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REVIEW ARTICLE

Assessment of Sarcopenia and Its Association with Balance in the Elderly Population

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Conflict of Interest
All the authors have no conflict of interest.

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ABSTRACT

Background: Background: Sarcopenia is a common illness among the elderly that is associated with substantial morbidity and mortality. It was described as a decline in muscle strength and mass associated with ageing. Sarcopenia in older adults has significant effects on everyday functioning, quality of life and balance. Mortality, diminished capacity to handle the stress of a serious illness, and disability are all influenced by sarcopenia. **Objective:** To evaluate the association of sarcopenia with balance in the elderly population. **Methods:** This study was carried out in the Central Park Teaching Hospital and Iffat Anwar Hospital in Lahore, Pakistan, with consent from the University of Management and Technology's research ethics and support committee. This cross-sectional observational study was conducted from June to August 2024. Data was collected through non-probability convenience sampling. The sample size was 187, as calculated by the WHO calculator. Eligibility criteria mandated an age group between 65 and 85 years, both males and females, proper cognitive and understanding abilities, people who can walk independently, and a score of >18 according to the Barthel Index scale. Individuals with dementia, any recent surgery or surgery in the last one-year, impaired cognition, mini mental scale below 24 were excluded. The data was collected by using the Berg Balance Scale and Sarcopenic Questionnaire. Before using a questionnaire to collect data, informed consent was obtained. The participant has the freedom to decline participation at any point during the study. The sarcopenic questionnaire was used to measure the degree of sarcopenia during data collection, while the Berg balance scale was used to assess balance in participants. **Results:** There is a strong association between sarcopenia and balance, and the p-value is less than 0.05. The mean Berg balance scale value is 45.32% among the participants. **Conclusion:** Participants with sarcopenia showed a positive association with balance. There is a strong possibility that people with sarcopenia have impaired balance.

Keywords: balance, elderly population, risk of fall, sarcopenia

1. INTRODUCTION

Sarcopenia is a common illness among the elderly that is associated with substantial morbidity and mortality. It is described as a decline in muscle strength and muscle mass that occurs with aging. Despite being common, sarcopenia does not yet have a widely accepted definition.[1] More recent definitions have come to incorporate the loss of muscle strength and physical performance.[2] Low assessments of muscular mass in combination with the recent research have recognized the importance of muscle strength and physical performance. Sarcopenia refers to the gradual loss of skeletal muscle mass and strength that is usually associated with advanced ageing.[3] Dystrophic diseases, diabetes, and chronic kidney illness can all make muscle atrophy worse. Muscular strength decreases in tandem with the loss of muscular mass.[4, 5] Low muscle mass combined with either low muscle strength or low physical performance confirms the diagnosis of sarcopenia.[6]

Sarcopenia in the elderly is caused by several factors that progressively reduce muscular mass, strength, and function. Sarcopenia is considered a complex disease due to its multifactorial pathogenesis.[7] Sarcopenia in older adults has significant effects on everyday functioning and general quality of life. Older persons who have reduced muscle strength and decreased balance due to sarcopenia are more likely to fall and break [8, 9]. Consequently, a compromised musculoskeletal system can lead to fractures and falls, as well as a marked decline in quality of life

(QOL) and the capacity to conduct activities of daily living. High sarcopenia prevalence might result in significant healthcare costs and caregiver stress.[10] Depending on the study, Sarcopenia prevalence ranges from 5% to 17% among older individuals living in the community, 14% to 85.4% in nursing homes, and 10% to 24.3% in acute hospitals. Sarcopenia patients experience more falls than their colleagues without the condition. This elevated risk is directly attributed to diminished muscular strength and unsteady balance.[11-13]

People's body composition varies with age, with skeletal muscle fibers gradually disappearing, muscle mass declining, strength diminishing, and muscle endurance and metabolic capacity declining.[14] Sarcopenia is a valid indicator of frailty and a dismal prognosis in the elderly.[15] Loss of muscle mass and strength will inevitably lead to a deterioration in physical fitness, which will impair older people's ability to do daily duties and increase their risk of falling. Sarcopenia, the typical loss of muscle mass, strength, or physical performance, can have disastrous consequences, such as an increased risk of frailty, fragility fractures, multi-morbidity, and other undesirable outcomes.[16, 17]

However, the literature's current scope has minimally addressed the term sarcopenia with balance. According to studies, the decrease of muscle mass, problems with movement, and reduced quality of life in older adults with sarcopenia all negatively impact balance. A person's overall mobility and quality of life are significantly influenced by their balance. It fills in a knowledge gap and aids in understanding the connection between sarcopenia and balance.

2. METHODS

The research was carried out in hospitals (Central Park Teaching Hospital, Iffat Anwar) in Lahore, Pakistan, with consent from the University of Management and Technology's research ethics and support committee. Designed as a cross-sectional observational study, data collection spanned from 1 June 2024 to 1 August 2024. Data was collected through non-probability convenience sampling. The sample size was 187, calculated by the WHO calculator.[18]. Eligibility criteria mandated age group between 65 to 85(both males and females), diabetic, hypertensive, proper cognition and understanding ability, people who can walk independently, score >18 according to the Barthel index scale. Individuals with dementia, any recent surgery or surgery in the last year, impaired cognition, mini-mental scale score below 24 were excluded.

The data was collected by using the Berg Balance Scale questionnaire.[19], Sarcopenic Questionnaire.[20] Before using a questionnaire to collect data, informed consent was obtained. The subjects of this study were not at risk. Local residents were the source of the data. The participant has the freedom to decline participation at any point during the study. The Sarcopenic questionnaire was used to measure the degree of Sarcopenia during data collection. The Berg balance scale is used to verify equilibrium.

3. RESULTS

The results of the study showed that the mean age of 187 participants was 68.94±4.25. Among those, 49.2 were males and 50.80 were females. Among 187 participants, 66.8% were hypertensive, 66.8% or diabetic, 49.7% had no participants with dementia, 1.6%, 34.2% participants who smokers or had other co-morbidities 33.69%. In research, there is a strong association between Sarcopenia with hand grip strength and balance in the elderly population, as our p-value is less than 0.05.

Data analysis was done with SPSS-27. A histogram was created and examined. A descriptive analysis was used in this investigation. Scoring of the Berg Balance scale showed affected balance in the population that is a mean value of 45.32. The result showed that sarcopenia populations have affected balance; there was a positive association between Sarcopenia and balance in the elderly population. The Berg balance scale has 14 points through which we can assess balance in the elderly population. This pie chart shows the level of Sarcopenia in our selected population, as our mean population was 68.9, 92.0%

Table 1: SARC-F

Components	Score 0	Score 1	Score 2
Strength	No difficulty	Some difficulty	A lot of unable
Assistance walking	No difficulty	Some difficulty	A lot of unable
Rise from a chair	No difficulty	Some difficulty	A lot of unable
Climb stairs	No difficulty	Some difficulty	A lot of unable
Falls	None	1-3 falls	4 or more falls
Total Score			0–10

Figure 1: Level of sarcopenia

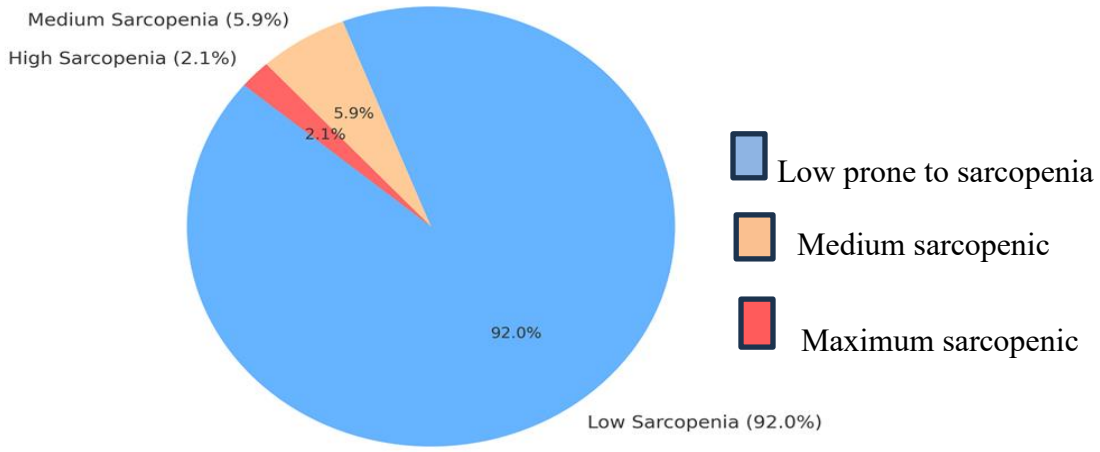

Figure 2: Level of the Berg Balance Scale

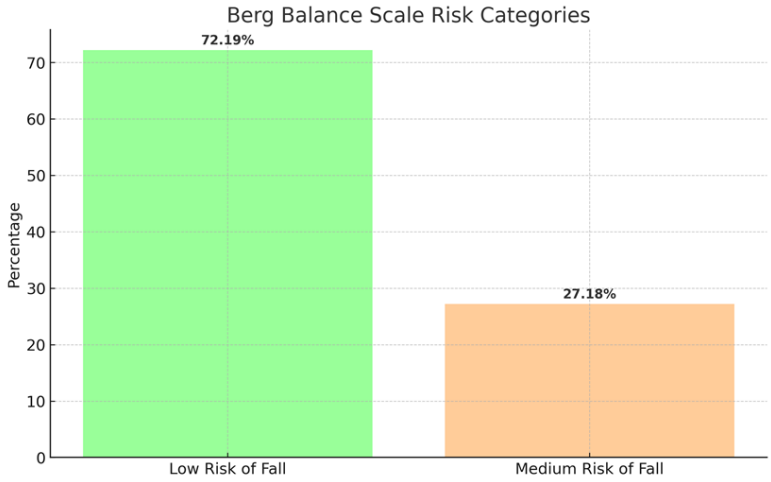

Table 2: Correlation between sarcopenia and Berg Balance Scale

		Level of sarcopenia	BBS total score
Level of sarcopenia	Person correlation	1	-.334
	Sig. (2-tailed)		.000
BBS total score	Person correlation	-.334	1
	Sig. (2-tailed)	<.000	

were low prone to sarcopenia, 5.9% were medium sarcopenia, and only 2.1% were high sarcopenia. About 72.19% participants were at low risk of fall according to the Berg Balance Scale, and 27.18% were at medium risk of fall. The p-value was less than 0.05, indicating a high correlation between the Berg Balance Scale and sarcopenia. Since the p-value was smaller than 0.05, our data indicated a substantial correlation between balance and sarcopenia. According to the Berg Balance Scale, 27.18% of participants were at medium risk of falling, and 72.19% of individuals were at low risk. Since the P-value is less than 0.05, there is a strong correlation between balance and sarcopenia.

4. DISCUSSION

The study's findings revealed that the average age of the 187 participants was 68.94 +/- 4.25. Of those, 50.8% were female and 49.2% were male. Of the 187 individuals, 49.7% have diabetes and 66.8% have hypertension. 1.6% of individuals did not have dementia, 34.2% of participants smoked, and 33.69% of participants had other co-morbidities. Our p-value of less than 0.05 indicates a robust correlation between sarcopenia and balance in the senior population. Tatangelo Toni highlighted in their narrative review strength of the lower limb muscles and physical function in older persons are related. Taking into account that dynamic balance and lower limb muscular strength were favorably connected with sarcopenia[21]. Additionally, the research conducted by Titin Kristiana sheds light on the relationship between old physical performance and muscle mass and strength. Namely, a moderately favorable association was seen between muscle strength and physical performance, hand grip strength, and balance. Our study and this one were comparable because of their favorable association.[22]

Jaqueline Mello Porto D found a relationship between lower limb muscle strength and future falls in community-dwelling older people. A positive significant association was found between grip strength and global muscle strength in older people.[23] Di-Ya Tu's research on sarcopenia in the senior population: A meta-analysis and systematic review of randomized controlled trials. These results agreed with what we had discovered.[24] According to Kaja Teraž's study, participants did better on motor tests than those found in other studies of a similar nature, even though age-related deterioration was predicted to result in lower scores on tests of sarcopenia parameters. Participants with diagnosed sarcopenic patients were included in this article's methodology, and patients with diabetes and hypertension were included in our study along with both diagnosed and undiagnosed participants.[25]

Asta Mastaviciute discovers the relationship between bone density, muscle mass, and muscle shape and physical function in older men suffering from sarcopenia. Sarcopenia positively correlates with athletic performance, muscular mass, balance, strength, and fall prevention. This study and ours were correlated, and the outcomes were similar.[26]
The cross-sectional design of the study makes it difficult to determine a relationship between handgrip strength and other physical function measurements. Because of the study's limited sample size, not all elderly residents of long-term care facilities may be represented in it. Determine correlation by evaluating physical function, such as handgrip strength, mobility, leg strength, flexibility, and postural balance, utilizing thorough and accurate assessment instruments. Look for correlations with other risk factors in the senior population, such as diabetes mellitus and hypertension.

5. CONCLUSION

In summary, this research investigated the relationship between balance and sarcopenia in the elderly population. Our results show a strong positive correlation between the factors. The positive correlation between balance and sarcopenia indicates that elderly individuals with sarcopenia are at higher risk of experiencing balance problems.

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