion, and improve static and dynamic trunk control. The Swiss ball is frequently used in stroke therapy. Swiss ball training has also been more beneficial than ground-based training in healthy persons and athletes<sup>5-21</sup>.

A study discovered that training on an unstable surface enhanced the cross-sectional part of the trunk muscles and stability function substantially additional than training on a stable surface<sup>22</sup>. Karthikbabu et al., 2011 additionally evaluated the impact of these workouts on trunk performance and balance when performed on a labile surface vs. a stable surface. The findings of this investigation indicated unequivocally that the therapy group improved greatly in trunk control and balance.

However, these studies have several limitations, including the fact that participants were recruited from a single geographical zone, demographic information about participants was not reported beyond the inclusion/exclusion criteria, limiting their generalizability to a larger population, and a lack of proper follow-up to determine the sustainability of the true effect.

Insufficient literature has discussed the clinical outcomes of bobath based trunk training and task-oriented trunk training to

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improving balance and function ability and walking in ischemic stroke patient. There is a need for a randomized controlled experiment that integrates standing and sitting workouts and assesses their effect on mobility function.

Finding of this study will have a number of important implication for future research and practitioners. It will assist physiotherapists for choosing the technique which will produce stronger results for treating ischemic stroke patients. Future studies may emphasize that combine physiotherapy could obtain better outcomes.

**MATERIALS AND METHODS**

A Randomized Controlled Trial was conducted at Physical Therapy department, Younas Health Care Hospital Shahdara from 02-06-22 to 02-03-23 after IRB permission. Non-Probability purposive sampling technique was used. The designed sample size TIS was 33 in both groups. After that each participant was randomly allocated to each group by using the lottery method of randomization in which a number was assigned to each participant. The study was single blinded in which the assessor was unaware of the treatment given to both groups. Before giving either treatment to each group, baseline data were collected from each participant and then after 6<sup>th</sup> week of treatment.

After adding 20% dropout the final sample size became 33+6=39 in each group. Inclusion criteria was age of the patients between 45-75, both male and female, a patient who has had a persistent unilateral stroke (6 months), individual with BBS score ≥ 20, ≤ 40, a Mini-Mental Status Examination score of 24 or greater (MMSE) and ability to sit independently on a hard surface for at least 30 seconds without any assistance. Exclusion criteria was patient with additional balance-related problems such as cerebellar illness, vestibular pathology, etc, patient with musculoskeletal abnormalities, or with any degenerative condition impairing lower limb motor ability. Data was collected after taking written consent from each patient. Participants underwent a detailed examination and assessment for eligibility as per inclusion and exclusion criteria. Primary outcome in this study was trunk damage scale, while secondary results stayed useful agility and balance purpose.

Risk was assessed by time up and go test (TUG) and Balance Function was assessed by Berg Balance Scale (BBS).

Group A received conventional treatment and Task oriented trunk training whereas Group B received Convention treatment and Bobath based trunk training. The therapy regimen was designed with the patients' functional limitations in mind and was consist of seven trunk exercises based on the Bobath idea (Group B). These included latissimus dorsi muscle stretching, latissimus dorsi functional usage and strengthening, functional abdominal and oblique abdominal muscle strengthening, including workouts to aid improve trunk extension, right and left hip rotations and counter-rotations with the trunk stretched, lumbar spine stabilizers training, shoulder, anterior, right, and left sides functional reach.

Exercise was applied by Physical Therapist in accordance with the Bobath. Conventional treatment uses TENS, Hot pack. Patient's dynamic sharing was ensured for fine functional movements numerous repetitions; following passive movement and holding difficult movements in the inner-range. The Group A; patients performed hardening (trunk flexion-extension) and stretching exercises (stretching and elongation), rug activities (bridging), efficient activities (weight transfer from anterior to posterior and left to right), and range of motion exercises (trunk flexion, extension, left-right rotation, lateral flexion). Participants in both groups were enrolled in a 12-week physiotherapy program that met three days a week for one hour each day. They were examined at baseline and after the 12-week mark. The patient assessment was done before and after the completion of the intervention. The data was examined using SPSS v.22.

**RESULTS**

Patients remained not dropped during the interventional duration. There were 15 patients in each group. The groups were parallel invariables like sex, socioeconomic station, profession, nature of stroke, status of DM and HTN at the starting point. The difference score of BBS remained 8.93 (6.32-11.54) that helps the experimental group (P<0.001). Besides, variation score of the Trunk Impairment Scale between the groups was 3.34 (1.48-4.91). It also helps the Task-oriented group with(P<0.001).There was not at all change in terms of fall risk in both the groups.

Table 1: Comparison of subject characteristics between control and study groups

	Control Group	Experimental Group
Gender	40% Females 73.3% Males	60% Males 26.7% Females
Socioeconomic status	40% Lower Class 20% Middle Class 40% Upper Class	13.3% Lower Class 60% Middle Class 26.7% Upper Class
Occupation	53.3% Businessman 46.7% Employed	46.7% Businessman 53.3% Employed
Dominant Side	60% Left 40% Right	40% Left 60%Right
Type of Ischemic Stroke	46.7% Major Ischemic Stroke 53.3% Transient Ischemic Stroke	46.7% Transient Ischemic Stroke 53.3% Major Ischemic Stroke
Artery Effected	20% Anterior Artery 26.7% Middle Artery 53.3% Vertebral Artery	26.7% Anterior Artery 40% Middle Artery 33.3 Vertebral Artery
Diabetes	60%	40%
Hypertension	20%	20%

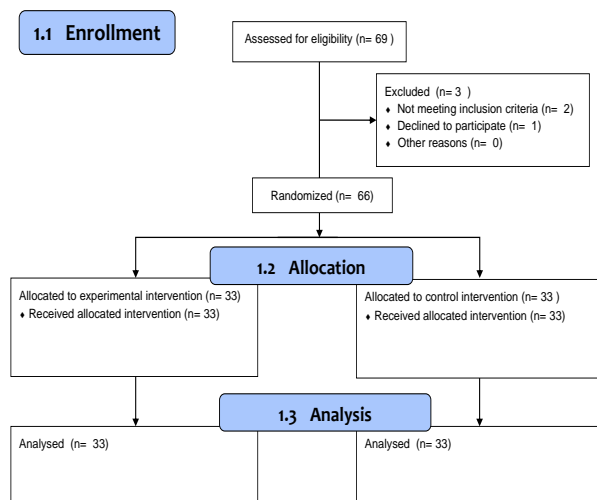
Table 2: Group Statistics (Trunk Impairment Scale)

	Experimental Group	N	Mean	Std. Deviation	Std. Error Mean
Trunk Impairment Scale Pre-Interventional Score	Task-oriented group	15	13.6000	1.45406	.37544
	Bobath group	15	12.9333	1.48645	.38380
Trunk Impairment Scale Post-Interventional Score	Task-oriented group	15	19.6000	2.64035	.68173
	Bobath group	15	16.4000	1.88225	.48599

Table 3: Group Statistics (Berg Balance Scale)

	Experimental Group	N	Mean	Std. Deviation	Std. Error Mean
Berg Balance Scale: Pre-Interventional Score	Task-oriented group	15	25.6667	2.46885	.63746
	Bobath group	15	26.2000	2.62406	.67753
Berg Balance Scale: Post-Interventional Score	Task-oriented group	15	49.9333	3.80726	.98303
	Bobath group	15	41.0000	3.13961	.81064

Figure 1. CONSORT Flow Diagram  
CONSORT 2010 Flow Diagram



## DISCUSSION

The study was done to relate the effects of task-oriented trainings with exercises achieved as per Bobath approach. The results of this study demonstrated that better development has been initiate on useful balance signifying the legacy effects with task-oriented exercises.

Balance and function was found to improve and the effect size index was 2.1 for trunk impairment scale. Previously the study confirmed that decreased activation of high threshold motor points reduces anticipatory postural adjustment of the trunk. The muscles help in reactive balance control

The results are similar to a learning on things of supplementary ten hours trunk exercises in stroke patients. The variation mark in active sitting balance was 1.47 on the trunk weakening scale. The change in score among the groups was a little low, a better effect size (4.07) was originate in our experimental group compared to of Verheyden et al study. There was improved weight shiftability in patients to the hemiplegic side<sup>21</sup>.

Control of lower trunk is more weakened in stroke patients and they alteration their weight towards the non-hemiplegic side. The focus of study on lower trunk control and it may have led improved balance and function. The comparison group received the same exercises on the plinth. This insufficiency in the dealing effect would only be qualified to the lack of unrests.

The exercises of trunk on the vertical standing and walking activities was detected in both groups. Furthermore, neurodevelopmental concept states that movement regulate from proximal to distal region. The effects of these trainings have shifted to distal body parts in purposeful activities.

A recent study also supports the correlation between trunk stability and balance in stroke patients who were able to walk independently around 5 meters per minute<sup>25</sup>. This point under scores that patients were able to exchange the base of support from single to double limb support. Furthermore, placing single leg on and off the step twice shows the dynamic single leg stance for 15 seconds. This improvement also attributed to the proximal single limb control.

The findings of this study are clinically important for the improvement of the dynamic sitting, standing and stepping balance in the acute stroke patients especially for those with inability to sit independently for at least 30 seconds. Therefore, results of this

study justify the inclusion of the dynamic equipment such as physioball in the rehabilitation program of the stroke patients due to refinement of the selective trunk control and carried-over effect to other body parts.

The limitations of this study include, inadequate sample size and absence a proper continuation to get the maintenance of effects after end of intervention period. It is known that renewal of proximal trunk is answerable for the development in the distal control, a future research is needed with the inclusion of the seeming electromyography to confirm these assumptions. Upcoming research is also mandatory to establish the effects of interventions on further outcomes such as fall self-efficacy and community rehabilitation.

Literature shows reasonable mark regarding the efficiency of trunk training in stroke patients<sup>6</sup> a study showed the efficacy of three altered physiotherapy approaches (NDT, specific reaching tasks, and balance training). They were associated and the Bobath method and was stated to be the most effective for trunk development<sup>7</sup>. However, in another study, trunk training with the Bobath concept was found to have no effect on sitting balance<sup>8</sup>.

A learning conducted by P Ravieta<sup>7</sup>, it was definite that 10 sessions of trunk range of motion exercises in count to conventional therapy improved the lateral flexion movements of the trunk, that is functionally based deeds remain required for additional efficient trunk control. Researchers observed that unstable surfaces were more effective in improving control. In another study trunk training was found to recover walking speed, cadence, and gait symmetry<sup>9</sup>. An RCT confirmed that trunk training in addition to conventional approaches effect betters on trunk function, balance, and mobility<sup>10</sup>.

## CONCLUSION

Exercises performed with task-oriented approach are more effective to improve balance and functions of the patients with ischemic stroke compared to patients who were treated with Bobath approach. Furthermore, better development has been created on purposeful balance suggesting the carry-over effects with task-oriented training exercise

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1. Conception and design of or acquisition of data or analysis and interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication.

All authors agree to be responsible for all aspects of their research work.

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