EFFECTIVENESS OF TRUNK EXERCISE ON UNSTABLE SURFACE FOR IMPROVING DYNAMIC SITTING BALANCE, GAIT, FUNCTION AND FEAR OF FALL IN ELDERLY- AN EXPERIMENTAL STUDY

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Abstract

Introduction- The balance and gait of elderly persons are crucial factors in health. Postural imbalance and functional performance instability in gait are both closely related to trunk dysfunction. To be able to live independently and perform ADLs, one must have trunk control and dynamic sitting balance.

Objective- To find out the effectiveness of trunk exercises on unstable surfaces for improving dynamic sitting balance, gait, function and fear in the geriatric population.

Study Design- An experimental study.

Method- Using a random sampling technique, 18 participants were chosen for the study based on the criteria. Prior to using a Swiss ball without back or foot support, participants were taught to practise exercises on a balancing board. For a total of 3 weeks, you exercise for 15 seconds, then relax for 2 seconds. This pattern is repeated 7 times over 5 days. Timed up and go, Berg, Lawton instrumental, and Fall efficiency scales were used to measure gait, balance, daily living activities, and fear of falling.

Result- The result of this present study showed that trunk exercises on the unstable surface were very effective to improve the dynamic sitting balance, functional activities of daily living, and gait and prevent falls in the elderly.

Conclusion- The study concluded that trunk workouts on an unstable surface were very beneficial in improving dynamic sitting balance, functional activities of daily living, gait, and preventing falls in the elderly.

Keywords- Dynamic sitting balance, gait in elderly, fear of fall
INTRODUCTION

Balance and gait are important considerations in the health of elderly subjects. It is estimated that 13% of adults self-report imbalance from ages 65 to 69 and this proportion increases to 46% in those aged 85 and older. Abnormal gait has been associated with a risk of institutionalization and death that is 2.2 times that seen in elderly adults without gait disorders.\(^1\)

Additionally, impairments of balance and gait have been implicated in increased risks of falls. In adults aged 65 and older, the estimated annual prevalence of falls is 28%. Although disability and falling are mulch-factorial problems, impaired balance ability is a common and underpinning factor \(^2\). Trunk impairment is closely associated with postural imbalance and functional performance instability in gait\(^3\).

In the elderly population, balance problems are frequently a complex condition. Decreased balance in the elderly can be brought on by a variety of factors, including weakened core stabilizing muscles, changed muscular activation patterns, proprioception loss, and an inability to manage standard postural sway.

According to Kim et al. (11), trunk muscle activation during a reaching exercise in stroke patients is strongly linked with both balance and trunk control. Weight-shifting, pelvic tilt or bridging, and trunk stabilisation exercises with the arms and legs can all be employed as training techniques to enhance balance when sitting. When performing shoulder or hip flexion exercises while seated, the trunk muscles engage to counteract postural sway, and when performing weight-shifting exercises, the ability to control the alignment of the trunk is necessary to counterbalance the change in the centre of mass.

METHODOLOGY

An experimental study was done to find out the effectiveness of trunk exercises on unstable surfaces for improving dynamic sitting balance, gait, function and fear of fall in the geriatric population.

A total of 18 subjects were taken from Department of Physiotherapy, Dolphin (P.G) Institute of biomedical and natural sciences, Dehradun based on inclusion and exclusion criteria Informed consent was taken from all the subjects after explaining the whole procedure. Firstly participants were advised to perform exercises on a balancing board first, then moved on to a Swiss ball without back or foot support. Rest subjects performed activities on a balance board first, and then moved on to a Swiss ball. Each exercise is performed for at least 15 seconds with 2-second relaxation in the repetition of 7 in 5 days in a week with a continuation of 3 weeks. Subjects were assessed gait by the Timed up and go scale, berg balance scale, activities of daily living by the Lawton instrumental scale activities of daily living and fear of fall by the Fall efficiency scale.

BBS is a reliable and valid scale that clinicians commonly used to evaluate the functional abilities in the lower limb of a patient's stroke\(^4\).

TUG is a reliable and valid scale that clinicians commonly used to evaluate the functional abilities in the lower limb of a patient's stroke. The reliability of TUG (ICC2,1=0.98)\(^5\).

FSS is a valid and reliable scale to measure fatigue in stroke. FSS is not sensitive to differentiate fatigue in stroke from the control subjects with
orthopaedic problems with similar age and gender.

**FIADLs** Scale is used to check the instrumental activities of daily life in an older population. The Lawton IADL Scale was originally tested concurrently with the Physical Self-Maintenance Scale (PSMS). Inter-rater reliability was established at .85. The validity of the Lawton IADL was tested by determining the correlation of the Lawton IADL with four scales that measured domains of functional status, the Physical Classification (6-point rating of physical health), Mental Status Questionnaire (10-point test of orientation and memory), Behaviour and Adjustment rating scales (a 4-6-point measure of intellectual, personal, behavioural and social adjustment), and the PSMS (6-item ADLs) 7.

The FES-I scale is a valid scale to examine the fear of falling and balance confidence in a person with dystonia. The reliability cut-off value of FES-I was 29.5. This scale is validated for use in many clinical populations, including multiple sclerosis Parkinson disease and healthy older adults 8.

**DATA ANALYSIS**

Data was analysed using paired sample t-test

**RESULTS**

**TUG Score**

**Table 5.1** The results of the Paired t test shows that there was a statistically significant difference in TUG score before and after the exercise (P<0.001). TUG score decreased significantly after the exercise.

*Statistically significant (P<0.05, Paired t-test)

**BBS Score**

**Table 5.4** The results of the Paired t test shows that there was a statistically significant difference in BBS scores before and after the exercise (P<0.001). BBS score increased significantly after the exercise.

*Statistically significant (P<0.05, Paired t-test)
Table 5.7 The results of the Paired t test shows that there was a statistically significant difference in FIADLs before and after the exercise (P<0.001). FIADLs increased significantly after the exercise.

![Fig 3 Graph showing Comparison of pre- and post-exercise FIADLs score](image1)

**Fatigue**

Table 5.10 The results of the Paired t test shows that there was a statistically significant difference in fatigue before and after the exercise (P<0.001). Fatigue increased significantly after the exercise.

![Fig-4 Graph showing Comparison of pre- and post-exercise Fatigue score](image2)

**DISCUSSION**

The results demonstrate a considerable improvement in gait, FIADLs, and balance training. After completing the trunk training programme for this study, core muscles such as the Rectus Abdominis, Erector Spinae, Quadratus Lumbrorum, Latissimus Dorsi, external oblique, and Gluteus Medius were more active. Exercises for the trunk using a Swiss ball and balance board stimulated more muscular activity. According to a study by Kim SG et al., strengthening exercises like Swiss ball trunk stabilisation for stroke patients enhance the muscular activation in all four limbs, including the trunk.\(^9\)

TB was found to be the most effective performance measure for assessing balance in older persons living in the community, followed by the TUG.\(^{10}\)
The dynamic balance-dependent variable demonstrated that the speed and direction of the weight shift, the BBS, and the TUG scores varied significantly. This indicated that the trunk's motion and training enhanced balance and gait. When the experiment (exercises) first started, BBS, TUG, and FoF all had subpar scores. The effects of exercise on weariness were also noticeably different. Due to the aged population, there were some BP variations during exercise. After the exercise program, BP increased slightly, although this was controllable thanks to daily medication.

Limitation of this study is that due to the small sample size, it is challenging to make generalizations, and we were unable to determine whether postural sway and weight distribution in the sitting position had improved. To confirm the effects of trunk exercise on postural sway on an unstable surface, it will thus be necessary to develop a variety of protocols depending on the patient's state in future studies.

CONCLUSION

The results of our study indicate that trunk workouts on an unstable surface were very effective in preventing falls in the elderly and improving dynamic sitting balance as well as functional activities of daily living and gait. According to the available data, stroke patients' walking speed, postural control, and trunk muscle activation also significantly improved when they performed trunk exercises on an uneven surface.

REFERENCES

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