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Effect of physical exercise on muscle strength and physical performance among adults with sarcopenia at selected old age homes, Puducherry

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Abstract

Background: Elderly population were attributed to several problematic factors in the society. Among all the illness that affects the elderly, physical illness are the biggest challenges to be faced by the elderly people that directly affects the activity of daily living and quality of life.

Methodology: Quantitative research approach, true experimental research design, pre-test posttest control group design was adopted. Descriptive and inferential statistics was used. Simple random sampling technique by lottery method was used. The tool used for collection of data which consist of socio demographical variables, SARC-F to assess the Sarcopenicstatus; Short physical performance battery (SPPB) to assess physical performance; CAMRY hand dynamometer to assess the muscle strength.

Results and Discussion: There is significant association between muscle strength and age ($p<0.001$), comorbidity ($p=0.004$) and duration of stay in old age home ($p=0.001$) was observed among the participants. There is significant association between level of physical performance and age ($p<0.001$), literacy ($p=0.006$), comorbidities ($p=0.034$), BMI ($p=0.016$) and duration of stay in old age home ($p=0.013$).

Conclusion: The study findings revealed that there was a significant improvement in the level of muscle strength and physical performance among adults with Sarcopenia following physical exercise.

Keywords: Sarcopenia, Physical exercise, physical performance, muscle strength

Introduction

Elderly in today's world are more vulnerable to become invisible and disposable as their functional role changes. The society should make sure that the elderly population were made as a prime focus by providing them a viable and productive life based on their functionality levels. All possible measures must be taken to protect the elderly population in all aspects of their lives^[1].

According to WHO classification of elderly, the people above 40 to 60 years are considered to be middle aged adults, people of 60 to 75 years are said to elder adults, people with 75 to 90 years are considered as senile aged those above 90 years are considered as long lives^[2].

Sarcopenia is a term, that is defined as an involuntary loss of skeletal muscle mass and strength related to ageing. It is evident that at 40 years of life the skeletal muscle mass and strength begins to decline in a linear fashion. Probably at 80 years of life, about 50% of this muscle mass is said to be lost, in which the muscles mass accounts up to 60% of the total body mass^[3].

A study conducted by Christopher Hurt in 2022 shows that, resistance exercises are recommended as the counteracting treatment that is also commenced as the first line option for frailty that acts on deleterious consequences of Sarcopenia in older adults and it is evident that the resistance exercises has an effective interventions for improving and maintaining muscle strength and function in healthy older adults^[4].

Need for the Study

At Global level- The prevalence of Sarcopenia ranged from 8% to 36% in individuals of less than 60 years and from 10% to 27% in individuals of more than or equal to 60 years.

Men had a higher prevalence of sarcopenia than women, according to the European.

Working Group on Sarcopenia in Older People (EWGSOP) [5].

At National level- A cross-sectional study was conducted on the prevalence and factors contributing to Sarcopenia in relatively older Indians, the results showed that the prevalence of Sarcopenia among elderly population were about 39.2%, among which male were more Sarcopenic than females [6].

At Regional level- A study conducted to assess the prevalence of sarcopenia among old age people residing in Tami Nadu, the data was collected among 212 people above the age of 60 years, the result showed that prevalence of Sarcopenia is about 42.5%, and male were more Sarcopenic than females [7].

Materials and Methods

Research approach: Quantitative approach was used.

Research design: True experimental, pre-test post-test control group design was adopted in this study.

Setting of the study: This study was conducted at Cluny Hospice, Puducherry and Dignity care centre, Cuddalore main road, Puducherry.

Variables

Independent variables

In this present study, it refers to physical exercises.

Dependent variables

In the present study, it refers to the muscle strength and physical performance.

Population of the study: Population is a group whose members possess specific attributes that a researcher is interested in studying. In the study, the population includes adult person above 40 years from Puducherry, India.

Sample: Sample is a representative units of target population selected for experiment and analysis. In this study sample consists of adult person above 40 years with Sarcopenia in Cluny Hospice and Dignity care centre, Puducherry.

Sample size: The sample size was calculated from the study of Sanna Vikberg, *et al.*, in 2019 with mean and standard deviation 8.25 ± 2.12 in experimental group and 10.5 ± 4 in control group of hand grip strength with power 80% and significance level 5%, the sample size obtained for each group was 32. Sample size taken was 60 in each group.

Sampling technique: Simple random sampling technique was used. Samples were selected based on Inclusion and Exclusion criteria.

Data Collection Procedure

Taibot (1995) [8] refers data collection as gathering

information from the sampling units. The study was conducted after obtaining permission from the concerned authority. The data was collected from 19.07.2023 to 24.08.2023 at Cluny Hospice, Puducherry and Dignity Care center, Cuddalore main road, Puducherry. The samples are selected through simple random sampling technique. The investigator obtained written consent from each sample. The nature and the purpose of the study were explained to them. During pre-test, the initial assessment was done by observing and interviewing the participants using the standardized tools and instrument, that took 10-20 minutes. Another 10 minutes was given to fill the questionnaire. Resistance exercises training program for muscle strengthening and improving physical performance was given for the experimental group for 35-45 minutes per session per day for 4 weeks, totally of 12 sessions. After 4 weeks interval post-test was conducted.

Validity and reliability of the tool

The reliability of the standardized SARC-F tool was obtained through internal validity were the Cronbach's alpha coefficient for internal was 0.84. The reliability of the standardized Short Physical Performance Battery (SPPB), a standardized tool for assessing physical performance in older adults given by National Institute of Ageing was done through internal consistency test and the Cronbach's alpha was found to be 0.76. The CAMRY hand dynamometer provides an accuracy of momentary digital reading of gripping power with a measuring capacity: 198lbs/ 90kgs and divisions: 0.2lbs/ 0.1kgs and specificity -83%, it is equipped with high precision strain gauge sensor.

Ethical Considerations

The researcher had undertaken formal permission from Director – Principal, Principal – Incharge of College of Nursing, Nursing Superintendent, ISC (Internal Scientific Committee) and IEC (Institute Ethics Committee – no: RC-2023-56), Pondicherry Institute of Medical Sciences. All participants were explained in the language comprehensible to them, the details of the study and level of risk/ benefit associated with it.

Results and Discussion

The data were analyzed on the basis of the study objectives, using both descriptive and inferential statistics. Findings are organized in the following headings.

Findings related to socio demographical variables

With regard to the socio demographical variables, Majority of the elderly population 65(54.2%) belongs to the age group between 60-75 years. Majority of them 62 (51.7%) were females. Majority 90(75%) of them were literate. Majority 81(67.5%) of them were married. Majority 61(50.8%) of them stayed between 6- 10 years in old age homes. Majority 117(97.5%) of them were consuming mixed diet. Majority 62 (51.7%) of them had normal weight in BMI interpretation. Majority (76.6%) of them had comorbidities.

Findings related to pre-test level of muscle strength and physical performance among Sarcopenic adults

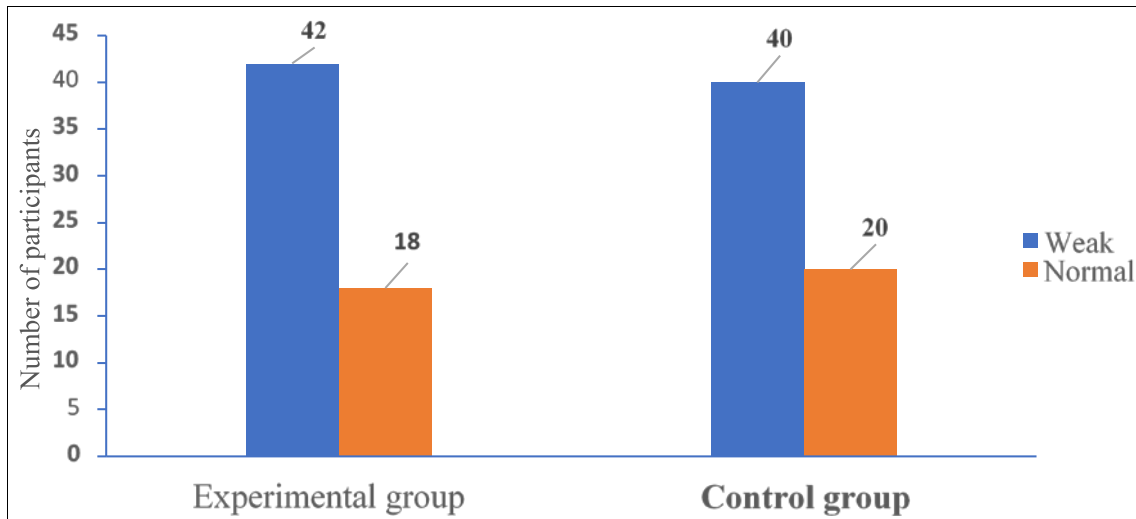


Fig 1: Frequency distribution of pre-test level of muscle strength among Sarcopenic adults. n=120

Figure 1 shows the pre-test level of muscle strength among Sarcopenic adults. It indicates that 42 (70%) and 18 (30%) of the participants had weak and normal level of muscle

strength in experimental group and 40 (66.7%) and 20 (33.3%) of them had weak and normal level of muscle strength in control group.

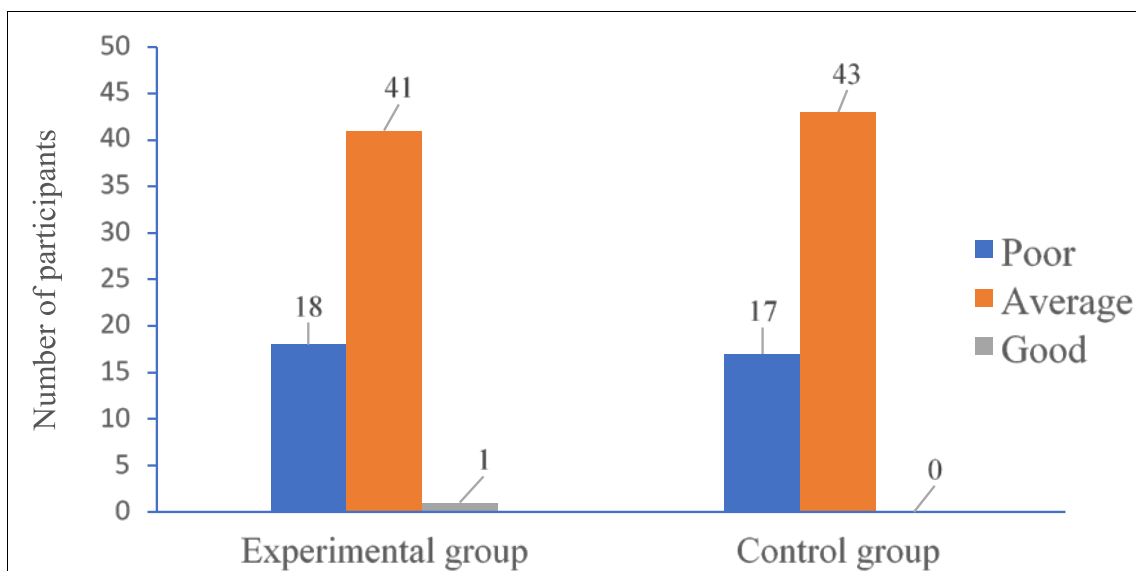


Fig 2: Frequency distribution of pre-test level of physical performance among Sarcopenic adults. n=120

Figure 2 shows the pre test level of physical performance among Sarcopenic adults. It indicates that 18 (30.0%), 41 (68.3%) and 1 (1.7%) of the participants had poor, average and good level of physical performance in experimental group. In control group 17 (28.3%) and 43 (71.7%) of the participants had poor and average level of physical performance and none of them had good level of physical performance.

Effect of physical exercise on muscle strength and physical performance among Sarcopenic adults in experimental group in comparison with control group

It shows there is no significant difference between experimental and control group in post test mean score of muscle strength ($p=0.487$) among Sarcopenic adults and there is significant difference between post test mean score of physical performance ($p=0.005$).

Association between the pre test level of muscle strength and physical performance of sarcopenic adults with selected demographic variables

There is significant association between muscle strength and age ($p<0.001$), comorbidity ($p=0.004$) and duration of stay in old age home ($p=0.001$) was observed among the participants. However there is no significant association found for variables like gender, educational qualification, dietary pattern and BMI with muscle strength among participants.

There is significant association between level of physical performance and age ($p<0.001$), literacy ($p=0.006$), comorbidities ($p=0.034$), BMI ($p=0.016$) and duration of stay in old age home ($p=0.013$). However there is no significant association found between gender and dietary pattern and level of physical performance among participants.

Conclusion

The study result showed that there is a significant difference in the pre test and post test muscle strength and the level of physical performance in experimental group and there is significant difference in the post test level of physical performance in experimental and control group. Therefore, the study concluded that there is significant effect of physical exercise on physical performance and muscle strength among elders with Sarcopenia.

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