

TRUNK CONTROL EXERCISES IN ACHIEVING FUNCTIONAL BALANCE OF POST STROKE SUBJECTS

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Abstract: Background: In stroke, there will be defect in balance and gait due to trunk instability. The aim of this study is to find out the exercise outcomes on trunk control and functional balance in post stroke.

Methodology: sixteen post stroke patients who met the inclusive criteria were randomly assigned into two groups. Group a included 8 patients and were treated with trunk stability exercises along with conventional exercise. Group b included 8 patients and was treated with conventional exercise. Both groups were evaluated with TIS and BBS and used as outcome measure. Both groups were treated for 45minutes per day with adequate rest period for 10-15 minutes for 4 days per week for 3 weeks.

Results: the statistical analysis, the paired „t“ test and the independent „t“ test was done using spss. In post test the mean value for group a is 18.75 and group b is 13.75 in TIS and in BBS for group a is 8.875 and group b is 8.875

Conclusion: it has been concluded that there is a significant improvement in trunk control to achieve a functional balance in post stroke.

Key Words: stroke, trunk instability, TIS, BBS.

1. INTRODUCTION:

Stroke is an acute onset of neurological dysfunction due to an abnormality in cerebral circulation with resultant signs and symptoms that corresponds to involvement of focal areas of the brain. It is the common neurological disorder with long term disability in adults worldwide (1). The prevalence of stroke in India was estimated as 203 per 1,00,000 population above 20 years amounting to a total of about 1 million cases(2). The effects of stroke will be depending on the location and size of the lesion in the brain. The most common symptom is hemiparesis or hemiplegia in the opposite side of the lesion. In addition to that the trunk muscle impairment will be seen in the both sides of the body(3). Stroke patients with balance and gait disorders are characterized by decrease in physical function (4). Trunk activities are impaired in the stroke is found to be the strong reason for impaired balance, gait and functional activities. Trunk muscles are important for the antigravity activities such as sitting, standing and functional activities. So good trunk stability is needed for doing ADL's and performing the higher level motor functions. Slow walking after stroke leads to the behavioral adaptations and poor endurance, balance and stability. Stroke patients with reduced body movements and stability require trunk training with trunk stabilization exercises. This will increase strength of the trunk muscles associated with maintaining the posture of the limbs and give increased stability (5). So, it is important for stroke patients to improve their trunk muscle strength and balance for a better functional recovery. In stroke rehabilitation, besides trunk rehabilitation and balance training is very important for recovery of both static and dynamic balance. There will also be improvement in the postural control and gait performance after stroke. But the evidence supporting the effectiveness of trunk rehabilitation and balance training is not sufficient (6).

2. NEED FOR THE STUDY:

The physiotherapy management after stroke is mainly concerned with upper limb, lower limb and balance training. Trunk exercises are not much concentrated in the rehabilitation protocol, which is a main core for both static and dynamic stability. To achieve a good functional balance both static and dynamic stability should be good. So thereby to improve the functional balance, trunk exercises are essential along with other rehabilitation exercises.

3. METHODOLOGY:

This is a quasi experimental study in which Sixteen participants were taken from Physiotherapy Outpatient Department, Saveetha Medical College Hospital, Saveetha Institute of Medical and Technical Sciences, Thandalam, Chennai 602 105, Tamil Nadu, India and Inclusion Criteria were middle cerebral artery stroke – first onset of unilateral MCA ischaemic stroke, acute stroke patients with less than 1 month duration, age 40-65 years, medically stable patients,

able to understand and follow verbal instructions. Exclusion Criteria were cognitive disorder such as neglect, haemorrhagic stroke, non correctable visual deficits, other neurological and musculoskeletal disorders other than stroke, non cooperative patients and sensory impairment. They were divided into two groups using simple random method. Group –A is experimental group and Group – B is control group. All subjects will be underwent basic neurological examination pre-test score for TIS (7) and BBS (8) will be taken. For both the groups exercises will be given for 45 minutes per day with adequate rest period for 10 to 15 minutes, 4 days per week for 3 weeks. At the end of third week, trunk stability will be evaluated for all subjects.

4. EXERCISE PROTOCOL FOR GROUP - A

SUPINE EXERCISES

Pelvic bridging,

Unilateral pelvic bridging,

Upper trunk rotation by bringing clasped hands on either side,

Lower trunk rotation by moving knees on either side from crook lying,

Flexion rotation of upper trunk,

Sitting exercises

Selective flexion extension of lower trunk,

Rotation of upper and lower trunk,

Forward and Lateral reach,

Sit to stand with clasped hands,

EXERCISE PROTOCOL FOR NON GROUP - B

Passive range of motion exercises:

Shoulder flexion and extension,

Shoulder abduction and adduction,

Shoulder rotation,

Elbow flexion and extension,

Forearm supination and pronation,

Wrist flexion and extension,

Finger flexion and extension,

Hip flexion and extension,

Hip abduction and adduction,

Hip rotation,

Knee flexion and extension,

Ankle dorsiflexion and plantar flexion,

Ankle inversion and eversion,

Toes flexion, extension, abduction and adduction.

Upper limb PNF Pattern:

D1 flexion,

D1 extension,

D2 flexion,

D2 extension,

Lower limb PNF pattern:

D1 flexion,

D1 extension,

D2 flexion,

D2 extension,

Stretching with Ice

5. DATA ANALYSIS:

The pre and post test of trunk control were obtained from 16 post stroke patients will be presented in table Mean, standard deviation and paired 't' test values will be used to find out whether there is any significant difference between pre and post test values within the group. Independent 't' values will be used to find out whether there is any significant difference between post test values between two groups.

6. DATA INTERPRETATION:

The data obtained from 16 post stroke patients who received the trunk control and functional balance will be analyzed statistically using paired 't' test and independent 't' test and interpreted as follows:

Table 1: TIS of Group A (Paired 't' test):

| Trunk impairment scale | No. of participants | Mean | Mean difference | Standard deviation | 't' value | 'P' value |
|------------------------|---------------------|-------|-----------------|--------------------|-----------|-----------|
| Pre test | 8 | 7.125 | 93 | 4.4700 | 7.332 | <0.05 |
| Post test | 8 | 18.75 | | | | |

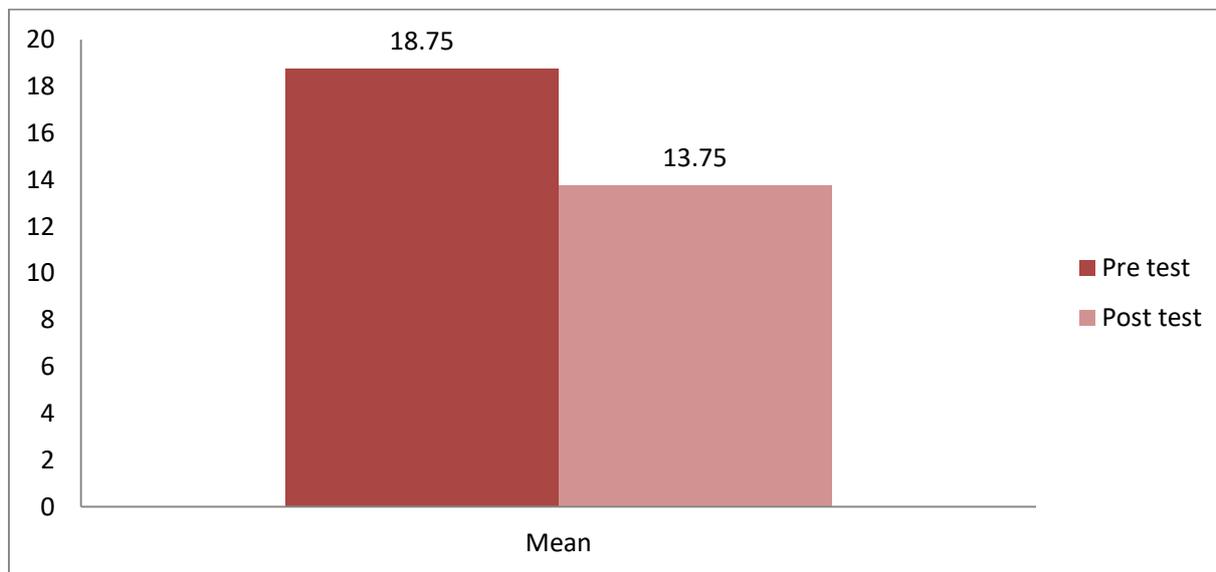


Figure 1: TIS of Group A

Table 2: TIS of Group B (Paired 't' test)

| Trunk impairment scale | No. of participants | Mean | Mean difference | Standard deviation | 't' value | 'P' value |
|------------------------|---------------------|-------|-----------------|--------------------|-----------|-----------|
| Pre test | 8 | 7 | 54 | 2.659 | 7.158 | <0.05 |
| Post test | 8 | 13.75 | | | | |

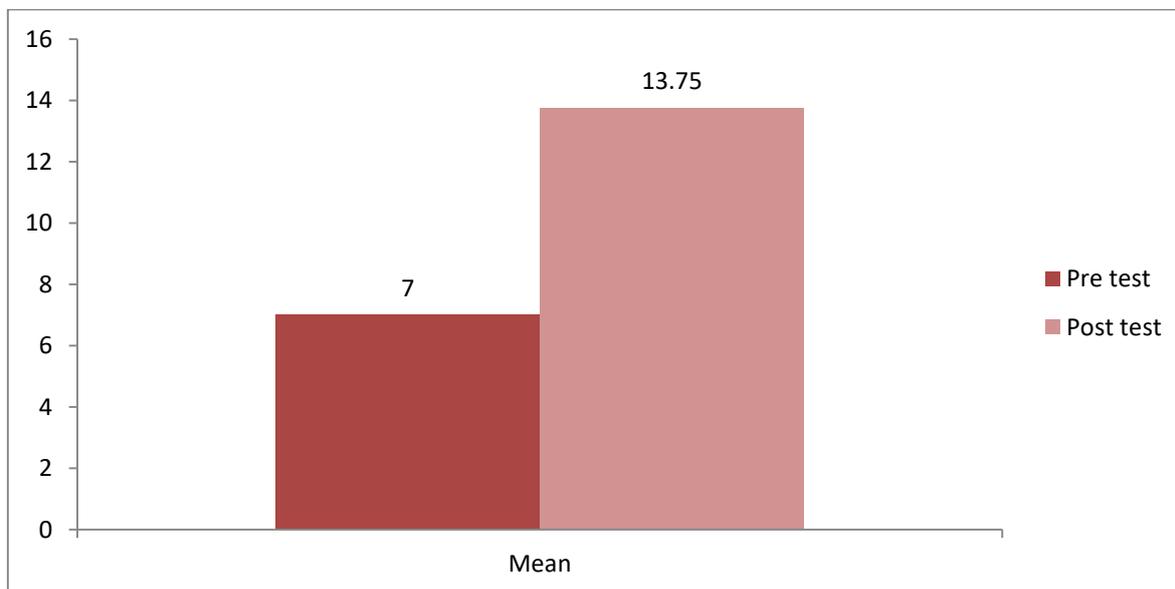


Figure 2: TIS of Group B

Table 3: TIS Independent ‘t’ test

| Trunk impairment scale | No. of participants | Mean | Mean difference | Standard deviation | ‘t’ value | ‘P’ value |
|------------------------|---------------------|-------|-----------------|--------------------|-----------|-----------|
| Group A | 8 | 18.75 | 5 | 4.1142 | 2.430 | <0.05 |
| Group B | 8 | 13.75 | | | | |

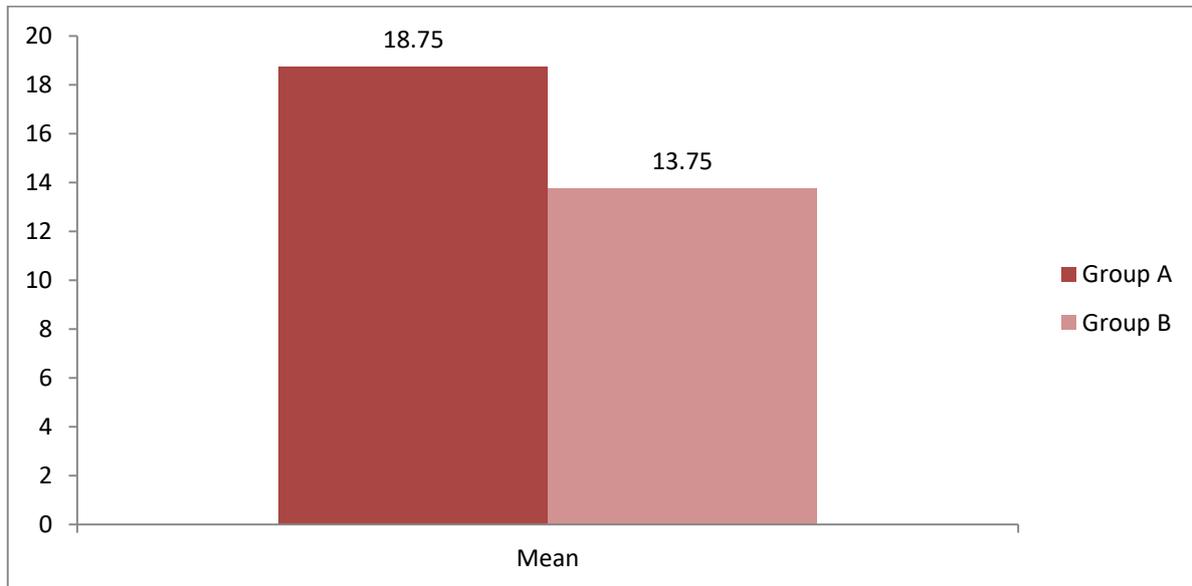


Figure 3: TIS Independent ‘t’ test

Table 4: BBS of Group A (Paired ‘t’ test)

| Brunel balance scale | No. of participants | Mean | Mean difference | Standard deviation | ‘t’ value | ‘P’ value |
|----------------------|---------------------|-------|-----------------|--------------------|-----------|-----------|
| Pre test | 8 | 5.125 | 3.75 | 1.2817 | -8.275 | <0.05 |
| Post test | 8 | 8.875 | | | | |

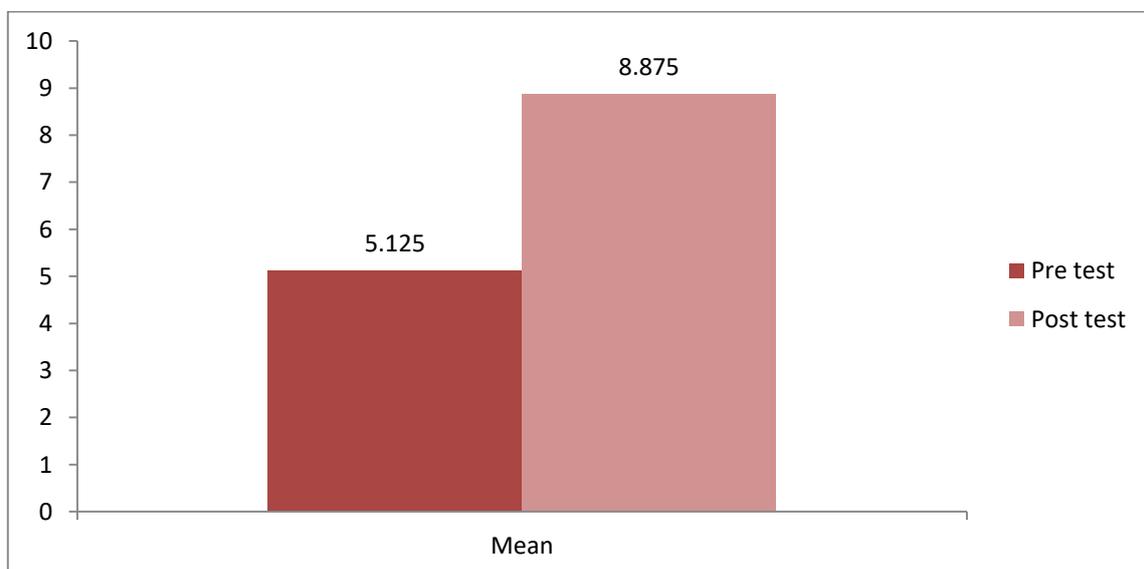


Figure 4: BBS of Group A

Table 5: BBS of Group B (Paired 't' test)

| Brunel balance scale | No. of participants | Mean | Mean difference | Standard deviation | 't' value | 'P' value |
|----------------------|---------------------|-------|-----------------|--------------------|-----------|-----------|
| Pre test | 8 | 3.625 | 5.25 | 2.6049 | -5.700 | <0.05 |
| Post test | 8 | 8.875 | | | | |

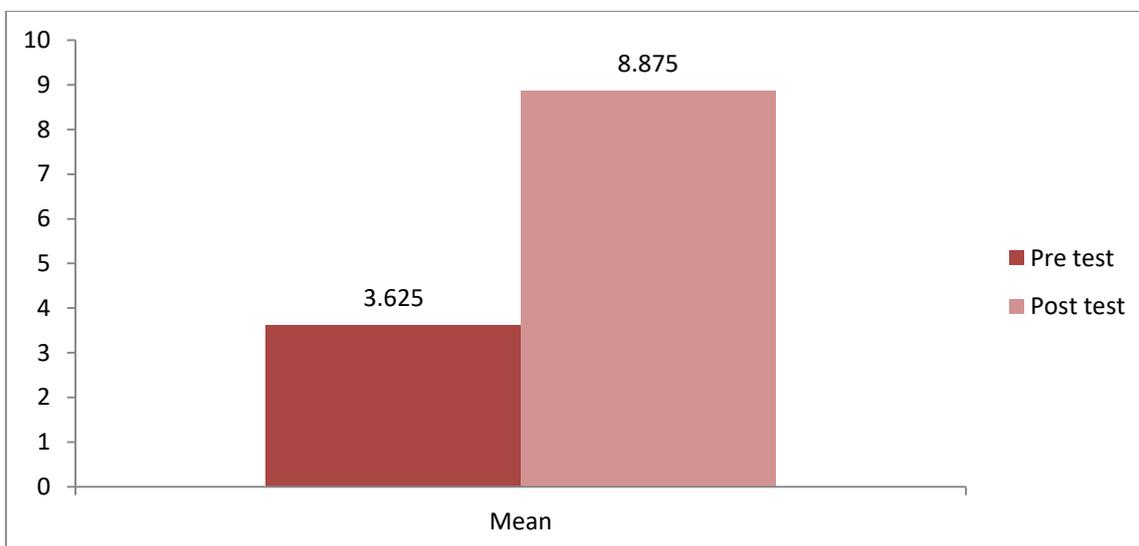


Figure 5: BBS of Group B

Table 6: BBS Independent 't' test

| Brunel balance scale | No. of participants | Mean | Mean difference | Standard deviation | 't' value | 'P' value |
|----------------------|---------------------|-------|-----------------|--------------------|-----------|-----------|
| Group A | 8 | 8.875 | 0 | 2.9 | 0.000 | <0.05 |
| Group B | 8 | 8.875 | | | | |

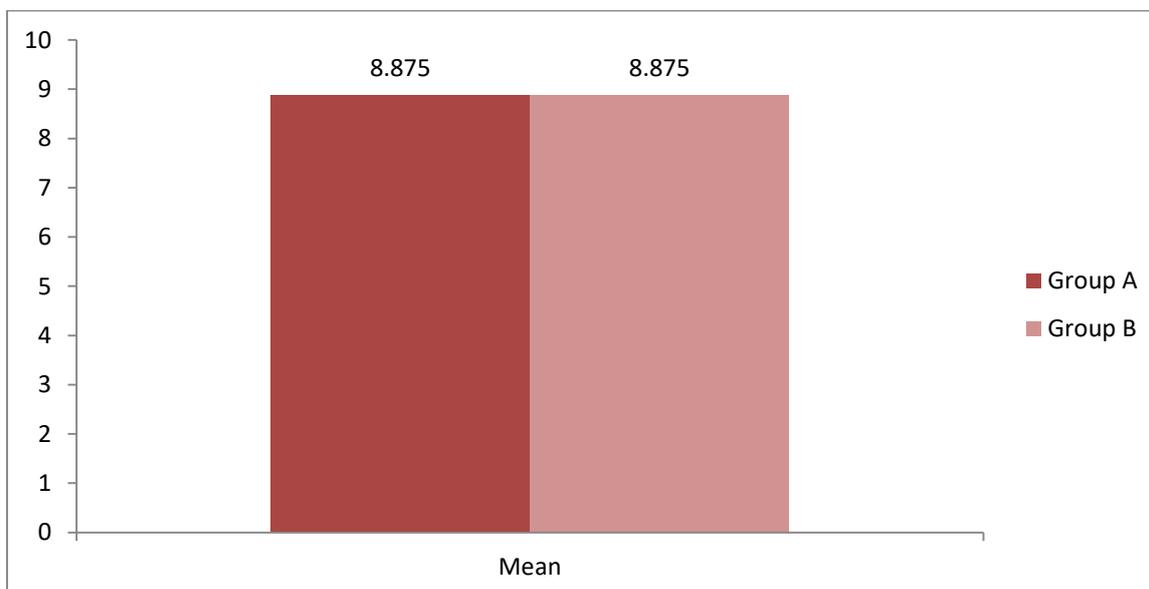


Figure 6: BBS Independent 't' test

7. RESULTS:

The calculated paired 't' test value for TIS for group A and group B are 7.35 and 7.18 respectively at $p < 0.05$. The calculated paired value for BBS for group A and group B are 8.28 and 5.70 respectively at $p < 0.05$. It has shown that there is a significant difference between the groups. The calculated independent 't' test value for TIS is 2.43 at $p < 0.05$ which is statistically significant. The independent 't' value for BBS is 0.00 which is $p > 0.05$, which is not statistically significant.

8. DISCUSSION:

The study on trunk control exercises in improving functional balance on post stroke patients was conducted on 16 patients. They were evaluated using TIS and BBS. The treatment protocol was trunk control exercises for 45 minutes per day with adequate rest period for 10-15 minutes, 4 days per week for 3 weeks. It improves the strength of both trunk muscles by focusing on selective muscle strengthening such as pelvic bridging and selective trunk movements. Based on these mechanisms, trunk exercises in post stroke subjects have improved the trunk control and functional balance. According to previous studies, it is shown that the trunk exercises will improve the trunk control and functional balance. In our study, TIS shows significant improvement but BBS shows no improvement in trunk control. It can be assumed that with small sample size we can't say that the trunk exercises can't improve trunk control in post stroke patients by non significance of BBS.

8.1. LIMITATIONS: The specified sample size could not be achieved within the limited time duration. The sample size was small.

8.2. SUGGESTIONS FOR FUTURE STUDY: Based on the outcome of this study, the following changes are suggested, the study can be extended to large sample size and duration of the study can be increased.

9. CONCLUSION:

The study was conducted to find out the exercise outcomes on trunk control to achieve functional balance in post stroke. There was statistical difference in paired 't' test for both TIS and BBS and no statistical difference in independent 't' test for BBS but there is statistical difference in independent 't' test for TIS.

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