International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Effect of Task Oriented Activity Training on Improving Balance and Self Efficacy in Sub Acute Stroke

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ABSTRACT

Many interventions have been practiced and used for the rehabilitation of balance in stroke patients among which one of the approach is the task oriented activity. In the present study this approach has been used to evaluate its effectiveness on improving balance, self- efficacy and functional status in sub acute stroke. Thirty individuals were selected and divided into two groups of fifteen each, one group was administered conventional therapy and the other group was administered conventional therapy along with task oriented activity approach for four weeks (five days per week). Berg Balance Scale, Activity-specific Balance Confidence Scale, Timed Up and Go and Barthel Index were used prior before starting the therapeutic intervention and on last day of the intervention to assess the changes between the baseline and the post intervention. Independent t-test was used for comparing means between all the two groups. Paired t- test was used to compare the difference within the groups at two time periods –baseline and after 4 weeks. The results showed significant improvement in both the group administered with conventional therapy along with task oriented approach. With the mean difference found between the pre and post therapeutic measurements was much more in the experimental group in balance, self- efficacy ($p > 0.00\%$) and functional status ($p > 0.04\%$). So it concludes, that the present study provides evidence for the effectiveness of task oriented approach on improving balance, self-efficacy and functional status.

Keywords: Stroke, neuroplasticity, balance, self-efficacy, task oriented activity approach, Berg balance Score, Activities Specific Balance Scale, Timed Up and Go, Barthel Index.

INTRODUCTION

Stroke has been defined as 'rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer, or leading to death, with no apparent cause other than of vascular origin'. [1]

Balance is disturbed following stroke with impairments in steadiness, symmetry, and dynamic stability common. Problems may exist when reacting to a destabilizing external force (reactive postural control) or during self-initiated movements (anticipatory postural control). Disruptions of central sensorimotor processing lead to an inability to adapt postural movements to changing task and environmental demands and impair motor learning. Patients with stroke typically demonstrate asymmetry with most of the weight in sitting or standing shifted toward the stronger side. They also demonstrate increased postural sway in standing. Delays in the onset of motor activity, abnormal

timing and sequencing of muscle activity, and abnormal co-contraction result in disorganization of postural synergies. Patients with hemiplegia typically fall in the direction of weakness. [1] Self-efficacy is defined as a judgment of one's ability to organize and execute given types of performances. [2] Due to the impairments leading to difficulty in day to day activities, the individual loses his confidence in doing them which would again lead to deterioration of the motor function.

The rate and extent of recovery post stroke depends largely upon the initial degree of impairment, on an intact cortex adjacent to the lesion, and on the timing and intensity of the rehabilitation. Improvement of motor activity may occur post stroke because of the recovery of marginally functional neurons and later due to reorganization or relearning of neural functions (i.e., neuroplasticity). [3]

Various therapeutic approaches can be applied after stroke based on neurophysiological, motor learning or orthopaedic principles. However, they do not specifically target balance, and there is no evidence that any of these approaches is more effective than another in promoting the recovery of postural control. [4] Among some approaches the below mentioned approaches are used for the stroke rehabilitation, they are as follows - treadmill along with backward walking, ground backward walking, proprioceptive activities, range of motion, stretching activities, strengthening activities, coordination tasks, and motor re education, aerobic exercises, visual feedback with rhythmic balance training (weight shifting) on a force platform, balance training using equipments like Smart Balance Master, task oriented activity approach. [5-9] Recently, evidence was found on improved walking ability not being associated with improved motor control of the paretic lower limb, [10-12] but rather with the development of compensation movement strategies [12,13] and improved coping with loss of function in enhancing the ability to maintain balance over the non-paretic lower limb. [13,14]

Task-oriented approach, movement emerges as an interaction between many systems in the brain and is organized around a goal and constrained by the environment. Task-related practice is advocated during stroke rehabilitation to improve functional performance of daily activities such as walking and reaching to grasp objects. [15]

Many of the studies show that the Task Oriented Activity Training is helpful in improving in balance and self efficiency in chronic post stroke patients. But due to paucity of literature found on whether this training given to sub acute stroke patients helps to overcome balance related issues, reduce risk of falls and increase individual's self efficacy. Also most of the studies done have targeted one of the activities like sit to stand, gait, etc, but very few literature is found on the overall parameters of the lower limb function such as walking in different ways such as obstacle walking, lateral walking, backward walking, walking with different speeds, stepping up and down, stair climbing, also balance was challenged in activities like close standing, reach out for targets while standing at the same position, maintaining balance on a wobble board, etc.

The present study was designed to determine the add on effect of task oriented activities training along with the conventional therapy on sub acute stroke patients for improving their balance and functional status.

MATERIALS AND METHODS

30 patients with subacute stroke were selected on the basis of the inclusion criteria like first occurrence of stroke diagnosed by CT or MRI or diagnostic medical reports by a neuro physician, age between 35 to 65 years, duration after stroke between 4 weeks to 6 months, mini mental scale score of more than 24, Brunnstrom voluntary control (BRS) grade 3 or more, participant ambulatory before stroke and doesn't have any medical contraindication to walking. The patients having any other

neurological disease or musculoskeletal disorders and any other sensory issues affecting balance were excluded.

Institutional Ethics Committee of The Sarvajanik College of Physiotherapy approved the study.

30 patients (25 males and 5 females), who met the inclusion criteria were allocated randomly into one of the two groups using quasi randomization procedure. The patients were informed about the study and a written consent was taken prior to this study. The patients were blinded of the intervention provided to them.

Group B once they fulfilled the inclusion and exclusion criteria. The same sequence of procedure was followed throughout for consecutive participants.

Groups and procedure:

Group A: In this group, participants were administered conventional treatment.

Group B: In this group, the participants were administered conventional treatment along with task oriented activities approach.

Pre test measurements of dependent variable balance were done, using outcome measures Berg Balance scale (BBS) for balance, Activities-Specific Balance Confidence scale (ABC) for self efficacy, Timed Up and Go (TUG) for functional task and Barthel Index (BI) for activities of daily living were taken on Day 1 before the intervention started.

Table 1: List of activities that were a part of task oriented approach given to the patients of Group B

Sitting and reach out for targets
Standing and reach out for targets
Close standing
Speed walking
Transfer from chair to chair
Balancing on a wobble board
Step up and step down activity
Lateral walking
Walking to a particular distance
Walking backwards
Walking on an obstacle course
Ball kicking activity along with walking
Stair climbing

The intervention training for each individual of both the Group A and Group B was administered for 4 weeks with 5 days intervention in each week. The treatment session was of 60 minutes.

At the end of 4th week, all outcome measures were recorded as post test measurements using the same methods as for pre test measurements.

RESULTS

Descriptive statistics of mean and standard deviation for continuous variable were used. Independent t-test was used for comparing means between the two groups. Paired t- test was used to compare the difference within the groups, at baseline and after 4 weeks. Results were considered to be significant at $p<0.05$ and confidence interval was set at 95 %. All statistical analysis was performed using SPSS version 20.

Paired t-test values of control group and experimental group

Table 2: Pre and post comparisons of BBS

	(BBS)	Mean	SD	t	P
Control	Pre	42.0	2.13	23.482	0.00
	Post	46.26	1.90		
Experimental	Pre	41.4	1.84	33.31	0.00
	Post	49.66	1.95		

Table 3: Pre and post comparisons of TUG

	(TUG)	MEAN	SD	t	P
control	Pre	20.56	1.09		0.00
	Post	17.57	1.64	8.374	
Experimental	Pre	21.05	0.731	22.27	0.00
	Post	13.40	1.093		

Table 4: Pre and post comparisons of ABC

	(ABC)	MEAN	SD	t	P
control	Pre	9.748	0.65	11.79	0.00
	Post	12.29	1.12		
Experimental	Pre	9.66	0.66	46.63	0.00
	Post	17.29	0.65		

Table 5: Pre and post comparisons of BI

	(BI)	MEAN	SD	t	P
control	pre	53.00	3.16	15.199	0.00
	post	64.00	3.38		
experimental	pre	51.33	0.66	20.917	0.00
	post	68.00	0.65		

DISCUSSION

The purpose of the study was to assess the effectiveness of task oriented activity approach given along with conventional therapy for improving balance and self efficacy among sub acute stroke patients.

The results showed significant improvement in both the groups i.e. group administered with conventional therapy and group administered with conventional therapy along with task oriented approach. But the mean difference between the pre and post therapeutic measurements was found much more in the Group B.

Van de port et al conducted a systematic review including 21 high-quality RCTs. The results showed medium-sized, statistically significant effects in favour of task-oriented circuit class training for walking distance and gait speed and the TUG. No statistically significant effects were found for the step test or balance control measured by the BBS. [16,17] The findings of this present study contrast to the study mentioned above, support the increase in the gait speed and the TUG. But it does not support the no change in BBS. As there was significant increase in the score of BBS found in the study.

Wevers Lotte et al conducted a systemic review on effects of task-oriented circuit class training on walking competency after stroke which included 6 studies. This systematic review demonstrated medium-sized, statistically significant effects in favour of task-oriented circuit class training for walking distance and gait speed. No statistically significant effects were found for the step test or balance control measured by the BBS. Also most patients that were recruited for circuit class training showed relatively high scores on the BBS at baseline, which limits further significant change on this scale. [18] The present study is in agreement with the results with an outcome of increase gait speeds.

Though studies mentioned above have very less difference or change in their outcomes after the interventions as contrast to the present study, but the present study highlights some of the features which were included in the studies that would justify the change in their outcomes of the intervention. The present study included many activities in the form of task which were a part of the BBS which would might be the probable reasons for the improvements that were found in it, also the intervention that consist of additional task oriented approach consisted of activities such as Sit to stand', 'Transfer from chair to chair', 'Balancing on wobble board', 'Reach out task' along with these activities like walking with various speeds, obstacle walking, backward walking, stair climbing, step up and step down. These activities were goaled towards improving the balance of the patients with sub acute stroke in their day to day activities which were not much included in the studies discussed above. Also the improvement found in the conventional group was due to the therapeutic intervention administered to them, which was a holistic approach that included strengthening, stretching, walking and mat exercises in which their balance is challenged unlike the studies discussed above where one group were upper extremity activities as in the study of Salbach N. In studies by Van De Port, et al, Lotte Wevers, et. al, their baseline data of the patients with sub acute stroke chosen were already found to be higher therefore no significant change could be found but in the present study there were patients with sub acute stroke who had initially a low baseline data therefore a significant change was found in their improvement. [19]

Though both the groups showed improvement, but the group that received conventional therapy along with the task oriented approach showed its improvement in the scoring of the BBS which included tasks like 'standing feet together unsupported', 'picking up an object from the ground', 'turning 360 degrees', 'placing alternate foot on step or stool', 'tandem standing' and 'standing on one leg', which was found to be 49.26 as compared to the mean obtained prior intervention which was 41.44. This improvement was seen more in this group because the exercises more focused on activities like reaching out, balancing on wobble boards, stepping up and down. Also the patients with sub acute

stroke' gait speed measured by TUG was found to be increased more in this group because there were many tasks that focused on the gait of the subject like walking, speed walking, lateral walking.

CONCLUSION

Based on the results of the present study it can be concluded that the improvement found in the group who received conventional exercise therapy along with Task oriented activity approach in balance, self efficacy and functionality is unclear, as not a larger change has been found in functionality of the patient as compared to the statistical significance that has been shown above. Thereby, further studies are required to prove its clinical significance.

Limitations:
Limited sample size
Longer duration for treatment can be taken under consideration

Source of funding: Self financed
Conflict of interest: none
Ethical Clearance: Taken from institute.

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How to cite this article: Katerawala S, Shah R, Sarvanan M. Effect of task oriented activity training on improving balance and self efficacy in sub acute stroke. Int J Health Sci Res. 2019; 9(5):109-114.

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