Effectiveness of Aerobic Exercise and Resistance Exercise on Improving Cognitive Function in Older Adults

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How to cite this article: Sarthaj, Saravan Kumar J, Rekha. K et al. Effectiveness of Aerobic Exercise and Resistance Exercise on Improving Cognitive Function in Older Adults. Indian Journal of Physiotherapy and Occupational Therapy / Volume 18, Year 2024.

Abstract

Background: Every living thing ages, yet it seems that a person’s activities and interactions with their surroundings may slow down to the point where their performance begins to deteriorate. Since cognition is linked to cortical and subcortical regions, these regions’ deterioration is typically followed by a decline in cognition. Aging affects a number of cognitive functions, including the ability to quickly process information, reason, and pay attention.

Purpose: To compare the Effectiveness of aerobic exercise and resistance exercise on improving cognitive function in older adults.

Materials And Methods: The study type was a comparative pre-post type, and the study design was experimental. 68 old persons with cognitive scores of less than 20 provided the data. The study lasted for around 8 weeks. Males and females between the ages of 60 and 70 were selected. Study period: November 2022 to July 2023.

Result: The Mini Mental Examination Test scale and the Montreal Cognitive Assessment scale, when compared between Groups A and B, show a highly significant difference in Mean values at P 0.001.

Conclusion: In this study the findings suggest that Aerobic exercise is more beneficial than resistance strengthening exercise in increasing the cognitive function among the older people.

Key Words: Cognitive Function, Aerobic Exercise, Resistance Exercise, MMSE and MoCA.

Introduction

All living things eventually become old; however, it seems that a person’s actions and interactions with their environment might slow down the rate at which they approach the point where their performance starts to suffer.¹ The dynamic and progressive process of aging causes a decline in morphological, functional, hemodynamic, and psychological skills, as well as a reduction in adaptive capacity and quality of life and an increase in morbidity. Cognitive decline frequently follows the degeneration of these areas. Aging impairs a variety of cognitive processes, including the capacity for quick information processing, reasoning, paying attention, and various memory.² Lack of cognitive function is not specific to any one disease or condition, but it could be one of its symptoms. It could be a short-term issue or a long-term issue. It could develop as a result of...
environmental factors including brain injury, mental illness, or abnormal neurological development or it might be present from birth. The capacity to learn and function is significantly hampered as a result.³ The number of adults above the age of 65 is increasing.⁴ A typical issue in the elderly, cognitive impairment occurs at a probability of about 21.05-73.3 per 1,000 person-years and is correlated with aging MCI.⁵,⁶,⁷ The management of MCI influences whether elderly people will have mild cognitive impairment, such as dementia, or healthy cognitive abilities.⁸ It estimates that there are 22.2% of Indians who have cognitive impairment, with North India’s rural areas having a higher frequency. Growing older is a progressive process that reduces morphological and functional capacities as well as adaptive capacity, quality of life, and morbidity.⁹ In India, 8% of the population and 11% of the global population, respectively, were over 60 in 2011, and that percentage will rise to 19% by the end of 2050. One percent of older persons are affected by Alzheimer’s disease, the most widespread cause of cognitive impairment. By 2050, the frequency of cognitive impairment is projected to quadruple while its incidence will increase every five years. Currently, 13% of seniors over 65 experience some sort of impairment.¹⁰

**Aim**

The goal of the study is to compare how well aerobic exercise versus resistance training can help older persons’ cognitive abilities.

**Material and Method**

The study type was a comparative pre-post type, and the study design was experimental which was conducted in November 2022 to July 2023. The study’s location was the Jeeva Physiotherapy Clinic. 68 older persons with cognitive scores of less than 20 would provide the data. The study lasted for around 8 weeks. Males and females between the ages of 60 and 70 were selected.

**Inclusion Criteria**

1. Subjects who were 60 years old or more
2. Both genders.
3. Subjects who complained of memory issues
4. MMSE is less than 26.

**Exclusion Criteria**

1. Being bedridden
2. Visual or auditory impairment
3. Subjects with severe osteoarthritis
4. Post stroke patients who have upper limb and lower limb paralysis.

**Outcome Measures**

Assessment was performed at baseline (before starting of treatment) and after eight weeks of study.

1. Mini mental state examination (MMSE)

**Procedure**

The patient was completely explained about the procedure and had given the consent form for the treatment. Subjects were selected according to convenient sampling techniques and according to inclusion and exclusion criteria. The subject were evaluated with a given questionnaire and the values were taken as pre-test measurement. Group A (n=34) was given a protocol of aerobic exercise and Group B (n=34) was given a protocol of resistance exercise. After eight weeks of intervention the subject was evaluated with a given questionnaire and the values were taken as post-test measurement. The pre-test and post-test measures were statistically analyzed.

**Group –A: Aerobic Exercise**

**Protocol For Aerobic Exercise Group:**

The aerobic exercise A program for eight weeks and was done three times a week on alternate days (Tuesday, Thursday, and Saturday). In order to warm up before each training session, stretching and active limb motions were administered for 5 minutes. After giving the subjects instructions to work out at 65 to 70% of their maximal HR, the subjects’ heart rates were recorded. Participants engaged in exercises involving stair climbing and speed walking during each training session. At first, subjects were instructed to exercise for at least 20 minutes in each session, and they were then instructed to gradually increase that time every week until it reached 30 minutes. Jogging for five minutes served as the cooling-down exercise following the workout.
Group -B : Resistance Exercise

Protocol for Resistance Exercise:

The resistance training group will follow the described protocol 3 times a week on alternate days (Monday, Wednesday, and Friday). The resistance exercise group followed an 8-week exercise program that involves dumbbells and weight rod (Seated Military press) was performed for upper limbs by using dumbbells or weight plates and for lower limb strengthening exercises (Dumbbell squat) is done by using a weight cuff or weight plates. Exercise group. Use dumbbells or weight plates to do the (seated military press) exercise for the upper limbs, and weight cuffs or weight plates to perform the (dumbbell squat) exercise for the lower limbs.

1. Seated Military Press

Place one dumbbell on each thigh once you’re seated. Place your lower back firmly against the bench back while you sit. Keep your back and shoulders as straight as you can. Bring the dumbbells up to shoulder height by raising them from your thighs. And Press the dumbbells up to the top of Your head until your arms are fully extended. After briefly remaining above your head, lower the dumbbells back to shoulder height. The group will adhere to the prescribed regimen. Dumbbells and weighted bars were used in the eight-week training program for the resistance.

2. Squat

As you begin to lower your body by bending at the knees, move your butt backward. Avoid arching your back forward as you descend until your thighs are parallel to the ground. A shorter distance is ok until you master proper form and hold for a few seconds. Finally, to straighten your knees and hips and stand backup, push firmly into your heels. Keep your chest up high to maintain a neutral spine.

Exercise Programme

1. Aerobic Exercise (Speed Walking - 1000 Steps, Stair Climbing - 1 - 15 Steps).


Data Analysis

Fig-1 Comparison of Mini Mental State Examination for group A and B in pre and post- test values

Fig-2 Comparison of Mini Mental State Examination Within Group-A & Group-B Between Pre & Post Test Values

Fig-3 Comparison of Montreal Cognitive Assessment between for Group-A and Group-B in Pre and Post Test Values.
Fig-4 Comparison of Montreal Cognitive Assessment Within Group-A & Group-B Between Pre & Post Test Values.

**Result**

When analyzing the mean values of Groups A and B on the Mini Mental State Examination, Group A’s aerobic exercise group displays a mean value of 25.00, which is higher and more effective than Group B’s resistance exercise group 23.88. There is a considerable rise in the post test scores when comparing the mean values of Group A and Group B on the Montreal Cognitive Assessment scale. Mean values are similar in both groups, however the Aerobic Exercise Group (Group A) reveals that it is more successful than the Resistance Exercise Group (Group B), with a mean value of 25.38. 23.47 at $P \leq 0.001$.

**Discussion**

The purpose of this study was to examine how high-impact exercise and obstacle practice affected the development of mental capacity in more experienced adults. It is evident that aerobic and resistance exercise work well to improve older adults’ cognitive function. Be that as it may, there are less examinations who had analyzed these approaches on working on mental capability. MMSE and MoCA are used to assess subjects Cognitive performance in the subjects both at the start and end of the intervention. In Aerobic group pre intervention mean of MMSE was (20.50) and MoCA was (20.26). After treating the subject with Aerobic exercise Protocol, the mean value of MMSE and MoCA is increased to (25.00) and (25.38), which shows statistically significant difference between the groups. In Resistance Exercise protocol group pre-mean of MMSE was (20.97) and MoCA was (20.58). After treating the subject with Resistance Exercise protocol, the mean value of MMSE and MoCA is increased to (23.88) and (23.47), which shows statistically significant difference between the groups. Based on the statistical analysis, both groups showed improvement in MMSE and MoCA. However, subjects in Aerobic Exercise protocol groups who received Aerobic Exercise protocol exercise showed better improvement in MMSE and MoCA than the subjects in the Resistance exercise Protocol groups who received Resistance strengthening exercise in the Earlier studies (ozakya 2005) According to studies, resistance training results in similar or improved specific cognitive performances. Both behavioral and neuroelectric cognitive processes supported these advantageous effects.11 Chodzko & Zajko (2009) define “exercise” as “planned, organized, and continuous movement” with the aim of improving or preserving a few physical fitness-related characteristics. Practice is believed to be neuroprotective through the systems it following up on cardio vascular framework and it likewise advances brain adaptability and it acts straightforwardly on neurocognitive frameworks. Exercise has been shown to increase cognitive function in older adults with cognitive impairments.12,13 Although resistance exercise is suitable for the elderly, little research has been done into the mechanisms by which it improves cognition or the benefits of resistance training beyond strength. According to Gorelick et al., resistance training improves circulation throughout the body, increasing the brain’s food supply. Changes in circulation, an adjustment of steroid hormones a rise in brain concentrations of neurotransmitters, with the production of neurotrophins are the processes by which we acquire discernment during obstruction training.14

**Conclusion**

According to the research, Resistance strengthening exercises Protocol and Aerobic exercises Protocol both increase Cognitive function in old age people. The findings suggest that Aerobic exercise is more beneficial than resistance strengthening exercise in increase in cognitive function among the older people.
Ethical Clearance: Taken from Institutional Research Committee 03 / 076 / 2022 / ISRB / SR / SCPT

Funding: Self

Conflict Interest: Nil

References


