

Prevalence of Sarcopenia and its Effects on the Quality of Life in Geriatrics

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Abstract:

Background- The study will identify the effect of sarcopenia on local geriatric population of Dehradun. In addition to that it focuses to establish the effect of sarcopenic criteria on stages of sarcopenia. The study mainly aims to associate the effect of sarcopenia with Quality of life of geriatric population. **Study Design;** correlation study. **Participants** 113 subjects were included as per inclusion and exclusion criteria. **Outcome measures:** Handgrip Dynamometer, 6 meter walk test, A.L.S.T., WHOQOLQ-BREF. **Result:** For psychological domain, gait speed showed significant positive correlation for Group A&C ($p=0.041$ & 0.002 respectively). ALST and Grip strength showed non-significant correlation with the psychological domain of QOL for all 4 groups. For environmental domain QOL showed significant positive correlation with gait speed in

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severe sarcopenic subjects ($p=0.023$). **Conclusion:** The prevalence of Sarcopenia among the geriatric population in Dehradun is high with 65% Severe Sarcopenic, 13% Moderate Sarcopenic. Males are more affected than females the result depicted that Muscle Mass (ALST), Gait Speed (6m walk test), Hand Grip Strength (HHD) were significantly lowered in Sarcopenic population. Out of which Gait significantly affected their QOL.

Key words: sarcopenia, A.L.S.T., QOL, muscle mass

Introduction

Sarcopenia is the loss of skeletal muscle mass resulting in a reduction of physical strength and ability to perform activities of daily living. The term “**sarcopenia**” to refer to the process of age-related loss of skeletal muscle mass and size. The term sarcopenia comes from the Greek words **sarx** (flesh) and **penia** (loss).(3)

Rosenberg’s reason for creating a medical term for age-related muscle loss was to bring increased awareness and attention to this issue, which he felt was greatly underappreciated and understudied. (4)

The decline in skeletal muscle mass is greater in men than women. Birth-weight and prepubertal height gain have been associated with midlife grip strength, independently of later weight and height gain and other determinants.(5)

Today sarcopenia is mostly seen as a somatic condition typical of old aged people. A condition which inevitably leads to an impaired functional performance, increased physical disability, vulnerability and frailty and an increased risk for falls, but sarcopenia and the loss of skeletal muscle mass do not appear during old age only. (6)

In men with sarcopenia, an approximately four-fold increase in the risk of disability, in women, an approximately

four-fold increase in the risk of disability in at least three of the instrumental activities of daily living has been reported.(5)

Recently, the European Working Group on Sarcopenia in Older People (EWGSOP) has recommended using the presence of both low muscle mass and low muscle function (strength and performance) for the diagnosis of sarcopenia.(8)

In addition, the severity of sarcopenia can be classified as pre-sarcopenia: low muscle mass alone; sarcopenia: low muscle mass plus low muscle strength or low physical performance; or severe sarcopenia: low muscle mass, low muscle strength, and low physical performance.(8)

The study of sarcopenia is appealing because it is a modifiable risk factor, as increasing muscle mass has the capability of reducing incidence of disability despite the co-occurrence of age-related diseases (9). A gradual erosion of QOL will be evident in these individuals. In this content the present study aim to analyse the effect of sarcopenia in QOL of geriatric population in specific Indian set up.

Materials and Methods:

A survey conducted at different places at Dehradun and 122 subjects aged 60 or above included in the study, informed consent was obtained.

Subjects excluded; if taking any medication deemed to affect calcium and bone metabolism, Any chronic or metabolic bone disease, physical disability and a treatment with drugs that may influence lean soft tissue and bone mass, such as cortisone treatment, smoking , taking steroids, female with prematured menopause, Inability to walk 6 meter in a reasonable time, People with poor communication ability.

Instruments used were Hand grip dynamometer, stop watch, 60 INS long tailors tape, 8-m self-retracting measuring scale.

Outcome was measured using Hand held dynamometer, 6 minute walk test, ALST, WHOQLQ-BREF.

Procedure

The study was conducted in Dehradun; a survey was done to identify geriatric population with sarcopenia. A total of 113 subjects with sarcopenia were selected out of 122 subjects, 9 subjects did not fulfil the criteria of study. A written consent form was signed by the subjects after explaining the procedure and utility of the study.

Information regarding their demographic data was collected and subjects were asked to fulfil the WHOQOL-BREF questionnaire.

Evaluation of Sarcopenia

Anthropometry²⁴:- Status of age, height, and weight was recorded for all subjects.

Hand grip strength²²:- Hand grip strength was measured by using a dynamometer, the process was performed 3 times and the average was taken. A cut-off for hand grip strength for Men < 30 Kg, and for Women < 20 Kg were taken.

Physical performance²²:- Gait speed was assessed by 6-meter walk. Participants walked at their usual speed. The time was measured by using a stop-watch. A cut off value for gait speed in both genders was < 1 m/s.

Anthropometric Equation²⁴:- In this ALST (Appendicular lean soft Tissue) was calculated by using the anthropometric equation that is

ALST equation for males:-

$-12.81 - (0.029 \times \text{age} \dots) + (0.211 \times \text{weight} \dots) + (0.153 \times \text{height} \dots) + (0.255 \times \text{calf circumference} \dots) + (0.141 \times \text{arm circumference} \dots) - (0.178 \times \text{hip circumference} \dots) = \dots \text{Kg/m}^2$.

ALST equation for females:-

$-2.658 - (0.023 \times \text{age...}) + (0.244 \times \text{weight...}) + (0.082 \times \text{height...}) + (0.087 \times \text{calf circumference...}) - (0.058 \times \text{arm circumference...}) - (0.102 \times \text{hip circumference...}) = \dots \text{Kg/m}^2$.

Cut off value for ALST equations are.

1. For Male:-

Severe sarcopenic < 8.50 Kg/m²

Moderate sarcopenic – 8.50 – 10.75 Kg/m²

Normal > 10.76 Kg/m²

2. For Females:-

Severe sarcopenic < 5.75 Kg/m²

Moderate sarcopenic <5.76 Kg/m²

Normal > 6.73 Kg/m²

World Health Organization Quality of Life – BREF (WHOQOL – BREF)²⁵:-

1. This questionnaire was designed for the assessment of quality of life.
2. This questionnaire contains 26 questions having answers with likert's scale ranging 1(not at all) to 5 (completely).
3. The response obtained was divided into 4 domains representing Physical, Psychological, Social relationship, and Environment.

Data Analysis

Data was analysed using software SSPS version 16.0.The data was distributed in 4 groups.

- Severe sarcopenic.
- Moderate sarcopenic.
- Pre sarcopenic.
- Non sarcopenic

Independent t-test was done to compare data between all the 4 groups. Karl Pearson test was applied to find out correlation between sarcopenic criteria and quality of life (QOL).The statistical significance was set as 95%, confidence interval with P value <0.05 considered to be significant.

Results

The data was taken from 122 subjects out of whom 9 were excluded.

Out of 113 selected subjects, distribution was done according to the European Working Group on Sarcopenia in Older People (EWGSOP) on the basis of its stages.

1. Group A (Severe Sarcopenic) consisted of 74 subjects.(SS)
2. Group B (Pre Sarcopenic) consisted of 7 subjects.(PS)
3. Group C (Moderate Sarcopenic) consisted of 15 subjects.(MS)
4. Group D (Non Sarcopenic) consisted of 7 subjects. (NS)

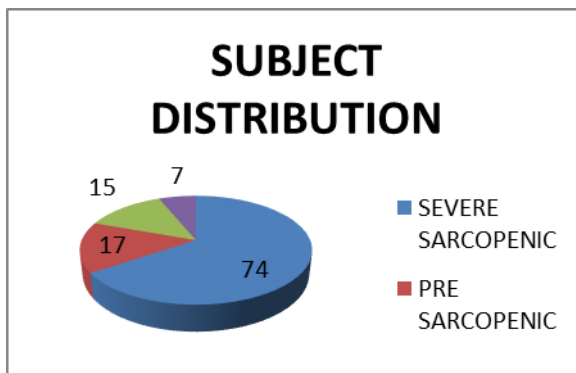


Fig: 1 Subject Distributions

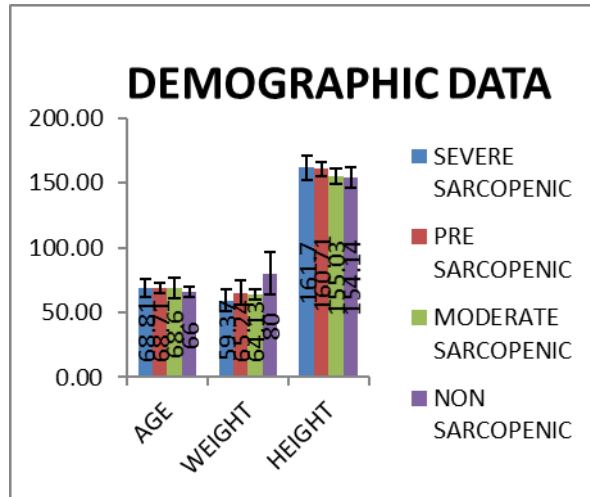


Fig: 2. Demographic Data

Analysis for demographic data showed significant difference between the groups when height and weight was compared. ($p=0.00$ & $p= 0.015$ respectively). There was no significant difference in statistical analysis of mean of age for the 4 groups ($p = 0.763$)

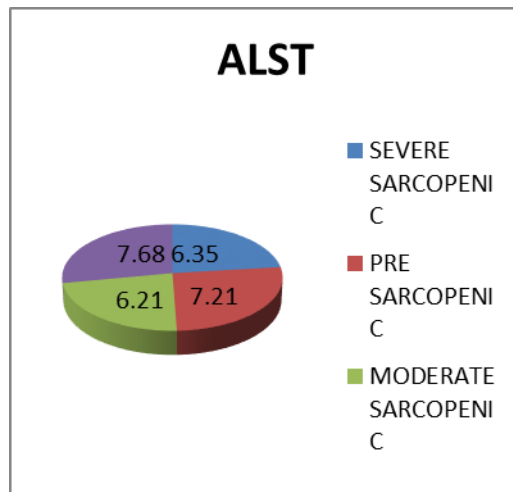


Fig:3 ALST

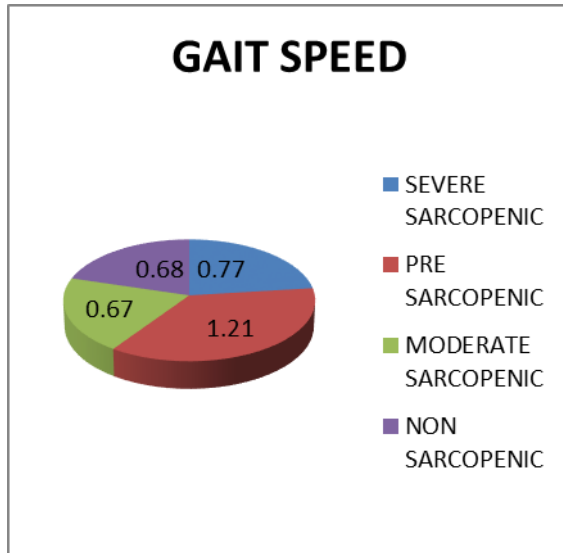


Fig: 4 Gait Speed

QOL was analyzed with WHOQOL scale. The analysis was done to find correlation of QOL with sarcopenia criteria.

For physical domain all the 4 groups showed non-significant correlation with ALST, Gait speed, and Grip strength.

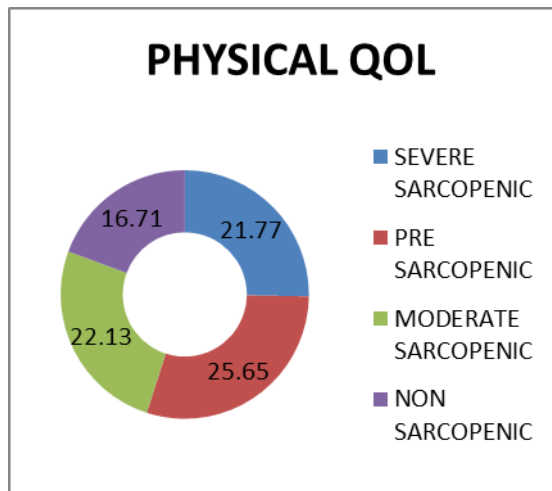


Fig:-5 Physical QOL

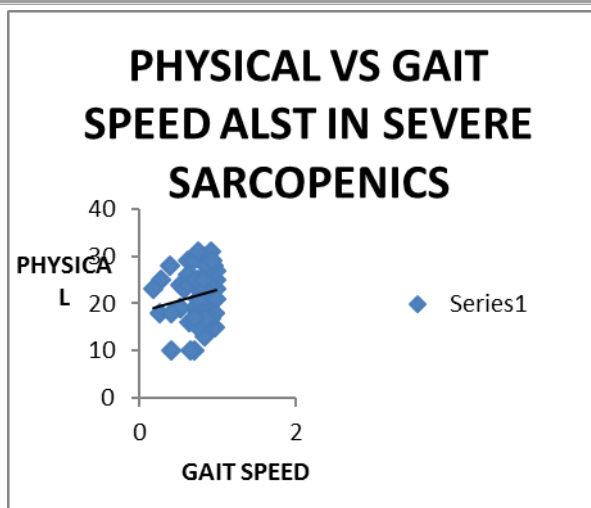


Fig 6: correlation of physical domain of QOL with ALST

Discussion

The result of present study revealed that out of 133 sarcopenic individual, 74 (65%) were severe sarcopenic, 7 (6%) were pre sarcopenic, 15 (13%) were moderate sarcopenic, 7 (6%) were non sarcopenic (**Fig: 1**). In support of our study Ian Janssen added that the prevalence of sarcopenia in older adults is 100%(4).

In the result of the present study it was proposed that the mean age of population in Dehradun with sarcopenia was 68 years. In support of these results, **Chatlert Pongchaiyakul** et al. added that the prevalence of sarcopenia varies between 5% to 13% among the elderly between 60 to 70 years of age (8).

Recently the European Working Group on Sarcopenia in Older People, define sarcopenia as the loss of muscle mass, loss of muscle strength (grip strength), or lower physical performance (gait speed) associated with speed (34).

In present study, subjects were divided into, Pre sarcopenic, Moderate sarcopenic, Severe sarcopenic, Non sarcopenic. When (ALST) Appendicular lean soft tissue was calculated the result showed significant difference between 4 stages of sarcopenia.

We used ALST as an indicator of muscle mass based on the concept that approximately $\frac{3}{4}$ of total body muscle mass exists in extremities and as it is used as a surrogate of skeletal mass (24). The result showed significant difference when gait speed was evaluated between the 4 stages of sarcopenia. It indicated that all the 4 stages depict change in functional performance.

In support of our study **John E. Morley** added that sarcopenia with limited mobility defined as person with muscle loss whose walking speed is less than equal to 1m/s or who walks less than 400m during 6 minute walk (35).

When grip strength was measured among 4 groups, it showed non- significant difference. The reason behind this could be statistical limitation of readings taken, however the literature adds decline of 20 to 40% in measure of hand grip strength in sarcopenic patients.

The correlation done in present study proves that only gait speed has significant correlation with psychological and environmental domain of Quality of Life, however other domain impacted the QOL but correlation was not significant. When physical and psychological domain was checked in Pre sarcopenic it proves to be most affected. When social and environmental domain was checked moderate sarcopenia proves to be most affected, the result indicates that QOL was very much impacted by Sarcopenia.

The result of the present study adds literature on Sarcopenia and also presents the requirement of strength training in middle age. **Noran N. Hari** et al. depicted that intervention such as resistive exercises that attenuates and reverse age, associated age decrease of muscle strength should be in-cooperated in sarcopenic patients (36). Physical activity program focusing on preventing muscular strength in younger population are indeed needed to decrease the impact of Sarcopenia in older ages.

Limitation

- For a survey study sample size was low.
- The study recruited individuals with relatively better health.
- As gait speed was taken the study was limited to only those patients who were ambulatory.

Future Study

Future study could include (BIA) in place of (DXA) and some gold standard strength measuring instrument in case of hand grip dynamometer.

Conclusion

The prevalence of Sarcopenia among the geriatric population in Dehradun is high with 65% Severe Sarcopenic, 13% Moderate Sarcopenic. Males are more affected than females the result depicted that Muscle Mass (ALST), Gait Speed (6m walk test), Hand Grip Strength (HHD) were significantly lowered in Sarcopenic population. Out of which Gait significantly affected their QOL

Clinical Significance

The present study specially focusing on Geriatric population in Dehradun. The result focus on the need of Strengthening in middle age which could lower the impact of Sarcopenia in geriatric population, and have a significant effect on their QOL

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