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Research Article

EFFECTS OF AEROBIC EXERCISES ON BALANCE AND GAIT IN GERIATRIC

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ABSTRACT

Musculoskeletal changes is seen during ageing this leads to reduction in the muscle strength. Which is more reduced in the lower limbs than the upper limbs. This leads to improper balance and gait which results to falls in the elderly. The aim of this study was to check whether aerobic exercises helps in improving balance and gait in geriatric. Total 30 elderly individuals were included in the study according to the inclusion criteria. A 3 week program was selected where 10 mins warm up and cool down was done followed by 20 minutes of stationary cycling daily. Pre and post berg balance scale and dynamic gait index was noted. After the end of study we found that there is significant improvement in balance and gait. Also the p value showed that the intervention is extremely significant. The study concluded aerobic exercises are effective on balance and gait in geriatric population.

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INTRODUCTION

Aging is a irreversible process in the life of a human being. There are many factors associated with the ageing process. Like decline in the physiological as well as physical capacity. The main risk factor seen is improper balance, postural control and gait pattern this however leads to falls in the elderly individuals¹. There are many reasons that can lead to falls. One of the major reason is reduced muscle strength which is much more noticed in the lower limbs than in the upper limbs².

Thus, preventing the falls and also the injuries associated with it will reduce disability, improve the quality of life, and reduce the costs of health care of the elderly individual³. A proper intervention should be set where resistance training should be given to produce moderate to high muscle strength of the lower extremities this will improve the balance, walking strength, stair climbing and mobility tasks. In a skeletal muscle the force production is more when the muscle is lengthened by the external force^{4,5,6,7}. This high force production acts as a feedback to the muscle to gain strength^{8, 9, 10, 11}. Many studies have proved that training the lower limb muscles will provide good strength and also increase the quality of life of an individual.

Aerobic exercises are a group of exercises where there is maximum usage of the muscles and capacity of the body. During aerobic exercise, the major work is done by the large muscles in your legs, hips and arms, and the body responds

quickly by breathing faster and more deeply. Your heartbeat accelerates, this increases the blood flow to the muscles and lungs which in order increases the strength of the muscles.

Stationary cycle is used for many purposes in a physiotherapeutic setup. Stationary cycling is a type of resistance training and also a form of aerobic exercise. If an older adult is trained properly on a stationary cycle there will be improved strength in the muscles of the lower extremity. And if the lower extremity muscles are properly strengthen then it will however improve the balance and gait in the person. Hence there will be reduced risk of falls and improved health.

In the following study stationary cycling is chosen as a form of aerobic exercise to check the improvement on balance and gait in older individuals. Stationary cycling will not only strengthen the lower limb muscles and help in proper balance and gait but also it will help in many other tasks. Like chair rising, negotiating the stairs, general mobility tasks and various others.

Aim

To check whether Aerobic exercises helps in improving balance and gait in geriatric.

Objectives

- To assess the pre and post balance after the intervention in geriatric individuals.

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- To assess the pre and post gait after the intervention in geriatric individuals.

MATERIALS AND METHODOLOGY

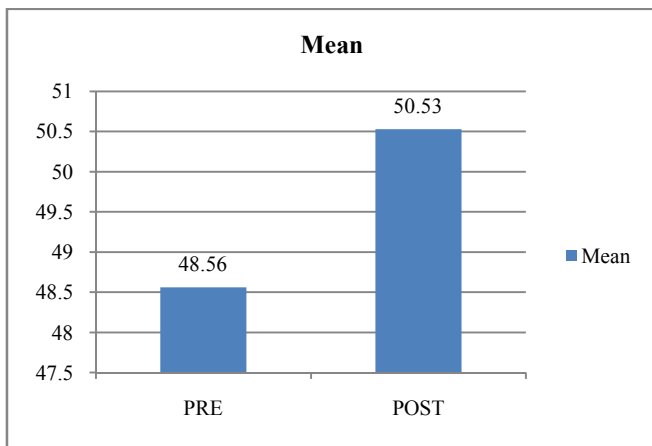
Study Design : Interventional study
Study Duration : 6 months
Study setting : Hospitals in Pune
Target Population : Elderly people
Sampling Method : Convenient Sampling
Sample Size : 30
Procedure:-

Before starting the study ethical clearance from the ethical committee was taken. All the people were given the consent forms to fill and the detailed procedure of the intervention program was explained to them. The age group was selected between 60-70 years. The inclusion and exclusion criteria was set.

Dynamic gait index to asses gait and berg balance scale to asses balance was taken before starting the treatment. A 10 min period of warm up and cool down was done. Then after that the person was asked to do cycling on a stationary cycle for 20mins. In between the participant was asked whether there are any signs of dyspnea.

The person was asked to do cycling daily on a stationary cycle for 3weeks. After 3 weeks again berg balance scale and dynamic gait index score was noted. Statistical analysis is done and the results are noted for the effectiveness of aerobic exercises on balance and gait in geriatric.

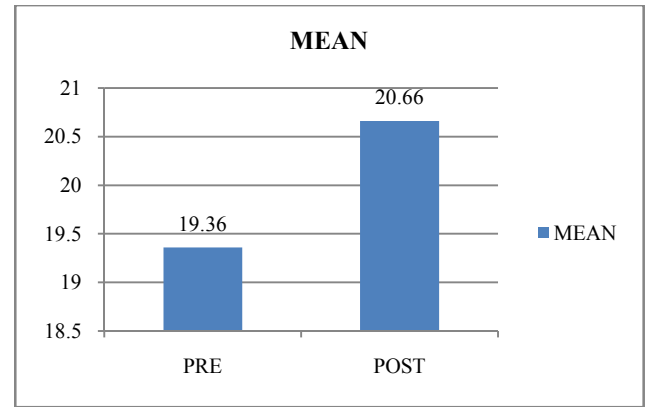
RESULTS



Graph 1 According to BBS

Interpretation: Participants showed significant improvement on balance after the intervention with a difference in the score of 1.97.

The p value is < 0.0001 considered extremely significant



Graph 2 According to DGI

Interpretation: Participants showed significant improvement on gait post intervention with difference in pre post mean of 1.36.

The p value is < 0.0001 considered extremely significant

DISCUSSION

In this study effect of aerobic exercises on balance and gait in geriatric population was checked. Ageing process is defined as all the changes that occur in a living organism with the passage of time. As we know ageing is a process which has many factors associated with it which decreases the quality of life of an individual.

As age advances there are many physiological changes that takes place in the human body. Like changes in the nervous system, musculoskeletal system, cardiovascular system and many more. With the nervous system changes the main complication is the alteration of balance and gait and also the coordination in the individual. Falls is a major symptom that is seen as the individual ages.

There are many causes for falls in elderly but the main aspect is musculoskeletal weakness. Musculoskeletal weakness is seen more in the lower extremities than the upper extremities. This leads to impairment in balance/postural control and also the walking ability this however increases the risk factors for falls in elderly population.

Stationary cycling is a type of aerobic exercise and resistance training intervention that can be used in order to strengthen the lower limb muscles. It is a self-monitoring intervention which needs no therapist to be present. It can be done anywhere with a stationary cycle. Only a proper protocol needs to be set.

A study done by Marques and Mangani described as the effect of aerobic versus resistance exercise on muscle strength and Physical performance in older people. Their results concluded that aerobic exercise improves measures of Physical performance such as gait speed and balance; resistance exercise was necessary to improve muscle strength.

Sung-jin Kim *et al*, in 2015 did a study on Effects of stationary cycling exercise on the balance and gait abilities of chronic stroke patients. They had set a stationary cycling program of 6 weeks for 30 mins for 5 times a week. They found that stationary cycling was effective in order to gain balance in patients with chronic stroke.

In 1997 Deborah F Verfailliet all, underwent a study on Effects of Resistance, Balance, and Gait Training on Reduction of Risk Factors Leading to Falls in Elders. They concluded that if balance and gait training is given in association with the resistance training it can show good results in muscle strength, balance and also walking abilities of an elderly individual.

Before starting the study ethical clearance from the ethical committee was taken. The inclusions and exclusion criteria was set up and goals of the study were clear. In this study 15 males and 15 females were included according to the inclusion and exclusion criteria of the study. All the individuals were included in the study who were caretakers of the patients or patients themselves who fitted the inclusion criteria. It was a 3 weeks of intervention.

Total 30 elderly individuals was included in the study as samples. A stationary cycle was chosen as the intervention. For assessing the balance berg balance scale was taken and for assessing the gait dynamic gait index was taken. Before starting the study berg balance score and dynamic gait index score was noted of all the samples.

A 10 min warm up and 10 min cool down period was done before starting the cycling. A period of 20 minutes of cycling was given to all the subjects. This was done daily for 3 weeks of time span. After 3 weeks again the berg balance score and dynamic gait index score was noted to see whether there is any progress in balance and gait.

At the end of the study statistical analysis is done of the readings of berg balance scale and dynamic gait index score of pre and post balance and gait. Mean score of pre berg balance scale and mean score of post berg balance scale was taken. Also the mean score of pre dynamic gait index and post dynamic gait index was taken.

After the completion of study we found that the mean of berg balance scale pre treatment was 48.56 and post treatment was 50.53. Which showed a mean difference of 1.97. Which says that all the participants had improved balance after the end of intervention. Also the mean value of dynamic gait index pre treatment was 19.36 and post was 20.66. Which showed a mean difference of 1.3. Even this score suggests that all the participants had improved gait patterns after the completion of the intervention.

Not only the mean score but also paired t test was done. The p values were removed which showed that the p value for berg balance scale as well as the p value for dynamic gait index were highly significant in the study. There is significant difference of aerobic exercises on balance using berg balance scale with p value (<0.0001). Also there is significant difference of aerobic exercises on gait with p value (<0.0001).

Stationary cycling can be chosen as an intervention to improve balance and gait. By improving the balance and gait patterns falls can be prevented to an extent in the older individuals. All the above reasons supports our study that the aerobic exercise can improve the balance and gait in geriatric population. So stationary cycling should be used as a long term protocol for improving balance and gait patterns in elderly.

CONCLUSION

Our study concluded that aerobic exercises improves balance and gait in the geriatric population.

Limitation

Limited number of sample was taken.

Scope of study

- Can be done in a large sample.
- A protocol can be designed that can be self monitoring and it will help to reduce the risk of falls in geriatric individuals.

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