

CASE REPORT**Effect of Trunk Training on Dynamic Balance in Chronic Stroke Survivor**MARIA SAMAD¹, BINASH AFZAL², AMNA ALI³, FAIZA ALTAF⁴, AMBREEN ASLAM⁴¹Neuro Muscular Physical Therapy Student at Riphah International University, Lahore²Assistant Professor at Allied Health Sciences Department at Riphah International University, Lahore^{3,4,5}Neuro Muscular Physical Therapy Student at Riphah International University, LahoreCorrespondence to Maria Samad, E-mail: mariasamad996@gmail.com, Tel. +92 3234103251**SUMMARY**

Stroke leads to muscle paresis, balance and postural control deficits. Balance instability is challenging problem in stroke survivor. Trunk control is prerequisite for balance either static or dynamic. Trunk training encompassed exercises to strengthen trunk muscles on a therapeutic mat (stable surface) and Swiss Ball (unstable surface). The objective was to estimate the effect of trunk training on dynamic balance in chronic stroke patient. The case was of 50 year old female patient with left hemiparesis. She had impaired trunk control and balance and assessed with Trunk Impairment Scale and Berg Balance Scale. The intervention comprised of trunk training of 40-50 minutes 3/week for four week. Trunk impairment scale and Berg balance scale score was improved post intervention which proposed that trunk training is useful to restore dynamic balance.

Keywords: Stroke, Trunk Training, Balance**INTRODUCTION**

Stroke is a neurological disorder that impairs the body's sensorimotor function¹. Additionally, trunk function impairment, muscle paresis, impaired postural control and balance are post stroke manifestations that reduced mobility and increased risk of fall^{2,3}. Numerous factors (neural and biomechanical) requires to maintain balance such as visual, vestibular, and somatosensory systems⁴. Dynamic balance – person center of gravity shifts- and mobility is compromised in stroke survivor^{4,5}.

Trunk control ensures body upright posture, weight shift regulation and execute trunk kinesis without losing balance and it depends on the trunk's sensorimotor capacity^{6,7}. Trunk training exercises – reaching, core stability and weight shifting- incorporate the trunk movement in sitting/lying position and minimize the lower extremity function. Literature supported trunk exercise training in post stroke because it recovers trunk control and balance as assessed by the outcome measure tools such as Trunk Impairment Scale and Berg Balance Scale^{2,5}.

Postural sway seen after stroke while preserving sitting/standing position as well as when shifting the body's center of mass in smaller range⁸. Neurologically, trunk is the key point of control for body movement so trunk stability is required for the distal movement. Post stroke patient faced difficulty in performing activities of daily living as the distal movement (head and limb) is also disturbed due to the instability of the torso¹. Retraining of trunk and augmenting balance ability are fundamental in stroke rehabilitation⁹.

Criekinge et al. study stated that implementing trunk rehabilitation on stable and unstable support surface may be a viable stratagem to regain trunk control, proprioception and dynamic balance in post-stroke patients^{2,9}.

The objective of study was to evaluate the effect of trunk training in revamping dynamic balance in chronic stroke survivor.

CASE PRESENTATION

The present case based on a 50 year old female patient. The patient presented with left side hemiparesis which is caused by a middle cerebral artery ischemic stroke five years ago. Initial assessment showed that the patient was oriented but has slurred speech. It was found that she has normal sleep and bowel & bladder pattern. She has postural misalignment; upper body tilted towards left side and left lower limb abducted and externally rotated. She has poor balance control. Babinski sign was positive in left lower limb. Her hand functions such as reach, grasp and release were absent. She was partially dependent in bed mobility activities like lying to sitting, sitting to standing, standing and

walking. The outcome measure tool used was Trunk Impairment Scale (TIS) and Berg Balance Scale (BBS). Baseline measurement for pre-intervention assessment showed TIS was 13 and 26 respectively. The intervention protocol consisted of specific trunk training exercises of 40-50 minutes. The training session will be given thrice a week for four weeks. The session include 5 minute warm up that include range of motion movement, and central part consist of 30-40 minute trunk training followed by 5 minute cool down period. The exercise session interrupted with rest periods. The patient received trunk training exercises on stable surface (therapeutic couch) as well as unstable surface (Swiss ball). The patient performed exercises in two positions: hook lying and sitting position. There were four exercises in hook lying position: (1) abdominal draw-in maneuver with balance pad under the buttocks, (2) bridging (3) trunk rotation (upper and lower). In sitting position, patient performed exercises on two levels. The patient sat unsupported on balance pad then progressed to Swiss ball sitting position. First level comprised of three exercises: (1) pelvic tilt (anterior and posterior and lateral), (3) trunk flexion and lateral flexion and trunk rotation. Progressively, patient was seated on unstable surfaces (Swiss Ball-75cm) to perform several exercises: (1) chest expansion exercises (2) pelvic tilt (anterior and posterior), (3) trunk lateral flexion (4) lateral reach (5) stepping and (6) perturbation in all directions while sitting on Swiss ball. The exercises added gradually to the treatment protocol according to the patient performance. The patient followed the treatment regime diligently. After four weeks of trunk training the, post intervention score was taken. The TIS score was 18 whereas BBS showed 44 score.

Fig. 1: Right Middle Cerebral Artery infarct seen in 50 year old chronic stroke patient



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Table 1: Comparison of Pre Test & Post Test Value

Outcome Measure Tools	Pre Test Score	Post Test Score
Trunk Impairment Scale	13	18
Berg Balance Scale	26	44

DISCUSSION

Balance and stability is necessary to prevent from fall in stroke survivor. Trunk control retraining is the key focus in stroke rehabilitation to revamp the balance deficits. The present study was conducted to inspect efficacy of trunk training exercises on dynamic balance in chronic stroke. The outcome measure score of Trunk Impairment Scale improved from 13 to 18 whereas Berg Balance Scale enhanced from 26 to 44 which indicated that trunk training exercise is beneficial in achieving dynamic balance in chronic stroke patient. Trunk Impairment Scale developed to evaluate the status of trunk impairment post stroke. The TIS specification are as follows; it ranges from 0 to 23 points describing static balance, dynamic sitting balance and trunk co-ordination⁵. The secondary outcome measure was Berg Balance Scale which is a 14 item measure that assess the person's balance during a series of predetermined tasks and ranges from 0 to 56 score². Trunk control and balance ability was significantly improved which is in compliance with the present study result as depicted by TIS score¹⁰.

Lee et al study (2020) conducted various type of trunk exercise on unstable surface and the result showed improvement in dynamic balance in post stroke patients⁸. The improvement in BBS score showed trunk training exercise is highly effective to achieve balance in post stroke survivor which is correlated to the studies conducted in 2016 in Spain². In this study the patient undergone trunk exercises while placing balance pad under the buttocks to make it more challenging to augment balance that is coherent to Jung et al study which focused on the weight shift exercise and the result announced that it improve the proprioception, balance and trunk control in chronic hemi paretic stroke⁶. Support surface is of much importance in stroke rehabilitation as trunk training exercise on a Swiss Ball enhance dynamic balance that is concurrent to a study which preferred trunk training on unstable surfaces (Swiss Ball, Balance Pads) and concluded it as superior to stable surfaces⁹.

Kim et al. in 2016 probed the effect of trunk stabilization training on dynamic balance by performing exercises on Swiss ball and concluded the enhancement of balance ability post intervention⁴. The trunk exercises regime utilized in this study was bridging, reaching, weight shifting and the outcome insinuated that trunk training is beneficial for stroke survivor that is consistent to the previous evidence showed trunk exercises in stroke rehabilitation have profound effects on trunk control, balance and kinesis³. An & Park stated that selective trunk exercise has improved the functional capability of patient by enhancing trunk movement and coordination with the limbs as this study also

focused on the trunk movement with lateral reach for functional activities⁷.

CONCLUSION

In this study the dynamic balance improved in post stroke survivor with application of trunk training exercise regime. Advanced studies can be done with more sample to scrutinize the efficacy of trunk training in chronic stroke for restoration of dynamic balance. Future studies could implement trunk training on unstable surface with or without visual stimulus to enhance balance in chronic stroke patients.

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