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Research Article

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To Compare the Effect of Resistance Training Versus Aerobic Exercise on Muscle Mass and Strength in Elderly People with Age Related Sarcopenia

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ABSTRACT

Background: Sarcopenia is a skeletal muscle disorder characterized by reduced muscle mass and strength. Age related sarcopenia poses significant challenges to the elderly population, leading to muscle weakness, functional decline. Resistance training and aerobics training have been proposed an effective intervention to counteract sarcopenia by improving muscle mass and strength in elderly people with sarcopenia.

Aim: This study aims to compare the effects of resistance training and aerobic exercise on improving muscle mass and strength in elderly individuals diagnosed with age related sarcopenia.

Objectives: This study evaluates the effects of resistance training versus aerobics on improving muscle mass and strength in elderly people with age related sarcopenia.

Methods: Based on inclusion and exclusion criteria the individuals were selected. The randomized controlled trail was conducted and the participants were assigned into group A (resistance training) and group B (aerobic Exercise). Muscle mass is measured through circumference of calf and muscle strength is measured with dynamometer.

Results: Results indicate the both resistance training and aerobics contribute to improve muscle mass and strength compared to baseline measurements in elderly people with age related sarcopenia.

Conclusion: Resistance training appears to elicit greater improvements in muscle mass and strength compared to aerobic exercise and this shows importance of incorporating exercise to yield better outcomes in quality of life in elderly with age related sarcopenia.

Keywords: Sarcopenia, Resistance Training, Aerobic Exercise, Muscle Mass, Muscle strength

Introduction

Skeletal muscle is an important organ as it supports body and enables locomotion. Sarcopenia is a generalized skeletal muscle disorder characterized by reduced muscle mass and strength and a powerful predictor of adverse health outcomes [1].

Sarcopenia was first presented by Irwin Rosenberg in 1989 that accounts for age related muscle mass and strength decline. In 2010, the European working group on sarcopenia in older

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people [EWGSOP] sarcopenia is a skeletal muscle disorder characterized by reduced muscle mass and strength [2]. Sarcopenia is a serious health concern among older adults in developing countries associated with lowered quality of life. It is remained unrecognized and rarely managed.

Sarcopenia occurs in elderly population between the age of 60 and 65 years and the prevalence of sarcopenia was reported to be up to 5 to 13 percent of persons aged 60 to 70 years. Exercise has been proposed as an intervention for age related sarcopenia to improve muscle mass and strength.

Resistance exercise is recommended as the first-line treatment for sarcopenia in older adults because of its favorable effects on muscle mass, strength and function. Resistance training is considered an important strategy for preventing muscle wasting because it stimulates muscle hypertrophy and increases strength by shifting the balance between muscle protein synthesis and degradation towards synthesis.

Aerobic exercise causes ATP production in mitochondria within skeletal muscle and improves aerobic capacity and metabolic regulation by increasing the demand for energy. It contributes to inductions of mitochondrial biogenesis and attenuated oxidative stress and inflammation which may indirectly benefit muscle hypertrophy in patients with sarcopenia. It is recommended to consider multicomponent interventions or combined resistance and aerobic exercise to impact different aspects of physical function in the elderly.

Need for Study

Identification of cost effectiveness innovations to prevent sarcopenia is one of the most important public health challenges. Enhancing both life expectancy and quality of life for overall wellbeing. To promote awareness of physical activity to enhance functional ability and independence. The need for the study is to investigate the effectiveness of resistance training and aerobics on muscle mass, strength in age related sarcopenia.

Materials and Methodology

Study Design

Randomized controlled Trail with Pre-test and Post-test study design. The study was conducted in the department of physiotherapy, Sree Abirami college of Physiotherapy, Coimbatore.

Study Sampling

20 subjects were randomly selected into two groups. Group A and Group B. Each group consist of (n=10) members. The study was conducted over a period of 6 months.

Selection Criteria

Inclusion Criteria

Subjects between 60-65 Years were taken. Only female subjects were included. Weight ranges from 35 kg to 45 kg are taken. Able to walk independently and capable participating in Moderate intensity exercise. Subjects with low muscle mass (e.g., low Skeletal Muscle Mass Index) plus low muscle strength or poor physical performance.

Exclusion Criteria

Acute condition: Heart attack, stroke. Chronic condition: Heart failure, arthritis, uncontrolled hypertension. Engaged in regular exercise, Osteoporosis, Subjects underwent recent surgery and psychiatric patients.

Study Methods

After obtaining informed consent form from the subjects, they were divided randomly into two experimental groups, Group-A (Resistance Exercises) and Group-B (Aerobic exercise) with 10 subjects in each group. Pre-test and Post-test measurements were taken.

Procedure

20 subjects were included in the study by using random sampling method among the persons with age related sarcopenia. The participants were randomly assigned into two groups. The group A underwent resistance training and group B underwent aerobic Exercise for a period of 2 days per week for 6 weeks.

The pre and post assessment for muscle mass is taken with the measurement of muscle circumference. Here calf circumference is taken for muscle mass assessment. The pre and post assessment for muscle strength is taken with dynamometer.

Group A (Resistance Exercise)

Group A with 10 subjects treated by resisted exercise. The resisted exercise is given in progressive manner for the duration of 6 weeks.

Treatment Duration

Two sessions/week 40 mins/ session. Exercise intensity: week 1 and 2: 30-40 percent of 1RM, week 3 and 4: 40-60 percent of 1RM, week 5 and 6: 70-80 percent of 1RM, Exercise volume: 2 sets of 10 repetitions.

Rest period

3 mins between sets and 1-2 mins between exercise.

Warm up & Cool down: 5 mins, Stretching, Shoulder rotation, ankle and hip rotations. Exercises for upper body: 1. Chest press, Arm rowing, Hammer curl – 2 sets, 10 reps, Lower body: chair squat, Leg curl, knee extension, heel raise – 2 sets, 10 reps.

Group B (Aerobic Exercise)

Group B with 10 subjects treated by aerobic exercise. Treatment duration: 40 mins/session, Two session/ week. Exercise intensity: week 1and 2: 30-40 percent of MHR, week 3 and 4: 40-50 percent of MHR, week 5 and 6: 70 -80 percent of MHR,

Rest period

2mins/sets.

Warm up & Cool down: Slow Walking -10 mins, Upper body: 1. Chest press, Arm Circle, side raise, Overhead arm clap, Shadow boxing – 2 sets, 10 reps, Lower body: Brisk Walking, Spot Marching, Stationary bicycle – 2 sets, 10 reps.

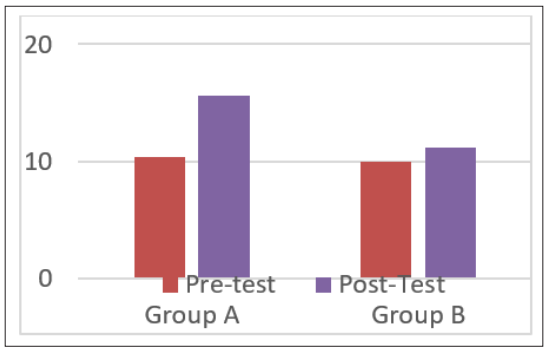
Datas Analysis

The Collected data were tabulated and analyzed using Student 't' test. Paired "t" test is used to analyze the significant difference between Pre-test and Post-test values of Group A and Group B and Unpaired 't' test was used to analyze significant difference

between two groups. p valve < 0.05 was considered as statistically significant improvement between the groups.

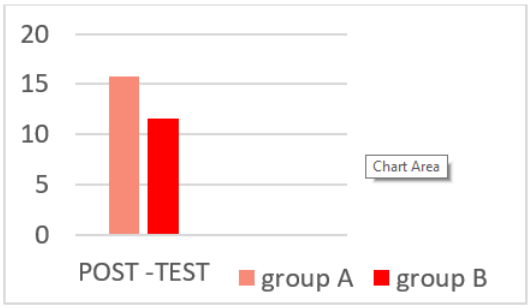
Paired 't' test: Muscle Mass,

Pre and Post test values of Group A and Group B

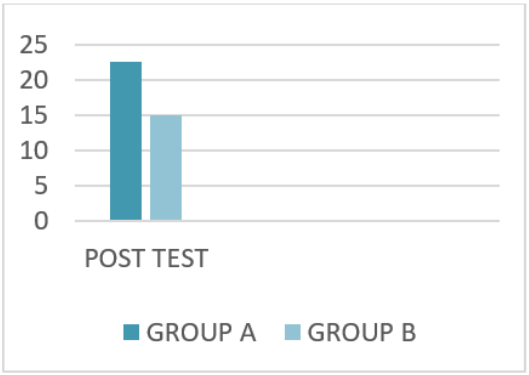


Paired 't' test- Muscle strength
Pre and Post test values of Group A and Group B

Unpaired 't' test- Muscle mass
Post test Values of Group A and Group B



Unpaired 't' test - Muscle strength
Post test values of Group A and Group B



Results

The Paired 't' test analysis for pre-test and post-test values of Muscle mass and muscle strength for group A and Group B showed there is a significant difference within groups. The Unpaired 't' test analysis showed posttest values of muscle mass measured using inch tape muscle strength measured using dynamometer for Group A and Group B showed there is a significant difference between the groups.

The statistical analysis showed that there was statistically significant improvement in both muscle mass and muscle strength in Group A (Resisted Exercise) ($p < 0.05$) than group B (Aerobic exercise) in elderly with age related sarcopenia. Hence alternate hypothesis is accepted and null hypothesis are rejected.

Discussion

The aim of the study is to compare the effect of resistance exercise and Aerobic exercise on muscle mass and muscle strength in elderly people with age related sarcopenia. Based on selection criteria 20 subjects were selected and they were divided into 2 groups with 10 each. Treatment duration 40 mins with outcome measure of muscle mass and muscle strength measured using muscle circumference and using Dynamometer.

Found that progressive resistance training significantly improved strength and physical performance in older adults. showed Resistance Training had a moderate-to-large effect on muscle strength and a small-to-moderate effect on lean mass in sarcopenic elderly. Aerobic training, while beneficial for cardiovascular and metabolic health, typically shows less impact on muscle hypertrophy and strength in the absence of resistance loading.

Conclusion

This study concluded that resistance training is significantly more effective than aerobic exercise in increasing muscle mass, strength, and improving functional mobility in elderly individuals with age related sarcopenia. This form of exercise is particularly effective in counteracting the muscle loss and weakness which is the characteristic of sarcopenia. Progressive resistance training be incorporated as a standard component of sarcopenia management protocols for individuals with age related sarcopenia [3-15].

Limitations & Recommendations

The study limited with small sample size & small duration, did not include a nutritional intervention, which could synergize with training effects. Future studies should concentrate on long term effects of resistance training and aerobic exercise, Further study can be conducted with larger samples and focus on Optimal dosing and periodization of Resistance Training in older adults.

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