

TO COMPARE THE EFFECTS OF FUNCTIONAL TASK EXERCISE AND FINGER MOVEMENT EXERCISE WITH FINGER WEIGHT LIFTING TRAINING ON HANDGRIP FOR COMMUNITY DWELLING ELDERLY POPULATION.¹*Dr. Jyothi Seshan, ²Dr. Senthil Selvam, ³Dr. Sundaram and ⁴Venkat Raman¹M.P.T (Ortho), Asst. Prof in School of Physiotherapy, VISTAS, Thalambur, Chennai.²M.P.T (Ortho), Ph. D, Prof and HOD in School of Physiotherapy, VISTAS, Thalambur, Chennai.³M.P.T (Sports), Ph. D, Prof in, School of Physiotherapy VISTAS, Thalambur, Chennai.⁴B.P.T Final year Student in School of Physiotherapy VISTAS, Thalambur, Chennai.***Corresponding Author: Dr. Jyothi Seshan**

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ABSTRACT

Background: Aging is an irreversible process; Due to inactivity, a sedentary lifestyle are very evident in most people. The purpose of the present study was to examine the effects of functional task exercise and finger movements exercise with finger weight lifting training on handgrip for community dwelling elderly population. When physical capacity falls below the ability to the performance of daily tasks, functional limitations and a loss of independence may occur. **Aim and Objectives of The Study:** The aim of the study is to analyze the effectiveness of functional task exercise program and finger movement exercise with finger weight lifting training in improving handgrip strength. **Methods:** This experimental study was conducted on 40 male and female patients (aged 60-75 years) without any severe illness. 40 subjects were divided into 2 groups, group A was taught functional tasks exercise and group B was taught finger movement exercise and finger weight lifting exercise. For the outcome measures, Handgrip strength was recorded using handheld dynamometer. **Result:** The result shows that group B (Finger movements exercise with finger weight lifting training) P Value is (right hand <0.0001, left hand p<0.0001) improved compared to group A (Functional task exercise) P Value is (right hand p<0.0001, left hand p<0.005). **Conclusion:** There is a significant for both these exercise. But statistically significant for finger movements exercise with finger weight lifting exercise comparing to functional task exercise.

KEYWORDS: elderly population, hand function, grip strength, functional task exercise, weight lifting exercise.**INTRODUCTION**

Ageing leads to gradual decrease in physical and mental capacity, a growing risk of disease and ultimately death.^[1] In general, ageing is an irreversible process, the effects of sedentary life in the elderly population due to inactivity of functional task achieving, leads to muscle wasting, etc. As ageing process occur there are certain natural changes that takes place biologically psychologically and physiologically which may have unfavorable impact on the life of elderly population.^[7] As the health complication of the individual increases there is decline in the self-sufficiency.^[8]

Ageing is strongly associated with improved mobility decreased physical and functional performance as a result of which there is a loss of independence and quality of life. Sedentary life style is consider to be one of the most important contributing factors for loss of independent performance of daily task, where the performance of functional tasks, however, is more complex and involves interplay of cognitive, perceptual,

and motor functions and is closely linked to the individual dynamic environment. The hand function trails have provided evidence of the positive effects of regular exercise in older age group for improving muscle strength.

One of the most changes in ageing skeletal muscle in the body is a major reduction in muscle mass ranging from 25% to 45% which is sometimes described as "Sarcopenia of old age". Sarcopenia is described as the age-related loss of skeletal muscle mass. He concluded that there is probably no decline in structure and function more dramatic than the decline in lean body mass or muscle mass over the decades of life (Victoria L. KeeVil). The estimated prevalence of Sarcopenia ranges from 18% to over 60% in general population of the oldest old.^[22]

After 60 years of age is a rapid decline in hand-grip strength, by as much as 20-25%. Handgrip strength is indicative of overall physical health and mobility in the

elderly. A reduction in strength increases the risk of mobility limitation and may lead to adverse outcomes such as dependence in daily activities and mortality.

Hand is the most active and important part of the upper extremity. Its function is a part of the complex interaction between the power provided by the intrinsic and extrinsic musculature, the stability provided by the ligaments and the structures provided by the bones which act as an intentional and attachment site for the muscles and ligaments.

The fingers in power grip usually function in clamp on and hold an object into the palm. The fingers assume a position of sustained flexion that varies in degree with the size, shape, and weight of the object. The palm is likely to contour to the object as the palmar arches form around it.

Grip strength of an individual strongly correlates with the overall body strength, ability to perform functional tasks^[9],^[10] and disability in daily living.^[27],^[28] The upper body strength is necessary for performing day to day activities, hence the stronger their upper limb the greater is their measure of independence.^[11]

Grip strength is associated with the health related quality of living HRQOL, hence lower grip strength is associated with reduced HRQOL in older men and women.

Muscle strength and functional activity have been shown to decline during the ageing process. A study (Frederiksen H) showed a linear decline in handgrip strength with age between 46 and 85 years, and rapid declines after 85 years. The degeneration of muscle strength with ageing is due to an overall decrease in muscle mass, especially the type 2 fibers. During the ageing process there is a decrease in muscle strength and functional activities in both male and female populations. However, a decrease in functional activity seems to occur earlier than the decrease in muscle strength during ageing (Shin-Jung Cheng). A decrease in muscle strength and functional activities seems earlier in females than in male individuals. Besides the decrease in muscle mass, it was parallel with the decrease of muscle strength.

Ageing is associated with a progressive degeneration of the tissues, which has a negative impact on the structure and function of the vital organs and is one among the most important known risk factors for most chronic diseases. (William MacNee). Ageing is also associated with loss of muscle mass which results in decreased muscle strength which is linked with disability. Maintaining muscle strength is very important to reduce functional limitation of older people.^[24] There is an increasing recognition of the serious health consequences that occur as a result of loss of muscle strength in terms of disability^[12], morbidity^[13], mortality^[14], and significant health care costs.^[15] A number of studies have

described the association between hand grip strength and the health decline in the elderly, these studies predominantly describing the association between hand grip and the functional disability^[17],^[18],^[19] and mortality.^[20],^[21]

Hand grip strength (HGS) is frequently measured as a proxy for muscle strength^[25], which is a simple non-invasive, reliable, and low cost screening technique which does not require trained personnel.^[26] Hand grip strength is commonly used as a surrogate measurement of overall muscle strength, and among elderly individuals, handgrip strength is associated with health-related quality of life, the ability to perform activities of daily living (ADLs), bone mineral density and the incidence of vertebral fracture, length of hospitalization, psychological and social health, and the development and prognosis of certain diseases.

Regular physical activity is recommended and is considered to be an important strategy for the reduction or prevention of functional decline with ageing^[4] in addition this reduces the risk of disease. The beneficial effect of physical activity is that it has an impact on a large number of chronic diseases, functional consequences and multi-morbidity.^[5],^[6]

Finger weight lifting training can be used to improve an individual's ability to control sub-maximal pinch force and hand function. Finger movement exercises are traditionally used during the rehabilitation of hand functions, and interventions based on finger movement exercise and finger weight lifting training have been accepted by older adults.

The functional task exercise program is an evidence-based exercise program for elderly people living at home to enhance the physical capacity of the individual with a sustainable effect.^[3]

AIM OF THE STUDY

To compare the effectiveness of functional task exercise and finger movement exercise with finger weight lifting training among the community-dwelling elderly population.

OBJECTIVE OF THE STUDY

To analyze the effectiveness of functional task exercise program in improving handgrip strength.

The effectiveness of finger movement exercise with finger weight lifting training in improving handgrip strength.

NEED OF THE STUDY

The present need of the study is to find the effectiveness of functional task exercise and finger movement exercise with finger weight lifting training on handgrip for community-dwelling elderly population.

BACKGROUND OF THE STUDY

Aging reduces the physical capacity of individual. When physical capacity falls below the ability recovery for performance of daily task, functional limitation and loss of independent may occur.

METHODOLOGY

- **Study Design**

Comparative study.

- **Study type**

Experimental Study.

- **Study Setting**

Old age home in and around Chennai

- **Study duration**

4 weeks

- **Study Size**

40

- **Sampling Method**

Convenient sampling

INCLUSION CRITERIA

- Age: 60-75 years.
- Subjects without any hand injuries.

Exclusion Criteria

- Cardiac function rating of greater than or equal to class 3.
- Severe cognitive impairment.
- Upper limb pain, severe arthritis or nervous disease that prohibited performance of handgrip measurements or exercise.
- Any other condition that restricted the application of hand force.
- Cardiac conditions with referred pain in hand.
- Conditions that causes radiculopathy in hand.
- Crush injuries in hand.
- Flexor and/or extensor tendon injury or repair.

Outcome Measure

- Handgrip strength was recorded using hand dynamometer.

Materials Used

1. Button
2. Clay
3. Cards
4. Clothes
5. Water
6. Bowl
7. Plastic bottle with water
8. Sandbag
9. Paper
10. Door lock
11. Pencil
12. Table
13. Sand

14. Coin
15. Marbles
16. Spherical and
17. Cylindrical shape objects

Procedure

Sample who have met the alone inclusion and exclusion criteria were selected and their consent to participate in the study was expressed by signing the consent form. They were divided into group A and group B by convenient sampling method.

Duration

10 repetitions of each functional task exercise. Exercises will be performed 3 times a week in 1-hour session for 4 weeks.

Functional Task Exercise (Group A)

- Carrying a plastic bottle of water transfer from one hand to another.
- Transfer sand bag from one hand to another.
- Crumple a sheet of a paper into a ball try to spread it back out into a flat piece of paper.
- Gripping the door lock.
- Roll a pencil between a thumb and finger.
- Place hand on table and try to lift each finger one at a time off table.
- Fill a bowl with sand or rice and place object in the sand try to find out the object with seeing.
- Take different objects, reaching and grasping.
- Molding a clay.
- Turn a card over.
- Do typing movement.
- Wringing out the wet clothes.

Functional Task Exercises (Group B)

- **Finger movement's exercises**

The set consisted of 11 movements: palm and opisthenar massage, pinching, stretching and clenching, fillipping, crooking, finger counting, pairing, pressing, digital root hitting, wrist pressing and turning and hand swinging.

- **Finger weight lifting**

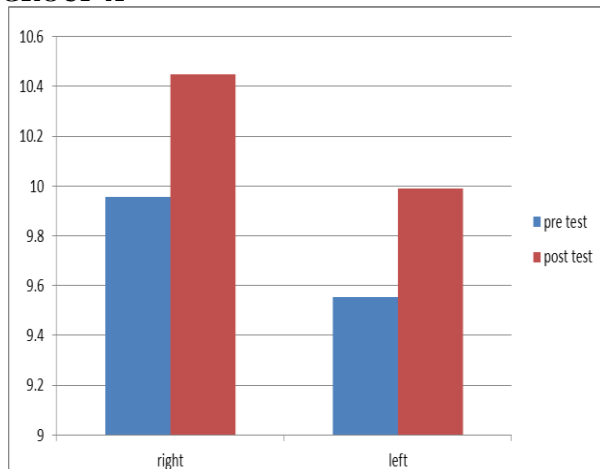
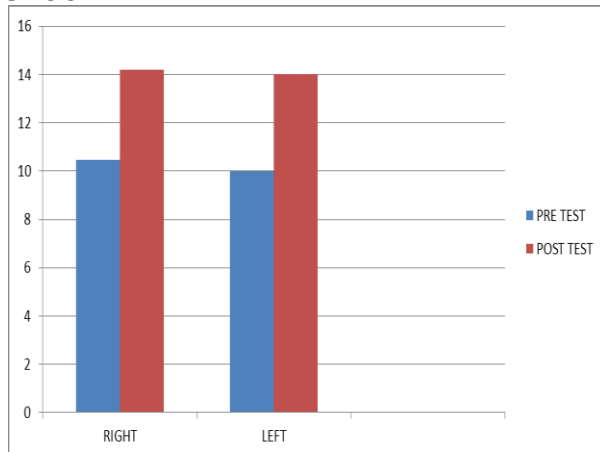
A training bag capable of holding four 600 ml plastic bottles was designed and constructed. Following completion of the finger movement exercise, the weight lift intervention was conducted as follows; each participant placed their arms to their sides, keeping their arms and wrist fixed. Then, they crooked their straps of the training bag with their finger tips and lifted the bag with the force produced by their fingers then they relaxed their fingers and lifted the weight again, repeating the lifting exercise 50 times with 1 or 2 breaks periods, if needed. This training regimen was conducted once per day. The weight of the training bag was gradually increased from 1 to 4 bottles that weighted a total of 2.5 kg. Participants spend one week of training adapting to the weight.

RIGHT SIDE**Table 1: Comparison of mean and standard deviation of pre test and post test hand grip strength of right hand.**

	N	Mean		Sd		T value	P value
		Pre Test	Post Test	Pre Test	Pre Test		
GROUP A	20	9.525	9.99	2.583	2.629	3.1606	=0.005
GROUP B	20	9.985	13.995	5.326	4.809	8.5240	<0.0001

LEFT SIDE**Table 2: Comparison of mean and standard deviation of pre test and post test hand grip strength of left hand.**

	N	Mean		Sd		T value	P value
		Pre test	Post test	Pre test	Pre test		
GROUP A	20	9.955	10.45	3.943	3.813	5.1954	<0.0001
GROUP B	20	10.45	14.205	4.835	4.81	12.5962	<0.0001

GROUP-A**Figure 1: Comparison of pre and post test hand grip strength for Group-A.****GROUP-B****Figure 2: Comparison of pre and post test hand grip strength for Group-B.****RESULTS**

- According to the statistical report since the p value is less than 0.05, we reject the null hypothesis of 5% level of significance. In addition, the mean value of hand held dynamometer is increased from Pre-test to Post-Test in both GROUP A (Right side: pre test mean value: 9.525, Post test mean value: 9.99; Left side: pre test mean value: 9.955, post test mean

value: 10.45) and GROUP B (Right side: pre test mean value:9.985, post test mean value:13.995; Left side: pre test mean value: 10.45, Post test mean value: 14.205) . Hence, the evidence is sufficient to conclude that there is significant improvement in hand held dynamometer.

- From the above results, we see that hand held dynamometer was found to be improved from Pre to Post test. This clearly indicates that the treatment is effective in terms of the parameters in both group B and A, group B shows a better improvement in hand grip strength when compared to group A.

DISCUSSION

There is a considerable impact of functional task exercise and finger weight lifting training in improving hand grip strength for older adults, there is a great number of experimental studies that evaluated the effect of functional task exercise and resistance training respectively on impairment of hand grip strength in older adults.

The present study was conducted to see the effects of functional task exercise and finger movement exercise with finger weight lifting training on hand grip strength for community dwelling elderly population.

The study was conducted within 40 subjects. Subjects divided into two groups. Functional task exercise given to group A and finger movement exercise with finger weight lifting training given to group B. prior consent was taken. Treatment protocol carried out for 4 weeks. The outcome measure for either study was hand held dynamometer.

Result of this study showed that there was a significant difference in improving hand grip strength after 4 weeks of interventions in both group A and B.

Anandhi D et al, 2018 shows that regular exercise is beneficial to basic physical function in older adults, increasing muscle strength, balance, endurance and flexibility and they is an improved hand function ability of older people with performed daily task and two types of exercise developed.

Vreedel showed that the functional task exercise shows better improvement on hand function when compared to the resistance exercise in elderly population which means that older individuals may continue exercising in elderly population.

Vinoth, et al 2015, study of 14 elderly subjects who performed skilled- finger movement exercise improve the ability to control the hand grip function and other disabilities of hand functions in older population.

CONCLUSION

This experimental study has concluded that the finger movement exercise with finger weight lifting training has better effect in increasing the handgrip strength in elderly population as measured in dynamometer.

From the statistical analysis of the present study, the samples in group B who received finger movement exercise with finger weight lifting training has shown highly statistically significant improvement between the pre-test and post-test and the samples in group B , who have functional task exercise program have statistically significant improvement between the pre-test and post-test in the hand grip strength. This study showed that both the group has shown a significant improvement in hand grip strength, in which group B has shown higher improvement than group A. Hence, it is concluded that finger movement exercise with finger weight lifting training is superior to functional task exercise program in improving hand grip strength.

LIMITATIONS AND RECOMMENDATIONS

Limitations

Small sample size.

Study duration is short.

Study sample was limited to age group of 60 to 75 old individuals.

Long term effects of treatments were not assessed.

RECOMMENDATIONS

Large sample size is recommended for future studies.

To provide long term follow up.

To do randomized control trail (RCT) study.

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