

Effects of Lumbar Stabilization Exercise with Abdominal Strengthening Exercise in Improving Trunk Stability for Patients with Stroke

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Abstract: *Background:* Stroke is the sudden loss of neurological function due to loss or lack of blood supply to brain. It is the leading cause of disability and death worldwide, but early recognition and prompt treatment can greatly improve the recovery. *Objectives:* The main objective of the study to find the effects of lumbar stabilization exercise along with abdominal strengthening exercise in improving the trunk stability in stroke patients. *Methodology:* It was a pre and post test quasi experimental study, based on inclusion and exclusion criteria 20 subjects were selected and by convenient sampling method they were divided into two groups. Group A received lumbar stabilization alone and Group B received lumbar stabilization along with abdominal strengthening exercise. The treatment duration was 8 weeks, the pre and post test score was assessed with Trunk Impairment Scale (TIS). Both paired and unpaired t test was done to rule the effect of the treatment with p value significance level < 0.05. *Result:* after 8 weeks of treatment protocol the subjects were assessed with Trunk Impairment Scale(TIS) and showed there is comparatively a higher improvement in Group B when compared with Group A. *Conclusion:* There was significant improvement in the group receiving lumbar stabilization exercise and abdominal strengthening exercise.

Keyword: Stroke, CVA, Stability, lumbar stabilization, abdominal strengthening exercise

1. Introduction

Stroke (cerebrovascular accident [CVA]) is the sudden loss of neurological function caused by an interruption of the blood flow to the brain. The vascular lesion can be either a haemorrhagic or ischemic involving the blood vessels supplying various parts of the brain. Ischemic stroke occurs when a blood clot blocks a blood vessel in the brain, while haemorrhagic strokes occur when a blood vessel in the brain rupture and bleeds into the surrounding tissue. When a stroke occurs, brain cells begin to die eventually a minute, and the severity of the damage depends on the location and extent of the affected area. Common symptoms of a stroke include sudden weakness or numbness on the one side of the body, difficulty in speech, loss of vision, fascial abnormality, and trouble with a balance and coordination.

Stroke is leading cause of long – term disability and death worldwide, Stroke is 5th leading cause of death and cause of long-term disability among adults. It is important to note that the prevalence of stroke is influenced by various risk factors such as ages, sex, race/ethnicity, lifestyle, and comorbidities, among others. Most patients with acute and subacute stroke have a poor sitting balance, they cannot maintain the standing erect posture. In stroke patients, trunk muscles weakness and loss of proprioception on the affected side can interfere with balance, stability, and functional ability may reduce the ability to control posture.

Lumbar stabilization exercise help improve postural alignment and balance ability by simultaneously activating the transverse abdominis and multifidus muscles. This muscle controlled by the central nervous system from the cerebral hemisphere, and their improvement leads to recovery of normal gait and movement patterns.

The importance of abdominal muscles and paraspinal muscles in walking ability and balance ability is well known, however, the importance of diaphragm as trunk stability muscle has been overlooked. These abdominal muscles strengthening exercise results indicate the increase in power and endurance of the abdominal muscles and the diaphragm and inspiratory muscles stabilize the trunk, thereby improving the overall coordination of the trunk.

Need of Study

The need of the study is to find the effects of lumbar stabilization exercise versus abdominal strengthening exercise along with lumbar stabilization exercise for improving trunk stability in patients with stroke.

Study Design

A pre and post test quasi experimental study design was used with 2 different intervention groups to assess with the effects of lumbar stabilization and abdominal strengthening exercise in trunk stability in subacute stroke.

Sampling Method

Using convenient sampling method 20 patients were selected based on the inclusion and exclusion criteria. The study setting was in Sree Abirami Hospital Coimbatore. Inclusion criteria: ▪Age: 40 to 65 ▪ Both male and female ▪ Ischemic stroke. ▪ Duration: 3 months to 6 months of stroke.

Exclusion criteria: • Acute stroke • Quadriplegia • Vertigo • Congenital heart disease • Orthopedics conditions. For e.g., fracture, arthritis • Psychological instability. • Obesity. • Dyspnea

2. Methodology

20 subjects were selected based on the inclusion and exclusion criteria. A brief explanation about the treatment session (4 session per week) was given to all the patients and informed consent was obtained. Subjects were evenly divided into two groups by convenient sampling. Group A (n=10) and Group B(n=10).



The measurement tool used in this study was Trunk impairment scale. It was reliable and valid as shown in the previous studies.

All patient received pre and post assessment by using trunk impairment scale.

3. Procedure

Group A	Group B
Lumbar stabilization exercise	Lumbar stabilization exercise and abdominal muscle strengthening exercises.

Group A (Lumbar stabilization exercises) Subjects in group A received Lumbar Stabilization Exercise for 30 minutes per session, one session per day, and 5 times a week. • Single leg raises • Bridging • Single leg bridging • Superman exercise • Cat and camel exercise were given

Single Leg Raise: Patient is positioned in supine lying on the back over the mat on the ground. Both the legs should be extended and both the hands should be kept by the side. Then bend the left knee. Foot is placed on the ground and now slowly raise the right leg towards the ceiling from the ground. Raise the leg until it is parallel to the opposite knee. Hold for few seconds then take the leg down. Switch to another side

Bridging: The patient lies down with the back, knees in full flexion and feet flat on the floor and close to the buttock. Then the patient lifts hip off the floor towards the ceiling /sky as high. The pressure is to be felt in the hands and feet of the patient. Hold their position for few seconds and relax.

Single Leg Bridging: Lie on back with arm by the sides, knee bent and feet flat on the floor. Raise one leg and lift the hips as high as possible. The pressure should be felt in the unaffected leg and lower the hips, and hold for seconds and switch the legs.



Superman Exercise: Lie on the ground in prone position with leg straight and arm extended in *the front. Keep the head in neutral position, slowly lift the arm and leg off the ground until the lower back muscle contracts. Lift the belly button is raised off the ground slightly and hold the position for 2 to 3 seconds.

Cat and Camel: Patient is positioned in the Quadri pod position and sink the back down towards the floor and lift the head up at the same time, sticking the tail bone out to make a curve with the 18 spine and hold for a second. Tuck the head and tail bone in, arching through the spine as to mimic the camel hump and hold for seconds.





Abdominal Crunches: In supine lying, with knees bent and comfortably apart, fold the arms on the chest and tighten the abdominal muscles. Raise head and shoulders off the floor.

Wipers: Lie down on the back. Bend your knees so that the feet are resting flat on the floor and extend the arms straight out either side and move the hips towards the left and right sides.

Statistical Tools:

The statistical tool used in this study are paired t test and unpaired t test. The paired ‘t’ test was used to compare the pre and post values of group A & B and the unpaired ‘t’ test was used to compare the pre-test of group A & B and post-test of group A & B.

Paired T Test: Using paired ‘t’ test with degrees of freedom and 5% as a level of significance the calculated ‘t’ value of group A & B is 6.609 and 7.646 respectively and ‘P’ value is <0.05 shown in table 1 & 2 resp

Table 1

S No	Group A	Mean	SD	Mean Dif	T Value
1	Pre Test	13.3	13.3	4.30	6.605
2	Post Test	17.6	1.95		

Table 2

S No	Group B	Mean	SD	Mean Dif	T Value
1	Pre Test	138	13.8	55	7.646
2	Post Test	193	19.3		

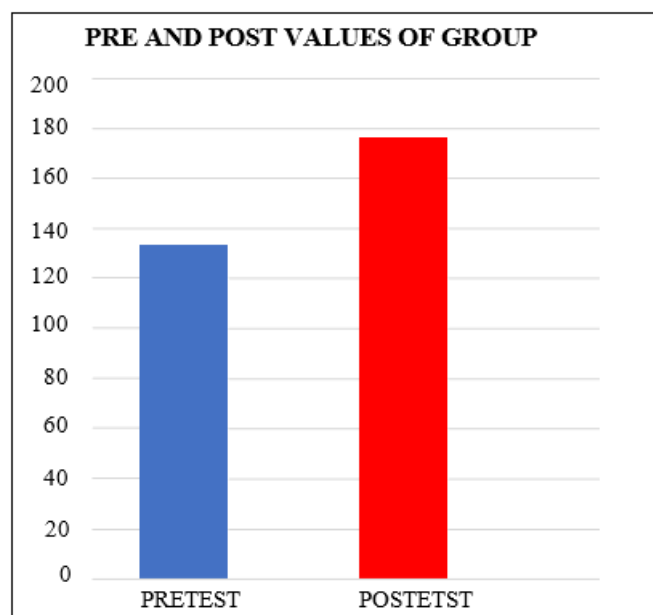
Unpaired T Test: Using unpaired ‘t’ test with degrees of freedom and 5% as a level of significance the calculated ‘t’ value of post test group A & B is 3.003 respectively and ‘P’ value is <0.05 in table 3

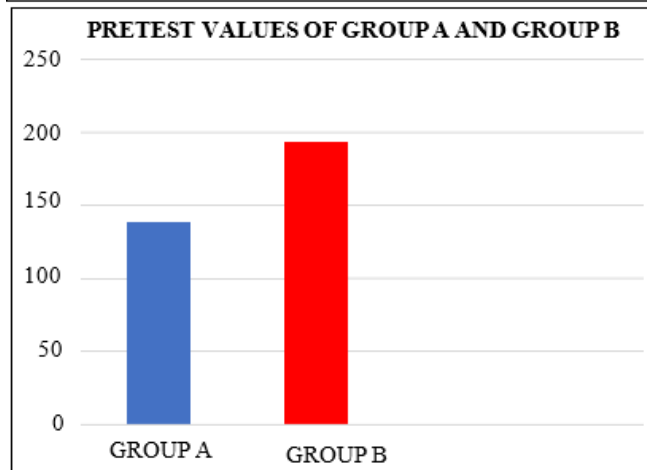
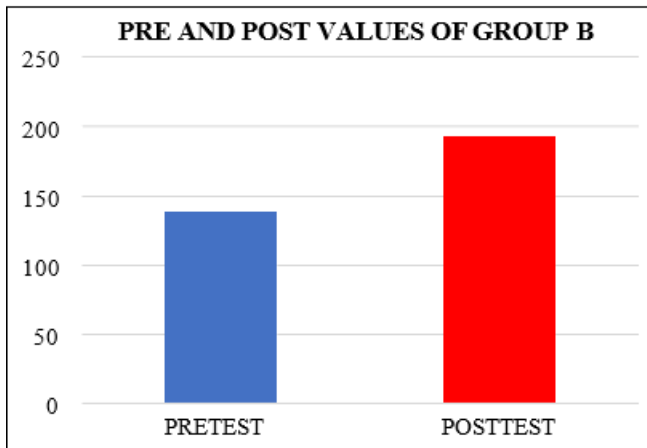
Table 3

S No	Post Test of A&B	Mean	SD	Mean Dif	T Value
1	GROUP A	17.6	1.95	2.2	3.003
2	GROUP B	19.8	1.25		

Group B (Lumbar stabilization exercise and abdominal strengthening exercise) Group B subjects also received Lumbar stabilization exercises for 15 minutes and 3 minutes of rest period. They also received Abdominal strengthening exercise for 10 minutes and 2 minutes of rest period. Each exercise is repeated for 3 sets. 30 minutes per session, one session per day and 5 times a week.

Abdominal Bracing Exercise: Patient is positioned in the supine lying and ask the patient to tighten their abdominal muscles as draw the navel down towards the stomach and feel the contraction in abdominal muscles, and the contraction is held for few seconds.





4. Result

The paired 't' test analysis for the pre-test and post -test variables are by using Trunk Impairment Scale for group A and group B patients with subacute stroke which was shown in table 1 and 2. Both the group shows significant difference in pre-test and post- test values. The 't' values of Group A are 6.609 and the 't' values for the Group B are 7.646. The unpaired 't' test analysis for the post- test values of both group A and group B which was shown in table 3 The unpaired 't' value for the post- test variable of both group A and group B are 3.033. The statistical analysis related that there was significant improvement in trunk balance in patient with stroke in both groups, Group B (lumbar stabilization exercise along with abdominal muscle strengthening exercise) stroke patients showed statistically significant improvement in trunk stability.

5. Discussion

The objective of this study was to evaluate the effectiveness of lumbar stabilization exercise and abdominal strengthening exercise in improving trunk balance in patients with stroke. The study design was experimental, and the sample size was determined using convenience sampling. This study duration was 6 months, with treatment duration of 2 months. The study considered of two groups: group A underwent lumbar stabilization exercise, while group B performed both lumbar stabilization exercise and abdominal strengthening exercises.

The pre test assessment were conducted before the intervention establish the baseline trunk balance of both group A (lumbar stabilization exercise) and group B (lumbar stabilization exercise along with abdominal strengthening exercises).

After the intervention, post-test assessment was conducted to evaluate the effects of the respective exercise on trunk balance. In group A paired 't' test was used to compare the pre- test and post-test values. The results showed a significant improvement in trunk balance following lumbar stabilization exercise.

Statistical analysis was done by using student 't' paired 't' test was used to find out the improvement within the group. Unpaired 't' test was used to find out the difference between two groups.

The results showed that there was a significant difference between the effectiveness of lumbar stabilization exercise with abdominal strengthening exercise for improving trunk balance in patient with stroke.

6. Limitation

- Limited sample size
- Trunk stability is measured using the trunk impairment scale.
- No control group in included
- Only ischemic stroke patient was included.

7. Recommendation

- More technique can be included
- Sample size can be increased
- Control group can be included
- Gender based difference can be analysed.
- Other physiotherapy treatment like proprioception neuromuscular facilitation exercise, Brunnstrom technique and bobath approach are also recommended.

8. Conclusion

This study concluded that lumbar stabilization exercise with abdominal strengthening exercise is more effective than the lumbar stabilization exercise alone for improving trunk balance in patient with stroke.

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