

# EFFECT OF AEROBICS EXERCISE TRAINING AND STRENGTHENING ON BALANCE IMPAIRMENT IN HEMIPLEGIC STROKE PATIENT

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## ABSTRACT

Stroke patient often leads to balance impairment which hampers their activities of daily living. Hemiplegic patients have decreased balance control ability due to the hemiplegia of arm or leg. Aim of the study was to see the effect of aerobics exercise training and strengthening on balance impairment in hemiplegic stroke patient. Total 30 patients with history of stroke were included. Subjects were evaluated pre and post intervention with berg balance scale. Treatment was carried out for 4 weeks. The SD ( $\pm$ ) for pre was 4.276 and the SD( $\pm$ ) for post intervention was 4.330 and the P value post intervention was  $< 0.0001$  which was done using the ANOVA test showed significant effect in pre and post intervention. It is concluded that there is significant effect of aerobics exercise training and strengthening on balance impairment on hemiplegic stroke patient.

**Keywords:** Stroke, Hemiplegic, Balance impairment, Aerobics exercise, Strengthening, Berg balance scale.

## INTRODUCTION:

A Stroke occurs as a result of brain damage caused by cerebral infarction or hemorrhage. The majority, 73-88%, of cerebral infarction patients have impaired sensory motor ability on the side opposite to the brain damage appearing as hemiplegic of the arms and legs or either. Individuals who have suffered a stroke tend to be older, with incidence rates nearly doubling each successive decade in advancing age; 90% of cases occur in those  $>55$  years.

Hemiplegic patients have decreased balance control ability. Especially, the postural sway in static positions is more than twice that of healthy subjects of the same age group, which has consequences for safety. Balance is described as the ability to maintain equilibrium in a gravitational field by keeping or returning the center of body mass over its base of support. Dynamic balance is a voluntary response which maintains the position in response to an external perturbation. Stroke patients with both motor and sensory deficits show high incidences of falls both during rehabilitation and thereafter due to

loss of postural control. The central health issues in this burgeoning sector of chronically disabled individuals are loss of functional mobility and sustained high risk for recurrent stroke and cardiovascular events .

Methods for improving the balance of stroke patients have been studied. An exercise program which promote weight bearing by the hemiplegic lower extremity was prescribed for stroke survivors by physical therapists . Functional strengthening training enhances the interaction of the nervous and muscular systems, maximizing functional regulation to improve ADL. Decreased endurance also contributes to compromised functional walking after stroke . It has been demonstrated that stroke survivors are not physically fit, and this affects their functional abilities . If interventions for those poststroke are to include endurance training, a clinical measure of fitness is necessary. Recently, it has been suggested that the 6-minute walk test be used as a clinical measure of cardiovascular endurance for adults with stroke . Stroke survivors are often left with physical impairments that limit functional abilities. One can reasonably suggest that, for those individuals with stroke, performance in the 6-minute walk test may be limited by stroke-related physical impairments, as well as cardiovascular endurance .

Stroke survivors also have an increased risk for falls and subsequent injuries due to their locomotor disabilities, including impaired balance, decreased stride length, decreased walking speed, compromised ability to step over objects, and decreased endurance . These loco-motor disabilities result in an inability to respond quickly and appropriately to challenges within their environment such as stairs, inclines, and uneven surfaces. Current training methods to improve walking patterns of individuals with poststroke hemiplegia during rehabilitation involve a therapist giving verbal cues and manual support during overground walking and using equipment such as parallel bars, mirrors, and stairs. Long-term and ongoing access to individualized walking therapy is seldom provided or covered by insurance . We used stepping over obstacles as an alternative training technique to improve walking in individuals with poststroke hemiplegia.

Several exercise modalities have proven to increase cardiovascular fitness in stroke survivors .A synthesis of these studies suggests that approaches to exercise training may necessarily vary as a function of neurological deficit severity, baseline fitness levels, and the time phase of recovery after stroke . Moreover, differing elements of training prescriptions and their progression (e.g., aerobic intensity, training velocity, repetition ) may further determine the nature of exercise-mediated outcomes, such as cardiovascular adaptations versus gains in locomotor function. The design of aerobic exercise prescriptions presents unique safety and feasibility issues in the stroke population. Due to the high incidence of medical and cardiovascular comorbid conditions that can influence exercise participation or safety..

Balance dysfunctions in stroke survivors are common and have significant impact on functional independence and overall recovery of the patient. Patients who have suffered a stroke, present with abnormal and delayed

postural responses in the lower extremity muscles during standing displacements and distorted proprioception. They also demonstrate postural control problems such as loss of anticipatory activation during voluntary movements, increased sway during quiet standing, especially on the affected side, and decreased area of stability during weight shifting while standing.

Balance problems have been implicated in the poor recovery of activities of daily living (ADL) and mobility and an increased risk of falls.. Studies on balance impairments have shown that stroke survivors have greater postural sway than age-matched volunteers who are healthy

## **MATERIAL AND METHODOLOGY:**

**Study Design:** Experimental

**Study Setting:** Hospital setup cooper hospital, Mumbai .

**Sample Size:** 30

**Study duration:** 4 weeks, 5 sessions/week, 20 sessions.

**Inclusion criteria:** ! ) 6 months –5years of stroke

2) More than 11 Score in BBS

3)PCA , MCA ,ACA type included

**Exclusion criteria:** Chronic degenerative joint diseases , fracture, vertigo, Aphasia

**Material required:** stationary bicycle, theraband (yellow) and weight cuffs (1 and 2 kg).

**Outcome measure:** Berg balance scale

- 1) The sample population was selected according to the inclusion and exclusion criteria
- 2) Consent forms were given to the patients and procedure was explained.
- 3) They were assured and responsibility was taken that the identity was preserved.
- 4) Vitals were taken pre and post intervention.

Static and dynamic balance on Berg balance scale was checked.

1. Aerobics exercises included

1) Warm up (10 min) -

- Breathing exercises-2min
- upper limb mild stretching exercises- 4min
- Lower limb mild stretching exercises-4min

2) Stationary cycling (15 min)

3) Cool down (10 min) -

- Breathing exercises-2min
- Upper limb mild stretching exercises-4min
- Lower limb mild stretching exercises-4min
- Exercise where done under supervision of the physical therapist.
- Berg balance scale (BBS) was taken post intervention.

## RESULTS :

Statistical analysis was done using ANOVA test. ANOVA test showed  $SD\pm$  for pre intervention 4.276 and  $SD\pm$  for post intervention 4.330. We found that there was significant effect for pre and post treatment. .

Table no 1

Age ( mean )	Mean- 55.6	
Gender	Female -8	Male-22
Pre intervention (Mean , $SD\pm$ )	Mean- 21.93	SD- 4.276
Post intervention ( Mean, $SD\pm$ )	Mean- 35.41	SD- 4.330
<b>P value</b> for post intervention <0.0001		

## DISSCUSSION:

In this study effect of aerobics exercise training and strengthening on balance impairments in hemiplegic stroke

patient was evaluated. 30 individuals were approached. The p value was  $< 0.0001$  which shows significant effect hence the results showed the significant effect of aerobics exercise training and strengthening on balance impairment in hemiplegic stroke patient.

Balance consists of static and dynamic balance. Static balance is the ability to stand on fixed ground without swaying, and dynamic balance is the ability to maintain balance in response to external perturbation. Postural sway occurs even in standing, and the degree of sway depends on the distance separating the feet, or the location of the feet.

It is possible that patients who are at a lower risk of falling may not need to improve balance in order to improve functional mobility. With the addition of a handrail or increased body weight support, the percentage of single limb support time on the paretic limb increased and temporal symmetry improved. Also cycling training with body weight support, as an automatically symmetric exercise, activated the paretic limb muscles, and increased the ability of motion of each side. These interventions improved the balance ability of stroke patients.

The risk of falls is high among stroke survivors and falling is one of the most frequent complications these patients present with in rehabilitation. According to Lamb et al approximately 40% of people fall within the first year of a stroke.

Functional reach distance has also been associated with an increased risk of falls and frailty in elderly people who are unable to reach more than 15 cm. Cycling can be used as both a form of strength and aerobic training. The primary goal of this study was to determine whether participation in a 10-week high-intensity exercise program comprising aerobic training, progressive resistance training (PRT), or a combination of the two would improve walking ability.

## **CONCLUSION:**

The study concluded that there is significant effect of aerobics exercise training and strengthening on balance impairment in hemiplegic stroke patient which was assessed through outcome measure like berg balance scale, stationary cycle, theraband and weight cuffs.

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