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ORIGINAL ARTICLE

Effects of Balance Training on Trunk Control and Postural Stability in patients with Sub-Acute Stroke

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ABSTRACT

Aim: To compare the effects of balance training on trunk control and postural stability in patients with sub-acute stroke
Methods: A randomized control trial study was carried out with a total of 60 stroke patients. Both males and females, aged above 40 years, were able to stand for at least 5 minutes without any support, and patients on grades 2, 3, and 4 on a scale of functional mobility were included in the study. Each group has a session of training for 40 minutes, 3 times per week for 6 weeks Berg Balance Scale was used for assessment. The valuation was done at baseline 3rd week and last 6th weeks. After 6 weeks of treatment, significant progress was recorded on Berg Balance Scale in both groups. BMI and nutritional status of the study population were also assessed.
Results: The p-value of the balance error scoring system after the 6th week of treatment was (P=0.004) while at berg balance scale after the 6th week was (0.001), In group B, the p-value of the balance error scoring system after the 6th week of treatment was (P=0.001) while at berg balance scale after 6th week were (0.001), which showed significant results after 6th week of treatment. The p-value of the balance error scoring system between groups was at baseline 0.16 while after the 6th week of treatment was 0.001 and the p-value of the berg balance scale between the group was at baseline 0.764 while after the 6th week of treatment was 0.04. Both levels of the assessment indicated significant improvement in-between groups. In control group A (p=0.004) however, in the experimental group (p= <0.001), BESS also showed substantial development in both the experimental and control group with p-value (p<0.001) for each group. The results of the study population suggest that there is a strong relationship between obesity and stroke.
Conclusion: This study evaluated that task-oriented balance training with sensory input indicated more progress in balance coordination and postural stability as compared to task-oriented balance exercises without sensory integration in patients with stroke
Keywords: BMI, Postural Stability, Rehabilitation, Stroke

INTRODUCTION

After cancer and Heart disease stroke is third leading of death, causes remarkable morbidity and disability considered as major public health issue worldwide[1] It causes motor impairment, usually with involvement of face, arm and leg in various combination, it leads motor impairments such as cranial nerves, muscle power and tone, reflexes, balance, gait ,coordination and apraxia[2]. Stroke affecting fifteen million people every year among them, nearly 50% of stroke patient's experienced disability and postural deficits[3]. Additionally stroke survivor's shows greater postural oscillations and altered muscular activation compared to healthy controls[4]. For these reasons they may have difficulties executing complex task and exhibit and increased risk of falling due to difficulties in walking and standing[5].

Physical therapy is main recommendation component of stroke rehabilitation for preventing complication and improving function in patients, the earlier study have demonstrated the effects of Training programs in preventing physical inactivity and improving gait ability in chronic stroke patients[6]. The task oriented training designed by Shepherd and Carr in 1980 is a kind of exercise therapy for stroke patients that are based on the motor learning theory emphasis on motor skill re training its main focus is to maximize the effectiveness of the inner sense needed in the task performance and then improves the adaption ability[7]. Past studies shown that task oriented training better improves functional ability than does traditional exercise intervention[8]. In previous study related to task oriented training attempted to increase the effects of intervention programme by controlling the parameters of stroke patients. Currently group task oriented intervention in circuit classes proposed as a method of improving the performance ability after stroke in task practice[9].

In previous study group task oriented intervention was an effective in improving gait ability as individual task oriented circuit training centered task oriented training is effective intervention to improve balance ability by using the Berg Balance Scale (BBS) in Stroke patients[10].

However, the effects of task orientation treatment between control and balance training group after sub-acute stoke has not been investigated in recent studies in Pakistan. Therefore, the goal of the study was to determine the effects of balance training for comparing the difference between the both groups on trunk control and postural stability in patients with sub-acute stroke.

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MATERIAL AND METHODS

A randomized control trail study was conducted at different clinic of Hyderabad Sindh from April to October 2021 via non-probability convenient sampling technique by sealed envelope method was used. Total 60 sample size included and it was calculated through open Epi tools. Each group consisted of 30 participants. Both male and female were includedwho had stroke more than six months of history, age above 40 years, oriented and grade 2, 3 and 4 on functional mobility scale. Participants who had shortfall of somatic sensation, hemiplegic, vestibular complaint and orthopedic disease which comprise lower extremities for example osteoarthritis, were not included. Participants of both groups had session of 40 minutes exercises, 3 times a week for 6 weeks. That includes 10-15 minutes of conservative training such as stretching exercises and 25-30 minutes of balance coordination exercise which include, Sitting without backrest while feet on floor, sitting on ball, semi-tandem stance, standing on one leg , Walk forward cross an

obstacle, and then continue to walk, walk lateral and backward and tandem walk. Control group patients had session of balance exercises under light exercises (eye open and hard surface) and Experimental Group patients performed balance exercises initially under normal condition (eye open and hard surface) and then getting advance training in experimental group after 2 weeks. Participants were assessed at baseline, third week and sixth week. The evaluation made through 4 outcome tools.

Berg balance scale, activities specific balance confidence, balance error scoring system and dynamic gait index. The BMI of the study population was also assessed by weight in kg and height in feet. A 24 hour recall for three consecutive days was used to assess the routine and energy intake of the patients. Data analyzed through statistical package of social science SPSS Version 23. Normality assessed according to Shapiro Wilk test.

RESULTS

A total 30 post-stroke patients were enrolled into two groups control and experimental. The mean age of control group was 54.12 with SD±5.42 and experimental group was 54.82 with SD±5.04 . In this study, both male and female wereincluded, control group consist of 63.33% males and 36.67% females and experimental group have 76.73% males and 22.33% females. Mostly of patients have left side affected and majority have MCA (group A=76.67, group B 83.33) type of stroke. This study showed that in stroke patient's task oriented balance training in addition to sensory measures in have significant outcomes than task oriented balance training without sensory integration.

Table I: Descriptive statistical analysis

	Demographics	Control Group A	Experimental Group B
Age	In year	54.12±5.42	54.82±5.04
Gender	Male	19(63.33%)	23(76.67%)
	Female	11(36.3%)	7(22.33%)
Side	Right	16(53.3%)	12(40%)
	Left	14(46.7%)	18(60%)
Type of stroke	MCA	23(76.67%)	25(83.33%)
	ACA	7(22.33%)	5(16.67%)

In group A, the p-value of balance error scoring system after 6th week of treatment were (P=0.004) while at berg balance scale after 6th week were (0.001), In group B, the p-value of balance error scoring system after 6th week of treatment were (P=0.001) while at berg balance scale after 6th week were (0.001), which showed significance results after 6th week of treatment. The p-value of balance error scoring system between groups was at baseline 0.16 while after 6th week of treatment was 0.001 and The p-value of berg balance scale between group was at baseline 0.764 while after 6th week of treatment was 0.04. Both levels of assessment indicated significant improvement in between group.

Table 2: between and within group analysis

Outcomes		Group A	Group-B	Mean Different	p-value
Trunk impaired score	Pre	37.61±6.99	37.65±3.67	0.04±3.32	0.16
	Post	34.16±5.61	32.13±3.04	2.03±2.57	0.001**
Mean Different		3.45±1.38	5.52±0.63		
p-value		0.004	0.001		
Berg BalanceScale	Pre	25.90±3.80	25.89±3.41	0.01±0.39	0.764
	Post	18.80±3.00	16.70 ±3.22	2.1±0.22	0.04*
Mean Different		7.1±0.8	9.19±0.19		
P-value		0.001	0.001		

DISCUSSION

The target of this research was to examine the effect of task-specific training on trunk control and postural stability after stroke. The current study, is a single-blind RCT in which Group-A received task-oriented schooling, however Group-B, received conservative treatment depending upon neurological rehabilitation emphasizing at improvement of trunk and stability. We got significant findings in the task-specific training group towards the improvement of TIS, Berg balance scale than conservative treatment.

One of the previous results confirmed the same findings that in a task-oriented circuit training program there is a significant decrease in the TUG score[11]. Another study, also suggests that group training is more effective than individual therapy towards balancing ability and gait toleration[12].

Another study carried out by Choi J et al, Results indicated comparison between Neuro-dynamic advance technique and multisensory inputs in post stroke patients the value was measured by BBS, they conclude no significance at acute in stage of stroke (p<0.393), However in chronic patients there is improvement in the outcome of the at BBS (p<0.052) in multisensory integration group[13]. Result of this study also supports the outcome of current study.

Significant improvements were observed among experimental and control groups but experimental study group was more effective. This is anatomical reality that the trunk muscles are reciprocally innervated and pivotal muscles which rarely contract singularly in any event, even when the arm starts a one-way movement, to maintain the body, however it could impose the pressure on the muscle cell. This is similar with Jean-Charles and his colleagues who stated that anterior and axial muscles are innervated from both contralateral and ipsilateral corticospinal pathways[14]. Studies in animals have shown that the corticospinal tract transfers collateral projections to nuclei from which reticulospinal neurons arises. These processes come from the areas of the motor cortex that control contraction and relaxation of of proximal and axial muscles[15].

However, in other review there were no significant difference between pre and post-evaluation in the BBS and TGU scores. Although the treatment protocol in the earlier research was not homologous to the existing study, and the selection criteria of the participants were different. They selected those individuals in the trial who were admitted in the hospital during the experimental period, whereas the individuals in the current study were walk-in patients. As inpatients require less exercise than outpatients, it was believed that task-oriented exercise is more potent in outpatients[16].

However, there is a need of more Studies with large sample size in which more Follow-ups can be done to see long term effects of this training. It can also be replicated by increasing the duration of treatment.

CONCLUSION

The study concluded that task-oriented training and conservative therapy are effective in between and within groups towards improving trunk control and postural stability after stroke. There is also significant improvement in task-oriented training group on BSS and TIS.

Conflict of interest: Nil

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