IMPACT: International Journal of Research in Applied, Natural and Social Sciences (IMPACT: IJRANSS)
ISSN (P): 2347-4580; ISSN (E): 2321-8851
Vol. 6, Issue 03, Mar 2018, 19-28

EFFECTIVENESS OF FUNCTIONAL SELECTIVE TRUNK MOVEMENT EXERCISE ON TRUNK CONTROL AND PERFORMANCE IN ADL AMONG ACUTE STROKE SURVIVORS

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Received: 23 Feb 2018 **Accepted:** 10 Mar 2018 **Published:** 16 Mar 2018

ABSTRACT

The aim of the study was to find out the effectiveness of functional task incorporated selective trunk movement exercise on trunk control and performance of ADL.The quasi-Experimental prospective study design was adopted for this study. The study was conducted at the SRM general hospital, SRM University, Kattankulathur. Study subjects were persons with acute stroke between the age group of 40 to 70 years. 30 subjects were taken for the study based on inclusion criteria(15 in experimental and 15 in the control group). Trunk Impairment Scale (TIS) and Functional Independence Measure (FIM) were used as outcome measures. The result showed that Comparison between the pre-test and post-test score for TIS and FIM in the experimental group showed a statistically significant difference. Comparison between the pre-test and post-test score for TIS and FIM in the control group showed no statistically significant difference. The study concluded that that Functional Selective Trunk Movement Exercise has a beneficial effect on Trunk Control and Performance in Activities of Daily Living (ADL) among Acute Stroke Survivors

KEYWORDS: *Acute Stroke, Functional Selective Trunk Movement, Exercise, ADL and Trunk Control*

INTRODUCTION

Background

Stroke is an enormous and a serious public health problem. It is the third most common cause of death in the world, after ischemic heart disease and all types of cancer[1]. In India, the prevalence of stroke is estimated to be 203 per 100,000 populations, accounting for a total of about one million cases. It is ranked as the sixth leading cause of disability in 1990 and is projected to rank fourth by 2020 [2].

A stroke or injury to the motor cortex results in weakness or paralysis of the contralateral limbs and the axial musculature with the severity exhibited more at the distal musculature than in the proximal [3]. It is also reported that the deficits of trunk muscle strength were exhibited on the contralateral side as well as to a lesser extent on the lesion side [4,5]. Many studies, that were carried out by means of isokinetic dynamometer muscle strength testing in patients with chronic stroke, have reported weakness in flexors, extensors and bilateral rotator of the trunk ,when compared to that of age matched, healthy controls [6,7]. Further studies done by Franchignoni F P, et al, and Hsieh CL, et al found that function of these trunk muscles were impaired after stroke when they assessed the trunk control of people with stroke using Trunk Control Test (TCT) [8,9]. Another similar study using the Trunk Impairment Scale (TIS) found that selective movements of

the upper and the lower trunk were impaired in people with chronic stroke [10]. The trunk performance has been identified as an important early predictor of functional outcome after stroke.[3,6] The emphasis of post-stroke rehabilitation has been to restore independence in gait and arm function [11, 12]. To some extent, this focus may unintentionally bypass the development of good trunk stability in preparation for the performance of daily living skills. In addition, early hospital discharge can result in the use of atypical or compensatory strategies to compensate for trunk instability. Later in recovery, these compensatory patterns may be learned and difficult to reverse [13].

Lacunae of Research

Although several studies discretely reported the effectiveness of Selective trunk muscle exercise in trunk rehabilitation after stroke[14, 15] and the usefulness of functional task in the treatment of stroke [16,17], there are no studies that I have come across to this day that intends to find out the effectiveness of incorporating functional task with selective trunk muscle exercise.

Need for the Study

To my knowledge, the present study is the first of its kind which attempted to determine the combined effect of selective trunk muscle exercise training with the functional task on trunk control & performance in activities of daily Living (ADL) among acute stroke survivors.

Aim

To find out the effectiveness of functional task incorporated selective trunk movement exercise on trunk control and performance of ADL.

OBJECTIVES

- To find the effectiveness of functional task incorporated selective trunk movement exercise on trunk control.
- To find the effectiveness of functional task incorporated selective trunk movement exercise on performance of the ADL.

Research hypothesis (H1)

There is a statistically significant improvement in trunk control & performance of ADL when administering functional task incorporated selective trunk movement exercise an individual with acute stroke

METHODOLOGY

Research design: It is a quasi-experimental intervention prospective study design is used to compare the effectiveness of the interventions given.

Study Setting

This study was conducted in the SRM General Hospital, Chennai

STUDY SAMPLE

Study Population

Consist of patients with acute stroke and who fulfills the inclusion criteria.

Sample Size

30 subjects with acute Stroke. From which 15 individuals were allotted for theexperimental group and 15 individuals in the control group.

Sampling Technique

Thirty [N=30] was selected through Purposive sampling procedure. Each of the participants was again divided into an experimental group and control group, each group consists of 15 subjects.

SCREENING CRITERIA

Inclusion Criteria

- Subjects with an acute stroke of (i.e. $\leq$ 6 months from the onset of stroke).
- Subject within the age group of 40 to 70 years
- First onset of unilateral supra-tentorial (hemorrhagic or ischemic stroke).
- Subjects who can understand and follow 3 step command (Person who obtained $\geq$8 out of 10 in the short portable mental status questionnaire [SPMSQ].
- Subjects who obtained a score of $\leq$ 21 out of 23 in the trunk impairment scale.
- Subjects who are not receiving any other therapeutic intervention specifically for trunk rehabilitation or trunk impairment.

Exclusion Criteria

- History of any other neurological disease affecting balance other than stroke (like Parkinson's disease or Vestibular lesion).
- History of any other musculoskeletal disorder affecting motor performance.
- History of recent surgery in the upper and lower extremity.
- Subjects with any other psychiatry illness.

TOOLS USED

- **Trunk Impairment Scale (TIS)** [18]: is a new tool to measure the motor impairment of the trunk after a stroke through the evaluation of static and dynamic sitting balance as well as coordination of trunk movement.
- **Functional Independence Measure (FIM)** [19]**:** It measures the level of a patient's disability and indicates how much assistance is required for the individual to carry out activities of daily living

- **Short Portable Mental Status Questionnaire (SPMSQ) [20]:** It is a 10-item test measuring the presence and the degree of intellectual impairment of the elderly.(Screening Tool)

DATA COLLECTION PROCEDURE

Study Procedure

The purpose of this study was explained to the authorities of the SRM General Hospital and a written consent form was taken from each of the participants participating in this study.

The procedure for data collection involves mainly two phases:

Phase 1

A pilot study was carried out with 5 acute stroke patient to bring out a functional task selective trunk movement exercise regime by integrating functional task with the selective trunk movement exercise protocol, from the key article, which could be applicable for both hemiplegic and paretic patients and that could be applied within the given limited time (45 min).

Phase 2 (Evaluation and Intervention Phase)

30 subjects with acute stroke (≤6 months) were recruited from SRM Medical College Hospital, based on the inclusion and exclusion criteria. The purpose of the study was explained to the subjects. A written consent form was obtained from each subject duly filled and signed. An initial evaluation was done using a brief neurological evaluation, Trunk Impairment Scale, and FIM Scale. The data collected served as baseline information (pre-test evaluation) for the treatment intervention, before the treatment program began.

Subsequently,all the participants were divided into the experimental group (n=15) and control group (n=15). Both the experimental group and the control group participated in a conventional stroke rehabilitation program which was patient-specific. The control group received an intervention with selective trunk movement exercise alone and the experimental group received an intervention with functional task incorporated selective trunk movement exercise regime for the duration of 45 min per day for 5 days in 4 weeks. The Post-test evaluation was carried out at the end of the treatment intervention. Finally, the data was statistically analyzed.

DATA ANALYSIS

Descriptive Statistics

Mean, Frequency and Standard deviation were used to find out the distribution of demographic variables.

Inferential Statistics

A Paired t -test was used to compare the effectiveness between experimental and control group. Pearson's Correlation was used to find out the correlation between TIS and FIM.

RESULTS

Table 1: Frequency and Percentage Distribution of Demographic Variables of the Stroke Clients in the Experimental Group and the Control Group N=30

Demographic Variables		Group			
		Experimental(n=15)		Control(n=15)	
		n	%	n	%
Age	40 -50 yrs	5	33.3	4	26.7
	51 -60 yrs	4	26.7	5	33.3
	61 -70 yrs	6	40.0	6	40.0
Sex	Male	10	66.7	9	60.0
	Female	5	33.3	6	40.0
Stroke side	Left	9	60.0	10	66.7
	Right	6	40.0	5	33.3

With respect to age distribution, majority 6 (40.0%) were between the age group70-79 years in experimental and control group. With regard to the distribution of gender majority of the participants were male 10(66.7%) in experimental and 9(60%) in control group. With respect to female 5(33.3%) in experimental and 6(40%) were in control group.

With respect to stroke side, the percentage of people with left side stroke is 9 (60.0%,) in an experimental group and 10(66.7%) in the control group.

Table 2: Comparison of Pretest and Posttest TIS Score in the Experimental and the Control Group N=30

Components	Experimental Group(n=15)				Control group(n=15)			
	Mean	SD	't' value	'P' value	Mean	SD	't' value	'P' value
Pre test	8.73	4.448	-15.512	0.001***	7.54	2.70	1.78	0.07
Posttest	16.87	4.340			7.69	2.46		NS

***Significant at <0.001 level**

Table 2 shows the Comparison between the pre-test and post-test scores of the experimental group based on TIS scores. Results indicate that there is a statistically significant difference between pre-test and post-test scores of TIS at p< 0.001 level. Whereas in control group results indicate that there is no statistically significant difference between pre-test and post-test scores of TIS.

Table 3: Comparison of Pretest and Posttest FIM Score in the Experimental and the Control Group N=30

Components	Experimental Group(n=15)				Control group(n=15)			
	Mean	SD	't' value	'P' value	Mean	SD	't' value	'P' value
Pre test	70.00	20.241	-9.722	0.000***	56.67	14.603	1.93	0.06
Posttest	97.73	25.081			57.53	15.032		NS

***Significant at <0.001 level**

Table 3 shows the Comparison between the pre-test and post-test scores of the experimental group based on FIM scores. Results indicate that there is a statistically significant difference between pre-test and post-test scores of FIM at p< 0.001 level. Whereas in control results indicate that there is no statistically significant difference between the pre-test and post-test scores of FIM.

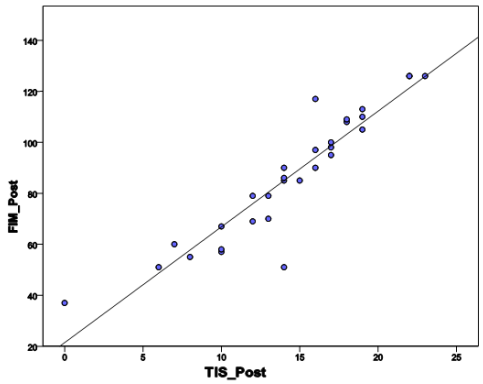

Figure 1: Correlation between TIS and FIM posttest Scores in Experiemental Group

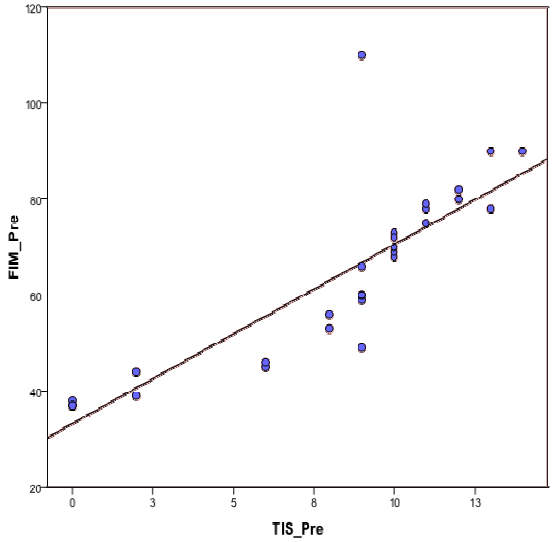

Figure 2: Correlation between TIS and FIM Pre Test Scores in Experiemental Group

Figure 1 and 2 show the correlation between TIS and FIM scale. Using Pearson Correlation, the correlation coefficient was found to be nearer to +1, showing statistical evidence of the strong positive correlation between TIS and FIM scale.

DISCUSSIONS

The experimental group which received conventional therapy program plus functional task incorporated selective trunk movement exercise was compared with that control group which received the conventional therapy program plus selective trunk movement exercise. The results of the study, using independent 't' test, as shown in table 2 and 3 indicate that there is a statistically significant difference in the pretest and post-test scores of TIS and FIM between experimental group and control group, with the experimental group showing improvement than the control group. Hence, the research hypothesis is accepted stating that significant difference exists in the effectiveness of treatment between the experimental group and control group based on TIS scale, with the experimental group showing more improvement than the control group. This suggests that incorporation of a functional task with selective trunk movement exercise showed greater improvement in trunk control and performance of ADL among stroke patients in the experimental group than that was shown by the control group, affirming that the additional improvement was due to functional task incorporation. This

beneficial effect of incorporating task with exercise is supported by studies done by Bo Hyun Kim et al.,[21] and Yea-Ru Yang et al., [22] which demonstrated the effectiveness of task-oriented training program for lower extremity function (walking related task) on lower extremity muscle strength, trunk control ability, balance and gait for personnel with stroke

The results of figure 1 and 2 show a strong positive correlation (P value <0.0001; i.e. near to +1) between TIS and FIM, showed that as trunk control increases the performance in ADL also increases. However, there are strong evidence in the stroke literature that trunk performance is an important predictor of functional outcome. Studies have shown a significant relationship between trunk performance measured early after stroke or on admission to the rehabilitation centre and functional ability measured at discharge from the rehabilitation centre and even 6 months after stroke [8-9, 23-24] This could mean that if trunk performance could be improved in the rehabilitation process, improvement in performance of ADL during the post-stroke period might be expected.

CONCLUSIONS

This study investigated the effectiveness of functional task incorporated selective trunk movement exercise on trunk control and performance of ADL. Functional task incorporated selective trunk movement exercise was more effective in enhancing trunk control and performance in ADL than just providing selective trunk movement exercise, showing an additional effect of incorporating task or activities. Hence, it is recommended that task-oriented training with general physical therapy is an effective intervention approach for stroke rehabilitation.

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