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Original Research Article

Effect of Trunk Strengthening Exercise on Functional Outcome in Post-Stroke Patient

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Abstract:

Background: Stroke is a leading cause of death and long-term disability worldwide. Trunk movement control plays a crucial role in functional tasks and is associated with functional outcomes in stroke survivors. Impaired trunk muscle strength and control are common in stroke patients, affecting various motor skills and activities of daily living. Effective rehabilitation strategies targeting trunk control are needed to improve functional outcomes.

Methods: This randomized controlled trial aimed to investigate the effect of trunk strengthening exercises on trunk performance and functional outcome in post-stroke patients. Thirty post-stroke subjects between 50 and 60 years, with a duration of 3 months to 1 year, were randomly assigned to either an experimental group or a control group. The Trunk Impairment Scale (TIS) and the Functional Independence Measure (FIM) were used as outcome measures.

Results: Baseline characteristics of age, sex, and duration were comparable between the groups. The experimental group showed a significant improvement in TIS scores after the intervention ($p = 0.007$). However, the change in the TIS score did not reach the minimal clinically important difference. The FIM score did not show a significant change ($p = 0.180$).

Conclusion: Trunk strengthening exercises had a limited impact on functional outcomes in post-stroke patients. Although the TIS score improved significantly, the change was not clinically meaningful, and the FIM score did not show a significant change. Larger studies with more rigorous designs are needed to further explore the potential benefits of trunk strengthening exercises in stroke rehabilitation.

Keywords: Stroke, Trunk strengthening exercise, Functional outcome, post-stroke patients.

Introduction

Significance of stroke as a major global health concern, being the second leading cause of death and the primary cause of long-term disability. It emphasizes the high prevalence rates of stroke in different regions of India and the substantial burden it imposes on individuals and their families. The introduction also discusses the impact of stroke on activities of daily living (ADL) and the persistent dependency experienced by a significant proportion of stroke survivors.[1]

The importance of trunk movement control in functional tasks is emphasized, along with its role as a predictor of functional outcomes and its essential contribution to daily living activities. Studies are cited that demonstrate the impairment of trunk muscle strength and control in stroke patients, particularly in forward and lateral flexion. The potential consequences of impaired trunk control on various motor skills, such as speech, balance, gait, and upper limb function, are also discussed.[2]The bilateral innervation of trunk muscles and the potential for unilateral stroke to affect both sides of the body are highlighted. The relationship between trunk muscle strength, balance, and functional disability is explored, with evidence suggesting that trunk muscle strength plays a crucial role in postural stability and overall mobility. The compensatory mechanisms used by stroke patients, such as posterior pelvic tilt and trunk anterior displacement, are described, as well as the asymmetry in rotator and side bending activities observed in hemiparetic patients.[3]

The introduction emphasizes the need for effective rehabilitation strategies targeting trunk control and

sitting balance in stroke patients to improve their functional outcomes. The importance of achieving normal trunk function and sitting balance in the overall rehabilitation process is underscored.[4]

Material And Methods

Research Design: A randomized controlled trial was undertaken to find out the effect of trunk strengthening exercise in improving trunk performance and functional outcome.

Population: Both male and female post stroke subjects with the duration of 3 months to 1 year, with the age group between 50 to 60 years, and who were attending the rehabilitation center or taking physiotherapy treatment at community level and who satisfied the selection criteria from the population of the study. Selection criteria

a) Inclusion criteria

- Age group between50 –60 years
- First-ever stroke
- TIS score to be 17 out of 23
- Post stroke subjects from 3 months to 12 months
- Mini mental state examination (MMSE) score more than 24 and above

b) Exclusion criteria

- History of neurological condition other than stroke such as
- Parkinson's disease, Head injury, Nerve injuries etc
- Patient who had acute back pain were screened by visual analog scale if the score exceed 5 on movements such subjects were excluded
- Medical history of heart disease or cardiac surgery conducted in the last 3 months of pre-assessment.

Withdrawal criteria

- Those patients who were not willing to continue their participation the study after signing the consent form were allowed to withdraw from the study.
- The subject with a second stroke or who develops any cardiac problems during the intervention duration was also allowed to withdraw from the study.

Sampling

30 post-stroke subjects were randomly distributed to control 15 and the experimental group

Sampling design

Concealed random allocation of subjects into experimental and Control groups convenient sampling.

Source of data

OPD of the Physiotherapy department in Pacific Hospital Udaipur.

Duration of the study

The study was conducted over a period of 3 months. The study was an experimental design. The intervention was given for 4 weeks alternate days for 14 days.

Outcome measures

- Trunk Impairment Scale(TIS)
- Functional Independence Measure

Procedure

Participants: 30 post-stroke subjects were recruited from the hospital and were allotted into experimental and control groups through concealed allocation randomly who fulfilling the inclusion and exclusion criteria.

Note: Pacific Medical University, Institute's ethical approval obtained dated 06/09/22, PMU/PMCH/IEC/2022/231. All participants completed information and consent form at recruitment.

Results

Table 1: Base line Charachteristics

	Experimental group	Control group
Duration	7.2±2.5 (months and SD)	5.6±2.2 (months and SD)
Age	57.08±2.8 (Age and SD)	56.66±3.12 (Age and SD)
Gender	Male-12	Male-10
	Female - 3	Female – 5

The age, sex and duration is statistically matched in both the groups which was determined by the mean and standard deviation.

Table 2: Evaluation Of Outcome Variables In Experimental Group

Variables	Outcome				
Outcome variables	**Pre**	**Post**	**Delta**	**95%CI**	**P value**
TIS	12.50±1.57 (13.0)	14.33±1.72(14.0)	1.83±1.59	0.83 to 2.84	0.007**
FIM	61.42±5.94 (61.50)	62.17±5.41(61.50)	0.75±1.76	0.37 to 1.87	0.180

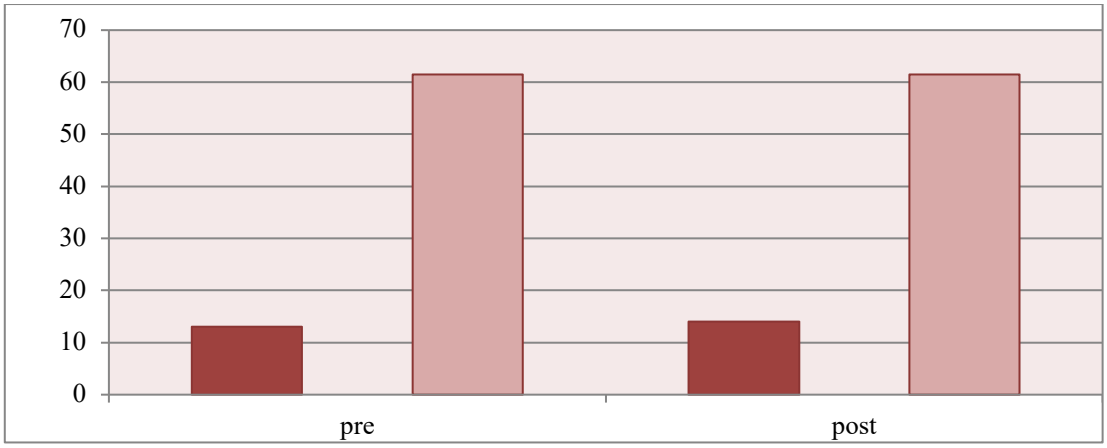

Figure 1: Evaluation of Outcome Variables In Experimental Group

The experimental group had a median value of 13 and 61.5 pre intervention and 14 and 61.5 post intervention with a p value of 0.007 in TIS and 0.18 in FIM. The TIS show a statistical significance but the change of score 3 in the total score of TIS which was not attained by none of the subjects. FIM shows no statistical significant change.

Discussion

The baseline characteristics of the experimental and control groups were comparable in terms of age, sex, and duration of the condition. This matching was achieved through statistical analysis using mean and standard deviation values. This ensures that any differences observed between the groups in the outcome variables can be attributed to the intervention rather than these baseline factors.[5]

Table 2 presents the evaluation of outcome variables in the experimental group. The outcomes assessed were the Total Independence Score (TIS) and the Functional Independence Measure (FIM). The TIS showed a significant improvement in the post-intervention assessment compared to the pre-intervention assessment ($p = 0.007$). However, it is important to note that although the improvement was statistically significant, the change in the TIS score (1.83 ± 1.59) did not reach the minimal clinically important difference of 3 points for this measure.[6]

On the other hand, the FIM score did not show a statistically significant change after the intervention ($p = 0.180$). This indicates that the intervention did not have a significant impact on the functional independence of the participants as measured by the FIM.[7] These findings suggest that the intervention had a limited effect on the overall functional outcomes in the experimental group. The improvement in TIS, albeit statistically significant, was not clinically meaningful due to the small magnitude of change. The lack of significant change in the FIM score indicates that the intervention did not lead to a substantial improvement in the participants' functional independence.[8]

It is important to consider several factors when interpreting these results. The sample size, for instance, may have influenced the statistical power to detect meaningful changes. Additionally, the specific characteristics of the intervention, such as its duration, intensity, and content, may have played a role in the observed outcomes.[9]

Further research with larger sample sizes and more rigorous study designs is needed to explore the potential benefits of the intervention in improving functional outcomes in stroke patients. Future studies could also consider evaluating additional outcome measures that may provide a more comprehensive assessment of functional independence and quality of life.[10]

Conclusion

In conclusion, while the intervention showed a statistically significant improvement in the TIS score, the lack of clinically meaningful change and the non-significant findings for the FIM score indicate that the intervention's impact on functional outcomes in stroke patients may be limited. These findings contribute to the existing knowledge in the field and underscore the need for continued research to identify effective rehabilitation strategies for stroke survivors.

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