JMSCR Vol||04||Issue||12||Page 14745-14751||December 2016

www.jmscr.igmpublication.org
Impact Factor 5.244
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v4i12.70

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Effectiveness of Trunk Rehabilitation and Balance Training in Improving Trunk Control and Balance in Hemiplegic Patients

Authors
Dr A. Kiran Kumar M.P.T (Neuro)[1], Dr G. Nandini[2], Dr K. Suneel Kumar[3], Dr M.V Naga Bhushanam[4]
[1]Professor, Department of Physiotherapy, Narayana Medical College and Hospital,
[2]Department of Physiotherapy, Narayana College of Physiotherapy
[3]Professor, Department of Physiotherapy, Narayana Medical College and Hospital,
[4]Professor, Department of General Medicine, Narayana Medical College and Hospital

ABSTRACT

Background: *Stroke is defined as rapidly developing Clinical Signs of focal disturbance of Cerebral functions, lasting for more than 24 hours (or) leading to death with no appropriate cause other than that of vascular origin. The aim of trunk rehabilitation and balance training is to improve trunk stability and trunk muscle performance.*

Objective: *To determine the effectiveness of trunk rehabilitation and balance in hemiplegic patients and to compare the trunk rehabilitation and balance training with conventional physiotherapy.*

Material & Methodology: *30 subjects with hemplegia were selected in the study according to inclusion and exclusion criteria and divided into 2 groups. Patients in Interventional group were given trunk rehabilitation and balance training. Patients in control group were given conventional physiotherapy. Berg balance scale and trunk impairment scale will be used as clinical outcome measures to evaluate the effectiveness of training method in improving trunk control and balance respectively.*

Result: *Comparison between 2 groups was analyzed using the unpaired t-test. It revealed a statistically significant difference of p-value ($p<0.001$) between the TIS scoring of group A & B and also showed a showed a statistically significant difference of p-value ($p<0.001$) between the berg balance scale scorings of group A & Group B.*

INTRODUCTION

Stroke is defined as rapidly developing Clinical signs of focal disturbance of Cerebral functions, lasting for more than 24 hours (or) leading to death with no appropriate cause other than that of vascular origin[1]. Stroke is the 3rd leading cause of death worldwide. A WHO study in 1999 quoted incidence of mortality due to stroke in India to be 73/100,000 per year[2].

The effects of stroke are variable depending on location of lesion. The most typical symptom is hemiplegia, which ranges from weakness to full paralysis of the body opposite to the side of supratentorial lesion[3]. Along with limb muscles, trunk musculature is also impaired in stroke patients.

Impairment of trunk control in hemiplegic patients has been characterized by asymmetry in

performance of rotatory and side bending activities [6,7]. This loss of selective trunk activity could result from reduction in strength and amplitude of trunk movements especially on paretic side. Trunk performance has been evaluated by trunk Impairment scale[8] and to enhance the independence of stroke patients in daily life, trunk strengthening and balance training has been followed. Unlike limb muscles, abdominal muscles need a stable origin to act efficiently that is pelvis, thorax (or) Central aponeurosis depending upon part of trunk that is moved. Counter rotation between upper & lower trunk is the mobility over stability task which is essential for all functional movements Trunk rotators cannot function efficiently when their origin & insertion and approximated as spine is flexed [9].

Hemiplegic stroke patients frequently present balance abnormalities in relation to trunk Impairments, associated with poor balance & falls. Balance being the essential part of sitting, sit-to-stand & walking activities leads to increased risk of falling towards paretic side is found to be significant with berg balance scale. The altered trunk movements are a challenge for maintenance of the body equilibrium & restoration of normal movements of the trunk in patients with stroke.

NEED FOR THE STUDY

1. There is need to develop effective treatment pattern to improve trunk control in hemiplegic patients.
2. To enhance the independence of stroke patients in daily life, trunk strengthening & balance training have been followed.

AIMS

- To determine the effectiveness of trunk rehabilitation & balance using trunk impairment scale and berg balance scale.
- To compare the results of trunk Impairment scale with that of berg balance scale.

OBJECTIVES

1) To improve good trunk stability/ trunk muscle performance.
2) To improve the activities of daily living.
3) To improve functional independence.

SAMPLE SIZE

30 subjects are enrolled in the study.

STUDY POPULATION

Includes Male and Female post stroke hemiplegic patients.

STUDY DESIGN

Comparative study

SOURCE OF DATA:

Subjects are chosen from Narayana College of Physiotherapy, outpatient department, chinthare-ddypalem, Nellore.

SAMPLING METHOD

Randomized Sampling method.

Groups

30 patients are randomly assigned into 2 groups of 15 each. 15 are assigned to control group. The diagnosis, age, gender and number of months since onset of hemiplegia were obtained from patient, interviews and medical charts.

Duration of Study

12 weeks of treatment given with trunk rehabilitation, balance training and conventional physiotherapy (4 times per week) with each session lasting for 45 minutes).

Outcome Measures

Trunk impairment scale

Berg balance scale

Trunk impairment scale: This tool is to measure the trunk balance in stroke patients. It has 3 components such as static sitting balance, dynamic sitting balance and co-ordination. The maximum score in this scale is 23).

Berg balance scale: Is a 14 item scale focused on a variety of self – initiated tasks related to every day function. Each topic is scored from 0-4 for a maximum of 56 points.

Inclusion Criteria

1. Unilateral involvement ischemic stroke.
2. Able to understand and follow verbal commands.
3. Ability to stand with (or) without stroke.
4. Scoring less than 21 out of 23 on Trunk Impairment scale.
5. Ability to walk at least 10m distance independently with (or) without walking aid.
6. Scoring at least 30/56 on Berg balance scale.

Exclusion Criteria

1. Neurological diseases affecting balance other than stroke (eg. Parkinson's disease, vestibular lesion.
2. Musculo skeletal disorders of trunk and lower extremity.
3. Uncontrolled hypertension (>180/100 mm Hg).
4. Seizures
5. Mental illness

Materials used: Mat**,** Chair/ Stool, Balance board, Timer.

METHODOLOGY

Training consisted of 45 minutes of trunk rehabilitation, balance training and conventional physiotherapy four times per week for eight weeks. Out of 30 patients 15 are assigned to interventional group, received trunk rehabilitation and balance training.

Trunk rehabilitation exercises consisted of supine and sitting.

Supine Exercises: Includes – Pelvic bridging, unilateral pelvic bridging, flexion rotation of the upper and lower trunk.

Supine exercises:

Pelvic bridge: - was performed by lifting the pelvis off the mat from crook lying.

Unilateral pelvic bridge: was performed by lifting the uninvolved leg off the mat while maintaining pelvic bridge position.

Upper trunk rotation: was performed by bringing clasped hands on either side.

Lower trunk rotation: was performed by moving knees on either side from Crook lying.

Sitting exercises:_ includes Flexion extension of lower trunk, rotation of upper and lower trunk forward and lateral reach.

Patients were seated on the chair/ stool with hips and knee bent at 90^0 angle and the feet kept flat on the floor.

Flexion extension of lower trunk: was performed by ante-flexion and retro flexion.

Upper and lower trunk rotations: were performed by moving both the shoulders and knees forwards and backwards respectively.

Forward reach: was performed by asking the patient to reach a fixed point at shoulder height by forward flexing the trunk at the hips

Lateral reach : was performed by reach out for a fixed point at shoulder height so as to elongate the trunk on the weight bearing side and shorten the trunk on the non-weight bearing side.

Balance training consisted of double leg stance, tandem stance, step forward and backward, step sideways on exercise step, walking forward and backward is tandem walking pattern and performing single leg stance.

Other 15 patients are assigned to control group, received conventional exercise.

Exercises included upper extremity shoulder exercises and lower extremity exercises.

Upper extremity shoulder exercises: weight cuff and dumbbell exercises.

Lower extremity exercises: Sit to stand exercises, partial squatting, toe rises, standing on a balance board.

DATA ANALYSIS: The data were analyzed by repeated measures Paired `t' test and unpaired `t' test.

TRUNK IMPAIRMENT SCALE

Interventional Group

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_TEST	17.5333	15	2.61498	.67518
	POST_TEST	20.8000	15	1.37321	.35456

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE_TEST & POST_TEST	15	.887	.000

Paired Samples Test

		Paired Differences					t	df	P VALUE
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PRE_TEST - POST_TEST	-3.26667	1.53375	.39601	-4.11603	-2.41731	-8.249	14	<0.0001 VHS

Control Group

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE_TEST	16.2667	15	2.98727	.77131
	POST_TEST	18.7333	15	2.60403	.67236

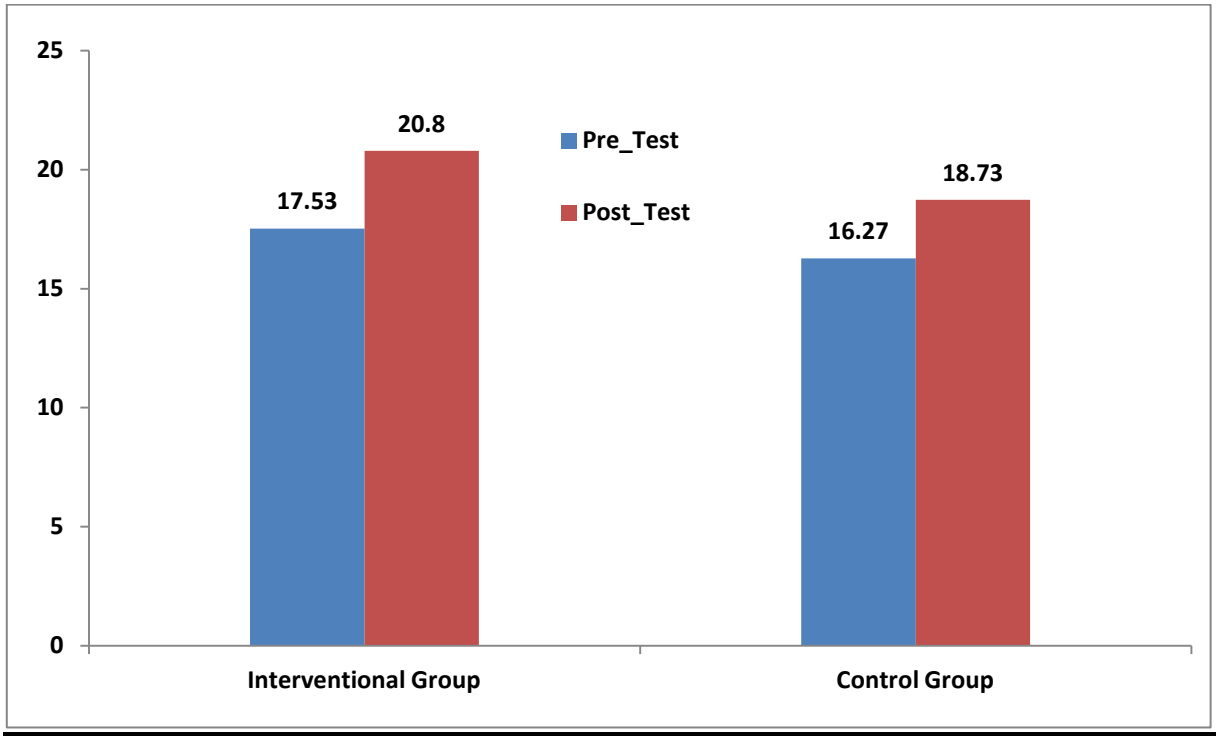
Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE_TEST & POST_TEST	15	.965	.000

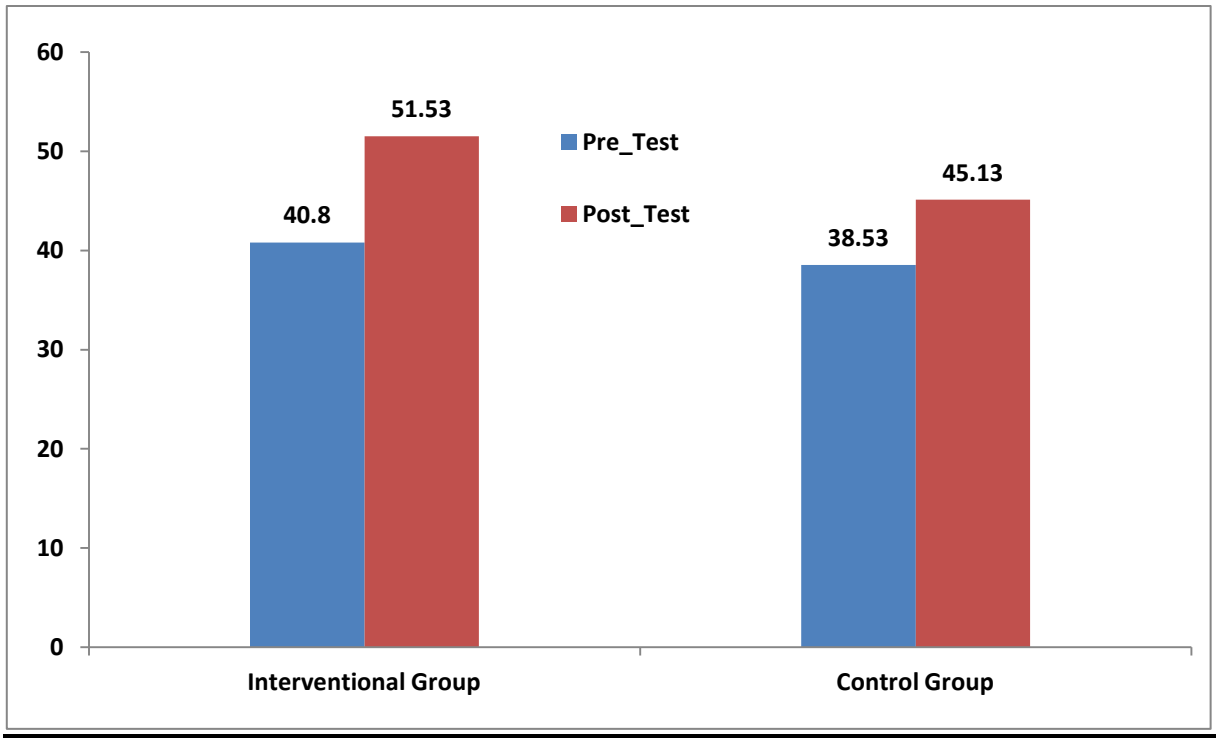
Paired Samples Test

		Paired Differences					t	df	P VALUE
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PRE_TEST - POST_TEST	-2.46667	.83381	.21529	-2.92841	-2.00492	-11.457	14	<0.0001 VHS

TRUNK IMPAIRMENT SCALE



BERG BALANCE SCALE



RESULTS

In this study, pre-test values of both interventional and control groups are not significant. For interventional group there was high significance compared to control group. (I.e. after training that is post test). The treatment of interventional group is trunk rehabilitation exercises, balance training showed improvement after 8 weeks. For patients in Interventional group both mean and t-test values are higher than control group values (p-value is <0.0001). All p-values <0.005 are considered as statistically significant. So, we are accepting alternate hypothesis.

DISCUSSION

In this study, we find that 12 weeks of trunk rehabilitation exercises, balance training improves the trunk control and balance. This study is more effective at enhancing trunk control and balance, in addition to conventional physiotherapy alone.

Clinical scales used to assess the trunk control and balance is by Trunk impairment scale and Berg balance scale. The results of present study are consistent with other studies. A study[12] showed that there was a positive association found between the trunk performance and the balance in patients with stroke. Experts in the field of neurological rehabilitation have addressed the trunk as the central key point of the body and the control of movement proceeds from proximal to distal body region. If an improved level of proximal trunk control gains were attained, a better distal limb control might be anticipated during balance and functional mobility.

In achieving good trunk control, selective trunk movements which helped in strengthening of trunk muscles and also increased awareness of trunk position. A study found that training the patient in the awareness of the trunk position could improve weight symmetry in sitting after the early phase of stroke.

In our study we observed a change in score of Berg balance scale points with trunk rehabilitation. A study showed the effect of the task specific balance training on rate of falls post stroke and concluded that balance training improves the balance and walking speed of hemiplegic / stroke patients. Improvement in balance and gait occurred because both the trunk rehabilitation programme and balance training consist of the use of lower limb muscles.

Our finding suggests that use of trunk rehabilitation exercises and balance training in addition to conventional stroke rehabilitation programme is beneficial in improving trunk control, balance in hemiplegic patients. The study findings indicate an improved trunk control and balance owing to an inclusion of trunk rehabilitation exercises in the comprehensive rehabilitation of patients with stroke.

CONCLUSION

This study showed a large effect on trunk control and balance after the treatment of 12 weeks in subjects who received trunk rehabilitation, balance training as compared to patients who received conventional physiotherapy.

REFERENCES

1. JN. Panicker, N. Thomus, K. Pavithran, D. Nair, P.S. Sarma. Morbidity predictors in ischemic stroke neurology India 2003; 51:49-51.
2. Bhalla et al. Predicting Mortality in stroke, Neurology India, Vol.50; 3 Sept.2002, PP 279-281.
3. O'Sullivan SB & Schmitz 200, Physical Rehabilitation assessment and treatment, 4th edn., F.A. Davis, Philadelphia, PP.519-581.
4. Sarah F Tyson, Maric Hanley, Jay Chillala, And reaselley and Raymond C Tallis. Balance disability after stroke: Physical therapy. 2006, 86: 30-38.
5. Karatas M, Cetin N, Bayran Moglu M, Dilek A. Trunk Muscle strength in relation to balance and functional disability in stroke patients Am, Phys Med Rehabilitation 2004; 83 : 81-87.
6. Rohannon Rc.Recovery and Correlates of trunk Muscle strength after stroke. Int. J Rehabili Re S1995; 18:262-67.
7. Franchignoni FP, Tesio L, Ricupero C, Martino MT. trunk Control test as an early predictor of stroke rehabilitation outcome. Stroke 1997; 28 : 1382-1385.
8. Mertin J, Neiuwboer-A, Verhyden G, Preger R, Kiekens C, Willy De Weerdt. Trunk impairment scale: a new tool to measure motor impairment of the trunk after stroke, Clinical Rehabilitation 2004; 18:326-34.

9. P.M. Davis, "Problems associated with the loss of selective trunk Activity in Hemiplegia". In: P.M. Davis, E.d., Right in the middle selective trunk activity in the treatment of Adult hemiplegia. 1990, PP.31-65.
10. HSiech CL, SheuCF, Hsuch pl, wang CH, Trunk Control as an early predictor of comprehensive activities of daily living function in stroke patients. Stroke 2002; 33.262-66.
11. Verheyden G.Nieuwboer A1 Feys H1 Schuback Baert L, jenni w.e.t.al. Trunk performance after stroke; an eye catching predictor of functional outcome J. Neurol Neurosurgery. Psychiatry 2007; 78: 694-698.
12. G. Verheyden, L.Vereeck, S. Truijen, M. Troch, I.Hergodts, C. Laffose, et.al. "Trunk performance after stroke and relationship with balance, gait and functional ability. Clinical Rehabilitation, Vol.20, No.5, 2006, P.P.451-458.
13. Flansb Jer UB. Progressive resistance training after stroke: effects on muscle strength, muscle tone, gait performance and perceived participation; Journal od Rehabilitation Medicine. 2008; 40(1):42-8.
14. Sara Ahmed, Nancy mayo, Johanne Higgins, Nancy M Salbach, Lois Finch Sharon L Wood, Dauphine; The stroke rehabilitation assessment of movement: a comparison with other measures used to evaluate the effect of stroke and rehabilitation; Physical therapy; 2003; 83: 617-30.
15. S. Tanaka, K. Hachisuka and H. Ogata, "Trunk Rotatory Muscle Performance in Post-Stroke Hemiplegic Patients," American Journal of Physical Medicine and Rehabilita-tion, Vol. 76, No. 5, 1997, pp. 366-369.