

Comparison Between Effects of Functional Training Program and Conventional Therapy on Postural Control and Functional Mobility in Chronic Stroke

QURAT UL AIN¹, ZAINAB HASSAN², SHABANA ASHRAF³, HAFIZA MAHJABEEN⁴, FAREEHA KOUSAR⁵, MISBAH WARIS⁶, SADAF WARIS⁷

¹Post Graduate Trainee, Riphah International University Lahore Campus

²Senior Lecturer, Riphah International University Lahore Campus

³Clinical therapist, Geriatrics Centre Model Town Lahore

⁴Lecturer, Riphah International University Lahore Campus

⁵Senior Lecturer, Riphah International University Lahore Campus

⁶Assistant Professor, Avicenna Medical and Dental College, Lahore

⁷Senior Lecturer, Avicenna Medical and Dental College, Lahore

Corresponding author: Sadaf Waris, Email: dr.sadaf54@gmail.com, Cell: 0308-8112501

ABSTRACT

Objective: To Compare the Effects of Functional Training Program and Conventional Therapy on Postural Control and Functional Mobility in Chronic Stroke

Place and duration of Study: This study was conducted in Qureshi Hospital Sahiwal, from September 2019 to March 2020.

Methodology: A randomized clinical trial was conducted through non-probability convenient sampling technique in which 12 participants were recruited, randomization was done by Lottery method and participants were divided into 2 groups. Group A received functional training treatment and group B received conventional therapy. Participants of both genders with age 40-65 years were included in study with 6 months of confirmed stroke. Patients with any other neurological disorder or those who were Unable to keep any (Sitting or Standing) position for 30 Second were excluded from the study. Berg balance scale, trunk control measurement scale, 6 Min walk test and time up and go test were used as outcome measuring tools. Pre-treatment and post-treatment readings were taken. And data was analyzed by using SPSS version 21.

Results: Mean age and standard deviation of the participants was 48.08 ± 4.833 . TUG pre value is 20.25 ± 2.26 while post treatment value is 15.25 ± 1.14 and pre-value for BBS is 39.75 ± 3.54 while post 48.42 ± 3.2 . In 6 MWT pre of the participants was Functional training program improves postural control and functional mobility in chronic stroke patients.

Conclusion: It was concluded that functional Training program is better technique to improve patient's condition as compare to Conventional therapy in TUG and BBS. Both interventions showed non-significant difference on TCMS and 6MWD.

Keywords: Functional training program, chronic stroke, Postural control, Functional mobility

INTRODUCTION

Stroke can be, normally named as a neurological deficit ascribed to an intense damage to central nervous system (CNS) by a vascular cause, including cerebral localized necrosis, intra cerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH), and around the world it is a significant reason for incapacity, ill health, disability and death¹ individual of age 60 and older than this had more cases of being assaulted by stroke. Weakness of muscles contralateral to the damage of brain is among the most devastating damages after stroke and harmfully affects the functional performance of survivors.^{2,3} Although about 70% to 80% survivors of stroke will improve the capacity to walk for a couple of distances on plane surfaces, just half addition i-e, 50% fractional society ambulation and less than 20% have unhindered ambulation in the society. In stroke all extremities are affected and they show different sign and symptoms including incoordination⁴ Specificity is a common principle of exercise training. This Principle states that every training is related to particular muscle group, fiber type and type of muscle contraction.⁵ Physical fitness is critical to permit individuals to do regular exercises, for example, strolling and climbing steps. Physical fitness

differs among everybody⁶ Trunk control and sitting balance are supposed to be the key predictors in functional outcome after stroke. Trunk control, sitting, and standard balance or mobility are able to be improved by trunk training.⁷ Many times injuries can be controlled or minimized by having postural control and this requires a stable core. Isometric or isotonic conditioning is must to be encompassing in core strengthening. Applying a functional balance program on the balance board allows for isometric contraction of the body core and thus achieving a stable functional lumbo pelvic hip complex.⁸ Neuro physiological techniques help to normalize or facilitate normal patterns, the functional technique focus on environmental role and the task in the performance of functional activities. Functional activities are learned by repetitive practice of task related activities in functional environment.⁹ Tamaya Van et-al (2019) did a systematic review to investigate effect of trunk training on standing balance, mobility and on sitting trunk control after stroke. After reviewing several studies they executed trunk training as core stability, weight shift and PNF exercises. There results showed that treatment was effective for trunk control and mobility. They concluded that here is solid evidence that show trunk training is capable of to improve trunk control and sitting

and standing balance and mobility.¹⁰ Behnaz Shahtahmassebi et-al (2019) after a research concluded that in older adults, trunk exercises training improves muscle size, function and strength. The purpose of this research was to estimate the efficacy of a multimodal exercise program to increase trunk muscle morphology and strength in older adults and their related changes in functional ability 64 older adults to age 60 were kept to a 12 week exercise program (including walking and balance maintaining exercises) with or without trunk. Motor control exercises that followed by a 6 week long, only walking program (detraining 32 per group) "DETRAINING is what happens when you take a prolonged break from training: you lose fitness". The conclusion is supported by the inclusion or involvement of such exercises as a part of multimodal exercise program in older adults.¹¹ Koshiro Haruyama et-al (2016) investigated the effect of training program on core stability and trunk and standing balance and function, and mobility in patients having stroke. They concluded that core stability training has more favorable effects on trunk function or standing balance and mobility in patients having stroke.¹²

METHODOLOGY

It was a Randomized Control Trial, Data was collected from Qureshi Hospital Sahiwal. The study was completed from September 2019 to March 2020. Through non-probability convenient sampling technique 12 participants were recruited by using epitool for the study (8) and randomization was done through lottery methods. Participants were divided into two groups.

Group A received functional training program including baseline treatment of TENS, hot pack with assisted equipment thera band, Swiss ball ,parallel bars ,balance boards , chairs and stairs of different heights, free weight training including modifiable weights and task oriented activities with different resistance activities.

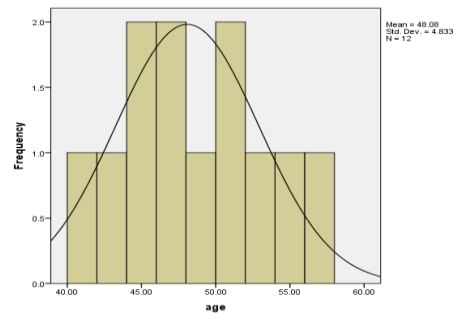
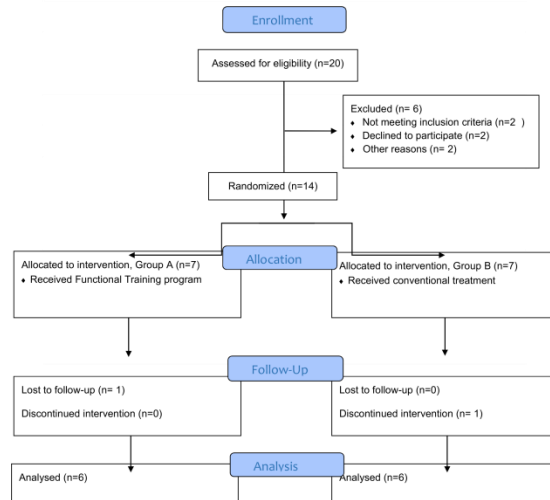
Group B received, TENS, hot pack, and active assisted exercise to active exercises then then resisted exercises with increased repetitions with time.

Inclusion criteria: Clinically diagnosed stroke Patients of both gender with age 40 years to 65 years were included in the study, those participants who were not able to walk independently were a part of the study.

Exclusion criteria: Patients with Unstable CVS status, significant lower limb MSK condition or neurological Condition other than stroke that influence posture. And the Patients with communication barrier and cognitive impairment. Or those who were Unable to keep any (Sitting or Standing) position for 30 Second were excluded from the study. Outcome measuring tools were Berg balance Scale¹³ Time Up and Go Tool.¹⁴ 6 Mint Walk Test, Trunk Control Measurement Scale¹⁵.

Data analysis: Data was analyzed by using statistical package for social sciences (SPSS version 25). Bar graphs were used to present the categorical data and line graph were used to compare the difference of pre value and post value of conventional therapy and functional training program. T-test was used to compare the effect of conventional therapy effect and functional training and paired t test was used to measure difference with-in group.

CONSORT FLOW CHART



DEMOGRAPHICS

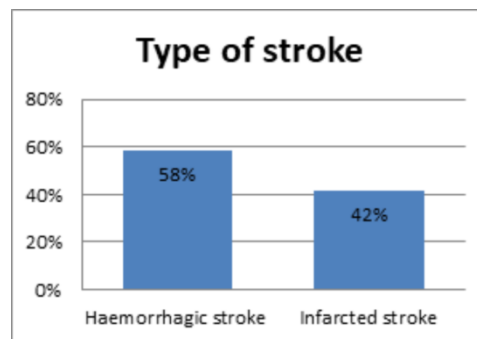
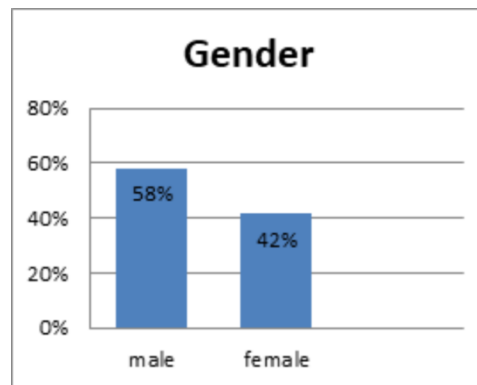


Table 1: Between Group Analysis

Group Statistics				
Variables	GROUP	Mean	Std. Deviation	P-Value
Difference TUG	Conventional	4.17	0.75	0.04
	Functional training program	5.83	1.47	
Difference (TCMS)	Conventional therapy	7.67	2.88	0.98
	Functional training program	9.33	2.07	
Difference (6MWD)	Conventional Therapy	50.17	27.48	0.28
	Functional Training program	50.67	33.64	
Difference (BBS)	Conventional therapy	5.67	1.63	0.001
	Functional training program	11.67	2.73	

Table shows that mean difference of time up and go is 4.17 seconds in conventional therapy while mean difference of time and up and goes is 5.83 seconds in functional training program, mean difference of TCMS by using conventional therapy is 7.67 while mean difference of TCMS by using functional training program is 9.33, mean difference of 6MWD by using conventional therapy is 50.17 while mean difference of 6MWD by using functional training program is 50.67 and mean difference of BBS by using conventional therapy is 5.67 while mean difference of BBS by using functional training program is 11.67

As P-values are less than 0.05 so there is significant difference between TUG pre value and TUG post value, TCMS pre value and TCMS post value, 6MWD pre value and 6MWD post value, BBS-pre value and BBS- post value

Table 2: Within Group Analysis

Variables	Mean	SD	SE	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
TUG-Pre TUG-Post	5.83	1.47	0.6	4.28	7.37	9.71	5	0.000
TCMS-Pre - TCMS-post	-9.33	2.07	0.84	-11.5	-7.17	-11.07	5	0.000
6MWD-Pre - 6MWD-Post	-50.67	33.64	13.73	-85.97	-15.36	-3.69	5	0.014
BBS-pre – BBS-Post	-8.67	3.8	1.1	-11.08	-6.25	-7.9	11	0.000

DISCUSSION

Current study was conducted to find out the effects of functional training program and conventional therapy on postural control and functional mobility in chronic stroke patients. Kaur gulnaz et.al in 2017 studied the effect of home based task oriented training program on lower extremity in chronic stroke and they concluded that task based training program at home improve the function performance of lower extremity and daily activities. The technique was applied for 4 week and data was collected at end of every week. The results of the study showed significant difference between pre and post value on step test, 10 meter walk test, 5 time sit to stand test. In our study we compare both conventional and functional training program in clinical setup for chronic stroke patients for postural control and functional mobility and result of our study showed significant difference between both therapies in TUG and BBS scale but there is no significant difference between both therapies at TCMS and 6MWD pre and post value of functional training program showed significant difference and hence improve functional mobility and postural control.

Koshiro Haruyama et.al in 2016 conducted a research on stroke patients about effect of core stability training to improve trunk function, balance and mobility. This study was RCT and the result of study showed that core stability training improves function mobility and trunk control more than conventional treatment. The result showed significant difference at Trunk impairment scale but no significant difference at TUG. They concluded that core training improve trunk dysfunction but in our study we compared functional training program and conventional therapy to improve trunk control and functional mobility and according to our study functional training program showed significant

difference at TUG test and BBS in improving trunk control and mobility and is better than conventional therapy. TCMS and 6MWD showed no significant difference between conventional and functional training program. Functional training program was applied for 8 weeks and data was collected at baseline and at 8 week, pre and post value of FTP showed significant difference and functional training improves postural control and functional mobility in chronic stroke patient.¹²

Birgitta Langhammer et-al 2012 conducted a research about functional exercises and physical fitness on chronic stroke. The scale is used for measuring the progress were TUG, BBS, 6MWD and BI in acute stroke. Change scores showed a greater prospective for rehabilitation in the motor assessment scale ≤ 35 in relation to group motor assessment scale >35 though the functional capacity later increased. This showed the importance of sustaining exercise and training for all patients following stroke but in our study we compare both functional and conventional training in chronic stroke patient and the scale used were TUG, BBS, 6MWD and TCMS but we didn't include MAS and our study showed significant difference in TUG and BBS.¹⁶

Margaret Inaba et-al (2019) find out that progressive resistive exercise in patients proved to be more significant to improve activities of daily living. In previous study progressive resistance training (64%) made significant improvement in activities of daily living than did patients in the control group (38%) and the active exercise group (30%). In current study functional training program and conventional treatment was compared and both treatments showed improvement in functional daily activities. Both groups showed no significant difference between both

therapies at 6MWD and TCMS as p value is greater than 0.05.

Behnaz Shahtahmassebi et-al (2019) conducted research about trunk training improves muscle size, strength and function in older adults and finds out that by adding trunk training in exercise program functional performance improved as at six weeks, performance in the 30-second Chair Stand Test was better in the trunk strengthening group, relative to the walking-balance group. After 12 weeks of the exercise program, participants in the trunk strengthening exercise group performed better on the 30-second Chair Stand Test, Sitting and Rising Test, Forward Reach Test Backward Reach Test (2.4 [0.33 to 4.5] cm, 12.9%) and Timed Up and Go Test (-0.76 [-1.4 to -0.13] seconds, 12%), relative to the walking-balance exercise group. In current study functional training program showed improvement on postural control and functional mobility at trunk control measurement scale, 6 min walk test, berg balance scale and time up and go test but both therapies conventional and functional training both showed equal improvement at TCMS and 6MWD and functional training program showed significant difference at BBS and TUG.

CONCLUSION

It was concluded that functional Training program is better technique to improve patient's condition as compare to Conventional therapy in TUG and BBS and both interventions showed non-significant difference on TCMS and 6MWD.

Acknowledgment: All praises to Allah

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Easton JD, Saver JL, Albers GW, et al. Definition and evaluation of transient ischemic attack: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease: the American Academy of Neurology affirms the value of this statement as an educational tool for neurologists. *Stroke* 2009; 40(6): 2276-93.
2. Lapchak PA, Wu Q. Vascular dysfunction in brain hemorrhage: translational pathways to developing new treatments from old targets. *Journal of neurology & neurophysiology* 2011; 2011.
3. Hatem SM, Saussez G, della Faille M, et al. Rehabilitation of motor function after stroke: a multiple systematic review focused on techniques to stimulate upper extremity recovery. *Frontiers in human neuroscience* 2016; 10: 442.
4. Eng JJ, Tang P-F. Gait training strategies to optimize walking ability in people with stroke: a synthesis of the evidence. *Expert review of neurotherapeutics* 2007; 7(10): 1417-36.
5. Hawley JA. Specificity of training adaptation: time for a rethink? *The journal of physiology* 2008; 586(Pt 1): 1.
6. Manini TM, Everhart JE, Patel KV, et al. Daily activity energy expenditure and mortality among older adults. *Jama* 2006; 296(2): 171-9.
7. Karthikbabu S, Chakrapani M, Ganeshan S, Rakshith KC, Nafeez S, Prem V. A review on assessment and treatment of the trunk in stroke: a need or luxury. *Neural regeneration research* 2012; 7(25): 1974.
8. Verheyden G, Nieuwboer A, De Wit L, et al. Trunk performance after stroke: an eye catching predictor of functional outcome. *Journal of Neurology, Neurosurgery & Psychiatry* 2007; 78(7): 694-8.
9. Muratori LM, Lamberg EM, Quinn L, Duff SV. Applying principles of motor learning and control to upper extremity rehabilitation. *Journal of Hand Therapy* 2013; 26(2): 94-103.
10. Van Crielinge T, Truijen S, Schröder J, et al. The effectiveness of trunk training on trunk control, sitting and standing balance and mobility post-stroke: a systematic review and meta-analysis. *Clinical rehabilitation* 2019; 33(6): 992-1002.
11. Shahtahmassebi B, Hebert JJ, Hecimovich M, Fairchild TJ. Trunk exercise training improves muscle size, strength, and function in older adults: A randomized controlled trial. *Scandinavian journal of medicine & science in sports* 2019; 29(7): 980-91.
12. Haruyama K, Kawakami M, Otsuka T. Effect of core stability training on trunk function, standing balance, and mobility in stroke patients: a randomized controlled trial. *Neurorehabilitation and neural repair* 2017; 31(3): 240-9.
13. Newstead AH, Hinman MR, Tomberlin JA. Reliability of the Berg Balance Scale and balance master limits of stability tests for individuals with brain injury. *Journal of Neurologic Physical Therapy* 2005; 29(1): 18-23.
14. Dhote SN, Khatri PA, Ganvir SS. Reliability of "Modified timed up and go" test in children with cerebral palsy. *Journal of pediatric neurosciences* 2012; 7(2): 96.
15. Heyrman L, Molenaers G, Desloovere K, et al. A clinical tool to measure trunk control in children with cerebral palsy: the Trunk Control Measurement Scale. *Research in developmental disabilities* 2011; 32(6): 2624-35.
16. Langhammer B, Lindmark B. Functional exercise and physical fitness post stroke: the importance of exercise maintenance for motor control and physical fitness after stroke. *Stroke research and treatment* 2012; 2012.