*Original Research Article*

A Pilot Study on the Prevalence and Risk Factors of Sarcopenia among Institutionalized Elderly in Polonnaruwa, Sri Lanka

.

ABSTRACT

|  |
| --- |
| **Aims:** This pilot study investigated the prevalence and associated risk factors of sarcopenia among elderly residents in care homes in Polonnaruwa, Sri Lanka. **Methodology:** All residents (n = 25, mean age: 73.2 ± 6.8 years) from two registered elderly care homes in Polonnaruwa were assessed. Sarcopenia was evaluated using the Asian Working Group for Sarcopenia (2019) criteria, which include handgrip strength, gait speed, and skeletal muscle mass index. Additionally, nutritional status, physical activity, depression, and dysphagia risk were assessed. Standardized anthropometric measurements were taken. Statistical analyses included t-tests, Fisher’s exact test, and logistic regression with significance at *P <.05*.**Results:** The prevalence of sarcopenia was 60%; among those, 66.7% were classified as severe. Malnutrition was a significant risk factor, as all malnourished participants (32%) were sarcopenic (*P = .03*). Sarcopenic individuals exhibited significantly lower gait speed (0.83 vs. 1.2 m/s, *P = .03*), handgrip strength (9.4 vs. 16.8 kg*, P = .02*), and skeletal muscle mass (4.8 vs. 6.23 kg/m², p < .004). While no significant associations were found with hypertension, diabetes, or dysphagia, depression was more prevalent among sarcopenic individuals (68.8% vs. 44.4%, *P = .67).* Physical inactivity showed a trend toward a higher risk of sarcopenia, with 75% of individuals in the "lower activity" category being sarcopenic compared to 33.3% in the "moderately active" group; however, this association was not statistically significant *(P = .09).***Conclusion:** This pilot study highlights the impact of malnutrition and functional decline on sarcopenia in institutionalized elderly individuals, emphasizing the need for routine screening and targeted interventions in Sri Lankan care homes. |

*Keywords: Depression, Functional decline, Malnutrition, Muscle strength, Physical activity*

# INTRODUCTION

Sri Lanka, the fastest-aging country in South Asia, is projected to have nearly one in four people classified as elderly by 2042 (De Silva & De Silva, 2023). This demographic transition brings numerous health challenges, including physiological aging, the rise in chronic diseases, cognitive decline, malnutrition, reduced physical fitness, and psychosocial issues. Among these geriatric syndromes, sarcopenia—a condition characterized by the progressive loss of muscle mass and strength with age—emerges as a significant concern (Cruz-Jentoft et al., 2019). Sarcopenia profoundly impacts physical function, increases health risks, diminishes quality of life, and shortens the longevity of older adults (Chatzipetrou et al., 2022; Cruz-Jentoft et al., 2010). The prevalence of sarcopenia in nursing homes ranges from 25% to 73.7%, whereas in community settings, it varies between 5.2% and 62.7% (Liu et al., 2023).

The progression of sarcopenia is influenced by multiple factors, including physical inactivity, malnutrition, smoking, diabetes, cognitive impairment, and chronic diseases, such as heart disease and osteoarthritis (Shen et al., 2019; Wu et al., 2021; Yuan & Larsson, 2023). Malnutrition impairs muscle protein synthesis and repair, while reduced physical activity accelerates muscle loss and functional decline, significantly contributing to sarcopenia (Bhattacharya et al., 2022; Rolland et al., 2014; Wylie et al., 2023). These challenges are amplified among nursing home residents, who often experience higher rates of frailty, comorbidities, and mobility limitations compared to their community-dwelling counterparts (Liu et al., 2023).

Elderly care homes provide vital support for older adults with complex health needs, including reduced mobility, chronic illnesses, and cognitive impairments. However, these settings also present unique challenges, such as limited opportunities for physical activity, reliance on standardized diets that may not meet individual nutritional needs, and a lack of personalized care plans, all of which contribute to poor health outcomes (Manton et al., 1995). Nursing home residents spend a significant portion of their time physically inactive—79% to 92% of daytime hours (Wylie et al., 2023)—and malnutrition rates in such settings are considerably higher (Mathewson et al., 2021), with up to 30% of Sri Lankan nursing home residents classified as malnourished (Rathnayake et al., 2015). These compounded risks make institutionalized elderly populations particularly vulnerable to sarcopenia, which is strongly associated with adverse outcomes such as physical disability, falls, fractures, hospitalizations, and increased mortality (Beaudart et al., 2017; Scott et al., 2016).

Despite increasing global awareness of sarcopenia and its impact, data on its prevalence and associated risk factors in Sri Lanka remain scarce, particularly among institutionalized elderly populations. This knowledge gap limits the development of targeted interventions and policies to address sarcopenia effectively. Understanding the prevalence of sarcopenia and the factors contributing to its onset in elderly care homes is essential for informing the design of effective interventions. This study focuses on investigating the prevalence of sarcopenia among residents of elderly care homes in Polonnaruwa, Sri Lanka, while also identifying key risk factors, such as nutritional status, physical activity levels, comorbidities, and socio-demographic influences, to support the development of strategies that promote healthy aging.

# METHODS

## Study design, participants, and setting

This pilot study was conducted from March 2024 to July 2024 among all eligible older adults residing in elderly care homes in Polonnaruwa, Sri Lanka. Eligible participants were aged ≥60 years, permanently residing in the care homes, capable of understanding and responding to questionnaires, and willing to provide written informed consent. Exclusion criteria included individuals with cognitive impairment, lower extremity amputations, bedridden status, and inability to walk or perform grip strength tests, or a history of long-term chronic diseases (e.g., neurodegenerative disorders, malignancies, or conditions affecting muscle mass).

## Sarcopenia diagnosis and determinants

Sarcopenia was assessed using the Asian Working Group for Sarcopenia (AWGS) 2019 criteria (Chen et al., 2020). The SARC-CalF questionnaire was used to identify individuals at increased risk of sarcopenia, as recommended by the AWGS 2019 diagnostic criteria. Muscle strength was measured using handgrip strength (HGS) with a Camry EH101 handheld digital dynamometer. Participants performed three trials with their dominant hand, and the highest reading was recorded. Low HGS was defined as <28 kg for men and <18 kg for women. Physical performance was evaluated via gait speed (GS) over a 6-meter walk, with acceleration/deceleration zones of 2 meters each. GS <1.0 m/s indicated low physical performance. Muscle mass was estimated using the Skeletal Muscle Mass Index (SMI). Appendicular Skeletal Muscle Mass (ASM) was calculated using the equation by Kawakami et al. (2021). SMI was derived as ASM/height², with cut-offs <7.0 kg/m² (men) and <5.7 kg/m² (women) defining low muscle mass.

## Data collection

Data were collected at each facility using validated questionnaires. Demographic data, including age, gender, ethnicity, highest level of education, and marital status, were recorded for all participants. Physical activity levels were assessed using the International Physical Activity Questionnaire – Short Form (IPAQ-SF). Nutritional status was evaluated with the Mini Nutritional Assessment – Short Form (MNA-SF), emphasizing dietary patterns, recent weight loss, and psychological stress. Dysphagia risk was assessed using the Eating Assessment Tool (EAT-10), with scores ≥3 indicating abnormal swallowing function. Depression severity was measured using the 15-item Geriatric Depression Scale (GDS-15). Anthropometric measurements, including height, weight, and calf circumference, were recorded using standardized tools, and BMI was calculated as weight (kg)/height2 (m2).

## Focus group discussion

A thematic analysis was performed to identify key factors contributing to sarcopenia risk in this population. Three focus group discussions (FGDs) were held: two with elderly residents (n = 8, n = 9) from separate care homes and one with caregivers and staff (n = 5). Participants were purposively selected to ensure diverse perspectives.

## Statistical analysis

Data were analyzed using R version 4.4.1. Continuous variables were summarized as means ± standard deviations (SD) and compared between sarcopenic and non-sarcopenic groups using independent two-sample t-tests, after assessing normality with the Shapiro–Wilk test. Associations between sarcopenia and categorical variables were examined using Fisher’s exact test, which was selected instead of Pearson’s Chi-square test due to the small sample size (n = 25) and the presence of expected cell counts below five. Statistical significance was set at *p < .05*.

# RESULTS

## Prevalence of sarcopenia

Among the 25 participants who completed all assessments (Figure 1), 60% (n = 15) met the AWGS-2019 criteria for sarcopenia. Severe sarcopenia, defined by concurrent impairments in muscle mass, muscle strength, and physical performance, was observed in 66.7% (n = 10) of individuals diagnosed with sarcopenia. The prevalence of sarcopenia was similar between women (61.5%, n = 8) and men (58.3%, n = 7), with no statistically significant difference (*P = 1.0*).

## Participant characteristics

Recruited Participants (n = 33)

Excluded n (%): 6 (18.2)

* Cognitive impairment:3 (9.1)
* Decline to participate 1 (3.0)
* Bedridden 2 (6.1)

Consented to study (n = 27)

Missed Measures n (%)

* Unable to complete gait speed Measure: 2 (6.1)

Completed Measures (n = 25)

**Figure 1: Participant recruitment flow chart**

The mean age of participants was 73.2 ± 6.8 years, with no significant difference between sarcopenic (74.4 ± 7.2) and non-sarcopenic (71.4 ± 6.1) groups *(P = .29).* An age-stratified analysis showed a trend toward higher sarcopenia prevalence in older age groups: 66.7% (n = 6) of participants aged ≥75 years were sarcopenic, compared to 50% (n = 5) in the 65–70-year group and 60% (n = 3) in the 70–75-year group. No significant associations were found between sarcopenia and marital status or education level *(P = .96*) (Table 1).

**Table 1: Socio-demographic characteristics of the participants by sarcopenia status**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Characteristic** |  **All****N =25** |  **Sarcopenia** **N = 15** | **Nonsarcopenia****N = 10** | **P-Value** |
| Age, mean ± SD | 73.2 ± 6. 8 | 74.4 ± 7.2 | 71.4 ± 6.1 | 0.29 |
| Age Group, n (%) |
| 60-65 | 1 (4) | 1 (100) | 0 | 0.78 |
| 65-70 | 10 (40) | 5 (50) | 5 (50) |
| 70-75 | 5 (20) | 3 (60) | 2 (40) |
| 75≤  | 9 (36) | 6 (66.7) | 3 (33.3) |
| Gender, n (%) |
| Male | 12 (48) | 7 (58.3) | 5 (41.7) | 1 |
| Female  | 13 (52) | 8 (61.5) | 5 (38.5) |
| Marital Status, n (%) |
| Partnered | 5 (20) | 3 (60) | 2 (40) | 0.96 |
| No Partner | 20 (80) | 12 (60) | 8 (40) |
| Level of education, n (%) |
| No schooling | 9 (36) | 7 (77.8) | 2 (22.2) | 0.39 |
| Primary  | 15 (60) | 8 (53.3) | 7 (46.7) |
| Secondary | 1 (4) | 0 | 1 (100) |

Abbreviations: SD, standard deviation.

## Nutritional status and dietary patterns

Malnutrition was significantly associated with sarcopenia. All malnourished participants (100%, n = 8) were classified as sarcopenic, compared to 45.5% (n = 5) of those with normal nutritional status (*P = .03*) (Table 2). No significant associations were found between sarcopenia and dietary patterns, dysphagia, or comorbidities (*P > .05*). Figure 2 illustrates this association, emphasizing the high sarcopenia prevalence in malnourished participants.

**Figure 2: Association between nutritional status and sarcopenia (P = .03)**

## Comorbidities and psychosocial factors

Hypertension, cardiovascular disease, and diabetes were not significantly associated with sarcopenia (*P > .05*). However, depression was more prevalent among sarcopenic participants (68.8%, n = 11) compared to non-sarcopenic individuals (44.4%, n = 4), though this difference was not statistically significant (*P = .67*). The SARC-CalF tool demonstrated strong predictive value: 81.3% (n = 13) of participants scoring ≥ 11 on the SARC-CalF were sarcopenic, compared to 22.2% (n = 2) in the lower-score group *(P = .02*) (Table 2).

**Table 2: The association of sarcopenia with dietary pattern and comorbidities**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variables** |  **All****N = 25** |  **Sarcopenia** **N = 15** | **Nonsarcopenia N = 10** | **P-Value** |
| Hypertension, n (%) |
| Yes | 9 (36) | 4 (44.4) | 5 (55.6) | 0.41 |
| No | 16 (64) | 11 (68.7) | 5 (31.3) |
| Cardio vascular disease, n (%) |
| Yes | 3 (12) | 1 (33.3) | 2 (66.7) | 0.54 |
| No | 22 (88) | 14 (63.6) | 8 (36.4) |
| Diabetes, n (%) |
| Yes | 4 (16) | 1 (25.0) | 3 (75.0) | 0.60 |
| No | 21 (84) | 14 (66.7) | 7 (33.3) |
| Disability (visual and hearing), n (%) |
| Yes | 4 (16) | 3 (75.0) | 1 (25.0) | 0.62 |
| No | 21 (84) | 12 (57.1) | 9 (42.9) |
| SARC-CalF score, n (%) |
| ≥ 11 | 16 (64) | 13 (81.3) | 3 (18.7) | 0.02 |
| <11 | 9 (36) | 2 (22.2) | 7 (77.8) |
| Dysphagia, n (%) |
| Yes | 4 (16) | 1 (25.0) | 3 (75.0) | 0.60 |
| No | 21 (84) | 14 (66.7) | 7 (33.3) |
| Depression, n (%) |
| Yes | 16 (64) | 11 (68.7) | 5 (31.3) | 0.67 |
| No | 9 (36) | 4 (44.4) | 5 (55.6) |
| Nutritional status, n (%) |
| Normal | 11 (44) | 5 (45.5) | 6 (54.5) | 0.03 |
| At Risk | 6 (24) | 2 (33.3) | 4 (66.7) |
| Malnourished | 8 (32) | 8 (100) | 0 |
| Physical activity level, n (%) |
| Active | 0 | 0 | 0 | 0.09 |
| Moderate | 9 (36) | 3 (33.3) | 6 (66.7) |
| Lower | 16 (64) | 12 (75.0) | 4 (25.0) |
| Meat, n (%) |
| Once a day or more | 22 (88) | 13 (59.1) | 9 (40.9) | 0.46 |
| Few times a week | 2 (8) | 2 (100) | 0 |
| Rarely or not at all | 1 (4) | 0 | 1 (100) |
| Milk, n (%) |
| Once a day or more | 23 (92) | 14 (60.9) | 9 (39.1) | 0.64 |
| Few times a week | 1 (4) | 1 (100) | 0 |
| Rarely or not at all | 1 (4) | 0 | 1 (100) |
| Legumes, n (%) |
| Once a day or more | 16 (64) | 10 (62.5) | 6 (37.5) | 0.94 |
| Few times a week | 6 (24) | 3 (50.0) | 3 (50.0) |
| Rarely or not at all | 3 (12) | 2 (66.7) | 1 (33.3) |
| Yogurt, n (%) |
| Once a day or more | 2 (8) | 1 (50.0) | 1 (50.0) | 0.96 |
| Few times a week | 16 (64) | 9 (56.3) | 7 (43.7) |
| Rarely or not at all | 7 (28) | 5 (71.4) | 2 (28.6) |
| Water, n (%) |
| More than 1.5 l per day | 20 (80) | 11 (55) | 9 (45) | 0.63 |
| Less than 1.5 l per day | 5 (20) | 4 (80) | 1 (20) |

##  ****Physical activity and functional decline****

Sarcopenic participants exhibited significant functional impairments. Gait speed was significantly lower in the sarcopenic group (0.83 ± 0.4 m/s) compared to non-sarcopenic participants (1.2 ± 0.4 m/s, *P = 0.03*). Handgrip strength was also markedly reduced (9.4 ± 7.1 kg vs. 16.8 ± 7.8 kg, *P = 0.02*) (Table 3). While physical activity levels did not reach statistical significance (*P = 0.09*), a trend was observed: 75% (n = 12) of participants categorized as "lower activity" were sarcopenic, compared to 33.3% (n = 3) in the "moderately active" group. This suggests a potential link between reduced physical activity and muscle loss, warranting further investigation.

**Table 3: The association of sarcopenia with anthropometric, body composition, function and strength**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factors** |  **All****N = 25** |  **Sarcopenia** **N = 15** |  **Nonsarcopenia** **N = 10** | **P-Value** |
| BMI (kg/m2) | 20.7 (16.8, 23.1) | 19.5 (16.0, 21.6) | 22.3 (20.9, 25.1) | 0.03 |
| BF%, mean ± SD (kg) | 31.4 ± 9.6 | 29.7 ± 8.7 | 33.8 ± 10.7 | 0.30 |
| SMI (kg/h2) | 5.4 ± 1.3 | 4.8 ± 1.1 | 6.2 ± 1.1 | 0.004 |
| ASM (kg) | 13.1 ± 4.4 | 11.5 ± 3.8 | 15.5 ± 4.3 | 0.02 |
| HGS, mean ± SD (kg) | 12.4 ± 8.1 | 9.4 ± 7.1 | 16.8 ± 7.8 | 0.02 |
| GS, mean ± SD (m/s) | 0.97 ± 0.4 | 0.8 ± 0.4 | 1.2 ± 0.4 | 0.03 |
| Calf circumference (cm) | 29.0 ± 5.0 | 26.7 ± 3.6 | 32.6 ± 4.84 | 0.002 |
| Waist circumference (cm) | 80.7 ± 11.4 | 77.2 ± 9.2 | 86.0 ± 12.7 | 0.05 |
| MUAC (cm) | 23.9 ± 4.1 | 22.4 ± 4.2 | 26.1 ± 2.9 | 0.02 |

Abbreviations: BMI, body mass index; BF%, body fat percentage; SMI, skeletal muscle mass index; ASM, appendicular skeletal mass; HGS, hand grip strength; GS, gait speed; MUAC, mid-upper arm circumference; h, height in cm; SD, standard deviation.

## ****Anthropometric and body composition measures****

Sarcopenic individuals displayed significant reductions in muscle mass and key anthropometric markers. Skeletal Muscle Mass Index (SMI) was notably lower in sarcopenic participants (4.8 ± 1.1 kg/m²) compared to non-sarcopenic individuals (6.23 ± 1.1 kg/m², P = .004). Appendicular Skeletal Muscle Mass (ASM) was also reduced (11.5 ± 3.8 kg vs. 15.5 ± 4.3 kg, P = .02). Additional anthropometric measures further distinguished the groups: sarcopenic participants had significantly smaller calf circumferences (26.7 ± 3.6 cm vs. 32.6 ± 4.84 cm, P = .002), lower BMI (19.5 [16.0–21.6] vs. 22.3 [20.9–25.1], P = .03), and reduced mid-upper arm circumference (22.4 ± 4.2 cm vs. 26.1 ± 2.9 cm, P = .02) (Table 3). These findings highlight the profound impact of sarcopenia on muscle mass and overall body composition, with calf circumference and SMI emerging as key distinguishing markers.

## Results of focus group discussions (FGDs)

The thematic analysis identified three key themes related to dietary habits, physical activity, and psychosocial factors, influencing sarcopenia risk among institutionalized elderly residents (Figure 3).

**Figure 3: Summary of key themes identified from focus group discussions with elderly residents and caregivers on dietary, physical activity, and psychosocial factors contributing to sarcopenia risk**

Dietary challenges: Participants reported monotonous diets, financial constraints, and difficulties in consuming protein-rich foods, all of which contribute to inadequate nutrition. Many elderly residents expressed a lack of appetite and digestive discomfort with certain foods. One participant shared:

*"I don’t have much appetite like in my earlier days."*

Protein intake was particularly limited due to dietary preferences, religious practices, and digestive issues. Some residents avoided meat and eggs, stating:

*"I don’t like to eat eggs and meat due to digestion problems."*

Caregivers acknowledged the challenge of providing a balanced diet, often relying on food donations. A staff member explained:

*"We try to provide nutritious meals as much as we can, but since we mainly rely on donations, sometimes we don’t get enough funds to structure a proper meal plan."*

Additionally, caregivers noted that individualized dietary needs could not always be met due to limited staff and financial resources:

*"We aren’t able to offer personalized meal plans because of staff shortages and funding limitations."*

Physical inactivity: Most elderly participants engaged in minimal physical activity, citing fatigue, joint pain, and fear of injury as major barriers. One resident described their decline in activity:

*"I used to do gardening, sweeping, and small tasks, but due to back pain, I no longer do them."*

Many participants expressed difficulty with even basic movement:

*"I don’t walk much because of my knee and joint pain. I can’t even think about climbing the stairs."*

Caregivers also discouraged strenuous activity due to concerns about falls and injuries. One caregiver explained:

*"We don’t encourage elderly residents to do physically demanding activities because if they fall or get injured, it’s difficult to manage. Medical care, extra assistance, and complications would add to our burden."*

Psychosocial challenges: Social isolation and emotional distress were common among residents, further contributing to inactivity and poor nutrition. One of the caregivers observed:

*"Some residents don’t engage in any group activities. They often sit alone, lost in deep thought, looking sad and withdrawn."*

A resident said, *"I often don’t feel like eating."*

A sense of lack of purpose and disengagement from social activities was also evident, affecting their motivation to stay active and eat well. Caregivers emphasized the need for structured social support programs to address these concerns.

# DISCUSSION

The prevalence of sarcopenia among elderly care home residents in Polonnaruwa was 60% (n = 15) based on AWGS-2019 criteria, with 66.7% (n = 10) classified as severe cases. A meta-analysis conducted by Liu et al. (2023) reported a wide range of prevalence—from 25% to 73.7% in nursing homes and 5.2% to 62.7% in community settings—across various countries. Interestingly, our findings fall at the higher end of the community-based estimates, more closely aligning with rates typically seen in nursing home settings

Our study found no significant difference in the prevalence of sarcopenia between men and women (*P = 1.0*). Prior research suggests that men may experience faster muscle loss due to testosterone decline (Gallagher et al., 1997; Renoud et al., 2014), whereas estrogen may offer protective effects for women (Manton *et al.,* 1995). Conversely, other studies suggest that women may be more vulnerable due to lower engagement in physical labor and reduced muscle strength (Rodríguez-Rejón et al., 2019). The conflicting findings highlight the need for further research on gender-related sarcopenia risks.

Age was a significant determinant of sarcopenia, with prevalence increasing from 50% in those aged 65–70 to 66.7% in those aged ≥75 years. This aligns with prior research linking aging, reduced physical activity, and chronic disease burden to muscle loss and functional decline (Chen et al., 2020). Additionally, each advancing year increases the risk of sarcopenia (Altaf et al., 2024).

## Dietary patterns, nutritional status, and sarcopenia

Malnutrition was a key risk factor (P = .03), affecting 32% of participants, with 24% at risk. All malnourished individuals (n = 8) were sarcopenic, compared to 45.5% (n = 5) of those with normal nutritional status, reinforcing the established link between poor nutrition and muscle loss (Darroch et al., 2022). Malnutrition and sarcopenia are associated with an increased risk of mortality (Saka et al., 2016), with reported malnutrition rates ranging from 2% to 38% and mortality rates between 37% and 62% (Pauly et al., 2007). Nursing home residents experience higher malnutrition rates than community-dwelling older adults (Bando et al., 2023; Ulger et al., 2013).

Dietary diversity and body composition play crucial roles in malnutrition (Hua et al., 2022). Although no significant association was found between dietary patterns and sarcopenia (*P > .05*), standardized meal plans in institutionalized care may limit nutrient diversity, exacerbating protein and energy deficiencies—key contributors to muscle maintenance. Sarcopenia is highly prevalent among older adults in long-term care facilities, with malnutrition playing a central role in its progression (Bando et al., 2023). The co-occurrence of these conditions represents a major public health concern, as evidenced by the high prevalence observed in both previous studies and our findings.

Dysphagia, though recognized as a malnutrition risk factor (Chatindiara et al., 2018), was not significantly associated with sarcopenia in our study (*P = .60*), possibly due to the small sample size limiting statistical power. However, it remains a contributor to protein and calorie deficits, accelerating muscle loss. Sarcopenia-related muscle weakness can also impair swallowing function, leading to sarcopenic dysphagia, which further exacerbates malnutrition (Bando et al., 2023). Early nutritional screening and interventions are essential to mitigate these risks (Darroch et al., 2022).

## Comorbidities and their association with sarcopenia

Our study found no significant association between sarcopenia and common comorbidities such as hypertension and cardiovascular disease (*P > .05*). This contrasts with research suggesting sarcopenia may contribute to cardiovascular disease (Gao et al., 2022). However, our findings align with studies indicating this relationship may be less pronounced in institutionalized elderly populations due to differences in disease management (He et al., 2021). Future research with larger sample sizes is needed to clarify these associations.

Depression was more prevalent among sarcopenic participants (68.8%) than non-sarcopenic individuals (44.4%), though not statistically significant (*P = .67*). Prior studies suggest depression contributes to sarcopenia through reduced physical activity, poor nutrition, and inflammation (Beaudart et al., 2017). Despite the lack of statistical significance, the trend highlights the importance of mental health screening in elderly care settings.

Interestingly, diabetes was more prevalent in non-sarcopenic participants (60%) than sarcopenic ones (40%), contradicting research linking hyperglycemia to muscle atrophy (Scott et al., 2016). The bidirectional relationship between sarcopenia and diabetes suggests that variations in glycemic control or disease severity may explain these differences. Future studies should explore the long-term effects of diabetes on muscle function in institutionalized populations.

## Functional and anthropometric impairments

Sarcopenic participants exhibited significant functional impairments, including lower gait speed (0.8 ± 0.4 m/s vs. 1.2 ± 0.4 m/s, *P = .03*) and reduced handgrip strength (9.4 ± 7.1 kg vs. 16.8 ± 7.8 kg, *P = .02).* Reduced grip strength is associated with diminished lower-limb function and increased fall risk (Darroch et al., 2022).

Anthropometric measures were also significantly lower among sarcopenic participants, including SMI (4.8 ± 1.1 kg/m² vs. 6.23 ± 1.1 kg/m², *P = .004*), ASM (11.5 ± 3.8 kg vs. 15.5 ± 4.3 kg, *P = .02*), calf circumference (26.7 ± 3.6 cm vs. 32.6 ± 4.84 cm, *P = .002*), BMI (19.5 [16.0–21.6] vs. 22.3 [20.9–25.1], *P = .03*), and mid-upper arm circumference (MUAC) (22.4 ± 4.2 cm vs. 26.1 ± 2.9 cm, *P = .02*). Small calf circumference has been identified as a predictor of sarcopenia, particularly in community settings (Liu et al., 2023).

Although BMI is often associated with better nutritional status and higher muscle mass (Zhang et al., 2020), excessive body fat can contribute to sarcopenic obesity. Our study found that sarcopenic individuals had significantly lower BMI, reinforcing that lower BMI is often indicative of poor muscle mass and nutritional deficits. Over time, even higher BMI may not protect against sarcopenia due to progressive muscle deterioration (Curtis et al., 2023). Waist circumference has also been associated with lower grip strength (Keevil et al., 2015), highlighting the complexity of body composition and sarcopenia risk.

## Physical activity and sarcopenia

Although physical activity levels did not differ significantly between groups *(P = .09*), 75% of participants with “lower activity” levels were sarcopenic, compared to 33.3% of those classified as “moderately active.” This aligns with findings that higher total and moderate-to-vigorous physical activity levels are inversely associated with sarcopenia (Sánchez-Sánchez et al., 2024). Physical activity enhances muscle bioenergetics and neuromuscular function while sedentary behavior accelerates muscle atrophy (Hämäläinen et al., 2024). Physical activity also mediates the relationship between sarcopenia and cognitive function (Yao et al., 2023). A study of 386 older adults found sarcopenia to be more common among those with cognitive impairment (*P < .05*), with physical activity mitigating its negative effects (Yao et al., 2023). These findings underscore the need for structured exercise programs in elderly care facilities.

Studies highlight the importance of targeted interventions, such as resistance and balance exercises, in reducing sarcopenia-related functional decline in older adults, including those in nursing care facilities (Hassan et al., 2016). Structured physical activity, particularly strength training and moderate-to-vigorous exercise, can help lower the risk of falls, cognitive decline, and disability while potentially slowing sarcopenia progression.

## Thematic analysis of focus group discussion

The qualitative findings emphasize the interplay between nutrition, physical activity, and psychosocial well-being in shaping sarcopenia risk among institutionalized elderly individuals. Limited dietary variety, financial constraints, and a lack of personalized nutrition plans suggest that nutritional interventions should focus on expanding dietary diversity and improving access to protein-rich foods. Caregiver-reported funding shortages highlight the need for policy-level support and resource allocation to enhance elderly care facilities.

Physical inactivity, largely driven by pain, fear of injury, and caregiver reluctance to promote exercise, underscores the necessity of safe and structured physical activity programs. While concerns over falls are valid, a balance must be struck between minimizing risks and preventing further physical decline through supervised mobility-enhancing activities.

The psychosocial dimension of sarcopenia is equally critical. Many elderly residents reported loneliness and lack of purpose, which may contribute to reduced motivation for maintaining a healthy lifestyle. Addressing these issues requires social engagement initiatives, mental health support, and community-based activities to foster emotional well-being and encourage physical participation.

## Limitations

To the best of our knowledge, this study is among the first to evaluate sarcopenia among institutionalized elderly individuals in Sri Lanka, as previous research has primarily focused on malnutrition prevalence. However, limitations must be considered. As a pilot study with a small sample size, the findings may not be generalizable to the broader population of institutionalized elderly individuals. Additionally, reliance on self-reported data for dietary intake and physical activity may introduce recall bias, potentially affecting data accuracy. Despite these limitations, the study provides valuable preliminary insights, laying the foundation for future research. Conducting follow-up studies with larger sample sizes is essential to validate these findings and ensure broader applicability to institutionalized elderly populations.

# CONCLUSION

This study reports a 60% prevalence of sarcopenia among elderly care home residents in Polonnaruwa, Sri Lanka, with two-thirds classified as severe. Advanced age, malnutrition, and low physical activity are key risk factors, with all malnourished participants being sarcopenic. Functional impairments and anthropometric deficits further highlight its impact. Qualitative findings reveal barriers like limited dietary variety, financial constraints, and physical inactivity, emphasizing the need for policy-level interventions and mental health support. These results underscore the multifaceted nature of sarcopenia, necessitating comprehensive strategies. Future research should focus on targeted interventions to improve muscle health and well-being in institutionalized elderly populations.

# ETHICS APPROVAL AND INFORMED CONSENT

The study was conducted in accordance with the Declaration of Helsinki and received ethical approval from the Ethical Review Committee of the Faculty of Allied Health Sciences, University of Peradeniya (Reference: AHS/ERC/2023/124). All participants were provided with a detailed explanation of the study protocol and signed a written informed consent form before data collection.

# REFERENCE

Altaf, S., Malmir, K., Mir, S. M., Olyaei, G. R., Aftab, A., & Rajput, T. A. (2024). Prevalence and associated risk factors of sarcopenia in community-dwelling older adults in Pakistan: a cross-sectional study. *BMC Geriatrics*, *24*(1), 497. https://doi.org/10.1186/s12877-024-05111-0

Bando, N., Nakayama, N., Kashiwa, K., Horike, R., Fujimoto, A., Egawa, M., Adachi, M., Saji, H., Kira, B., Nakayama, K., Okayama, A., & Katayama, S. (2023). Co-existence of malnutrition and sarcopenia and its related factors in a long-term nursing care facility: A cross-sectional study. *Heliyon*, *9*(11), e22245. https://doi.org/10.1016/j.heliyon.2023.e22245

Beaudart, C., Zaaria, M., Pasleau, F., Reginster, J.-Y., & Bruyère, O. (2017). Health Outcomes of Sarcopenia: A Systematic Review and Meta-Analysis. *PLOS ONE*, *12*(1), e0169548. https://doi.org/10.1371/journal.pone.0169548

Bhattacharya, S., Bhadra, R., Schols, A. M. W. J., van Helvoort, A., & Sambashivaiah, S. (2022). Nutrition in the prevention and management of sarcopenia - A special focus on Asian Indians. *Osteoporosis and Sarcopenia*, *8*(4), 135–144. https://doi.org/10.1016/j.afos.2022.12.002

Chatindiara, I., Allen, J., Popman, A., Patel, D., Richter, M., Kruger, M., & Wham, C. (2018). Dysphagia risk, low muscle strength and poor cognition predict malnutrition risk in older adults at hospital admission. *BMC Geriatrics*, *18*(1), 78. https://doi.org/10.1186/s12877-018-0771-x

Chatzipetrou, V., Bégin, M.-J., Hars, M., & Trombetti, A. (2022). Sarcopenia in Chronic Kidney Disease: A Scoping Review of Prevalence, Risk Factors, Association with Outcomes, and Treatment. *Calcified Tissue International*, *110*(1), 1–31. https://doi.org/10.1007/s00223-021-00898-1

Chen, L.-K., Woo, J., Assantachai, P., Auyeung, T.-W., Chou, M.-Y., Iijima, K., Jang, H. C., Kang, L., Kim, M., Kim, S., Kojima, T., Kuzuya, M., Lee, J. S. W., Lee, S. Y., Lee, W.-J., Lee, Y., Liang, C.-K., Lim, J.-Y., Lim, W. S., … Arai, H. (2020). Asian Working Group for Sarcopenia: 2019 Consensus Update on Sarcopenia Diagnosis and Treatment. *Journal of the American Medical Directors Association*, *21*(3), 300-307.e2. https://doi.org/10.1016/j.jamda.2019.12.012

Cruz-Jentoft, A. J., Baeyens, J. P., Bauer, J. M., Boirie, Y., Cederholm, T., Landi, F., Martin, F. C., Michel, J.-P., Rolland, Y., Schneider, S. M., Topinková, E., Vandewoude, M., & Zamboni, M. (2010). Sarcopenia: European consensus on definition and diagnosis. *Age and Ageing*, *39*(4), 412–423. https://doi.org/10.1093/ageing/afq034

Cruz-Jentoft, A. J., Bahat, G., Bauer, J., Boirie, Y., Bruyère, O., Cederholm, T., Cooper, C., Landi, F., Rolland, Y., Sayer, A. A., Schneider, S. M., Sieber, C. C., Topinkova, E., Vandewoude, M., Visser, M., Zamboni, M., Bautmans, I., Baeyens, J.-P., Cesari, M., … Schols, J. (2019). Sarcopenia: revised European consensus on definition and diagnosis. *Age and Ageing*, *48*(1), 16–31. https://doi.org/10.1093/ageing/afy169

Curtis, M., Swan, L., Fox, R., Warters, A., & O’Sullivan, M. (2023). Associations between Body Mass Index and Probable Sarcopenia in Community-Dwelling Older Adults. *Nutrients*, *15*(6), 1505. https://doi.org/10.3390/nu15061505

Darroch, P., O’Brien, W. J., Mazahery, H., & Wham, C. (2022). Sarcopenia Prevalence and Risk Factors among Residents in Aged Care. *Nutrients*, *14*(9), 1837. https://doi.org/10.3390/nu14091837

De Silva, W. I., & De Silva, R. (2023). Growth and Structural Changes of Sri Lankan Population During Coming Decades with Special Reference to Youth and Elderly. *Sri Lanka Statistical Review, Department of Census and Statistics, Sri Lanka*, *2*(1). www.statistics.gov.lk

Gallagher, D., Visser, M., De Meersman, R. E., Sepúlveda, D., Baumgartner, R. N., Pierson, R. N., Harris, T., & Heymsfield, S. B. (1997). Appendicular skeletal muscle mass: effects of age, gender, and ethnicity. *Journal of Applied Physiology*, *83*(1), 229–239. https://doi.org/10.1152/jappl.1997.83.1.229

Gao, K., Cao, L.-F., Ma, W.-Z., Gao, Y.-J., Luo, M.-S., Zhu, J., Li, T., & Zhou, D. (2022). Association between sarcopenia and cardiovascular disease among middle-aged and older adults: Findings from the China health and retirement longitudinal study. *EClinicalMedicine*, *44*, 101264. https://doi.org/10.1016/j.eclinm.2021.101264

Hämäläinen, O., Tirkkonen, A., Savikangas, T., Alén, M., Sipilä, S., & Hautala, A. (2024). Low physical activity is a risk factor for sarcopenia: a cross-sectional analysis of two exercise trials on community-dwelling older adults. *BMC Geriatrics*, *24*(1), 212. https://doi.org/10.1186/s12877-024-04764-1

Hassan, B. H., Hewitt, J., Keogh, J. W. L., Bermeo, S., Duque, G., & Henwood, T. R. (2016). Impact of resistance training on sarcopenia in nursing care facilities: A pilot study. *Geriatric Nursing*, *37*(2), 116–121. https://doi.org/10.1016/j.gerinurse.2015.11.001

He, N., Zhang, Y., Zhang, L., Zhang, S., & Ye, H. (2021). Relationship Between Sarcopenia and Cardiovascular Diseases in the Elderly: An Overview. *Frontiers in Cardiovascular Medicine*, *8*. https://doi.org/10.3389/fcvm.2021.743710

Hua, N., Zhang, Y., Tan, X., Liu, L., Mo, Y., Yao, X., Wang, X., Wiley, J., & Wang, X. (2022). Nutritional Status and Sarcopenia in Nursing Home Residents: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, *19*(24), 17013. https://doi.org/10.3390/ijerph192417013

Keevil, V. L., Luben, R., Dalzell, N., Hayat, S., Sayer, A. A., Wareham, N. J., & Khaw, K.-T. (2015). Cross-sectional associations between different measures of obesity and muscle strength in men and women in a British cohort study. *The Journal of Nutrition, Health and Aging*, *19*(1), 3–11. https://doi.org/10.1007/s12603-014-0492-6

Liu, J., Zhu, Y., Tan, J. K., Ismail, A. H., Ibrahim, R., & Hassan, N. H. (2023). Factors Associated with Sarcopenia among Elderly Individuals Residing in Community and Nursing Home Settings: A Systematic Review with a Meta-Analysis. *Nutrients*, *15*(20), 4335. https://doi.org/10.3390/nu15204335

Manton, K. G., Cornelius, E. S., & Woodbury, M. A. (1995). Nursing Home Residents: A Multiwiate Analysis of Their Medical, Behavioral, Psychosocial, and Service Use Characteristics. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *50A*(5), M242–M251. https://doi.org/10.1093/gerona/50A.5.M242

Mathewson, S. L., Azevedo, P. S., Gordon, A. L., Phillips, B. E., & Greig, C. A. (2021). Overcoming protein-energy malnutrition in older adults in the residential care setting: A narrative review of causes and interventions. *Ageing Research Reviews*, *70*, 101401. https://doi.org/10.1016/j.arr.2021.101401

Pauly, L., Stehle, P., & Volkert, D. (2007). Nutritional situation of elderly nursing home residents. *Zeitschrift Für Gerontologie Und Geriatrie*, *40*(1), 3–12. https://doi.org/10.1007/s00391-007-0430-x

Rathnayake, K. M., Wimalathunga, M., Weech, M., Jackson, K. G., & Lovegrove, J. A. (2015). High prevalence of undernutrition and low dietary diversity in institutionalised elderly living in Sri Lanka. *Public Health Nutrition*, *18*(15), 2874–2880. https://doi.org/10.1017/S1368980015000749

Renoud, A., Ecochard, R., Marchand, F., Chapurlat, R., & Szulc, P. (2014). Predictive Parameters of Accelerated Muscle Loss in Men—MINOS Study. *The American Journal of Medicine*, *127*(6), 554–561. https://doi.org/10.1016/j.amjmed.2014.02.004

Rodríguez-Rejón, A. I., Ruiz-López, M. D., Wanden-Berghe, C., & Artacho, R. (2019). Prevalence and Diagnosis of Sarcopenia in Residential Facilities: A Systematic Review. *Advances in Nutrition*, *10*(1), 51–58. https://doi.org/10.1093/advances/nmy058

Rolland, Y., Czerwinski, S., Abellan Van Kan, G., Morley, J., Cesari, M., Onder, G., Woo, J., Baumgartner, R., Pillard, F., Boirie, Y., Chumlea, W., Vellas, B., Rolland, Y., Czerwinski, S., Abellan van Kan, G., Cesari, M., Onder, G., Woo, J., Baumgartner, R., … Chumlea, C. (2014). Author manuscript; available in PMC. In *J Nutr Health Aging* (Vol. 12, Issue 7).

Saka, B., Ozkaya, H., Karisik, E., Akin, S., Akpinar, T. S., Tufan, F., Bahat, G., Dogan, H., Horasan, Z., Cesur, K., Erten, N., & Karan, M. A. (2016). Malnutrition and sarcopenia are associated with increased mortality rate in nursing home residents: A prospective study. *European Geriatric Medicine*, *7*(3), 232–238. https://doi.org/10.1016/j.eurger.2015.12.010

Sánchez-Sánchez, J. L., He, L., Morales, J. S., de Souto Barreto, P., Jiménez-Pavón, D., Carbonell-Baeza, A., Casas-Herrero, Á., Gallardo-Gómez, D., Lucia, A., del Pozo Cruz, B., & Valenzuela, P. L. (2024). Association of physical behaviours with sarcopenia in older adults: a systematic review and meta-analysis of observational studies. *The Lancet Healthy Longevity*, *5*(2), e108–e119. https://doi.org/10.1016/S2666-7568(23)00241-6

Scott, D., Park, M. S., Kim, T. N., Ryu, J. Y., Hong, H. C., Yoo, H. J., Baik, S. H., Jones, G., & Choi, K. M. (2016). Associations of low muscle mass and the metabolic syndrome in Caucasian and Asian middle-aged and older adults. *The Journal of Nutrition, Health and Aging*, *20*(3), 248–255. https://doi.org/10.1007/s12603-015-0559-z

Shen, Y., Chen, J., Chen, X., Hou, L., Lin, X., & Yang, M. (2019). Prevalence and Associated Factors of Sarcopenia in Nursing Home Residents: A Systematic Review and Meta-analysis. *Journal of the American Medical Directors Association*, *20*(1), 5–13. https://doi.org/10.1016/j.jamda.2018.09.012

Ulger, Z., Halil, M., Cankurtaran, M., Yavuz, B. B., Yesil, Y., Kuyumcu, M. E., Gungor, E., İzgi, H., İskit, A. T., Abbasoglu, O., & Ariogul, S. (2013). Malnutrition in Turkish nursing homes: A correlate of short term mortality. *The Journal of Nutrition, Health and Aging*, *17*(4), 305–309. https://doi.org/10.1007/s12603-013-0016-9

Wu, X., Li, X., Xu, M., Zhang, Z., He, L., & Li, Y. (2021). Sarcopenia prevalence and associated factors among older Chinese population: Findings from the China Health and Retirement Longitudinal Study. *PLOS ONE*, *16*(3), e0247617. https://doi.org/10.1371/journal.pone.0247617

Wylie, G., Kroll, T., Witham, M. D., & Morris, J. (2023). Increasing physical activity levels in care homes for older people: a quantitative scoping review of intervention studies to guide future research. *Disability and Rehabilitation*, *45*(19), 3160–3176. https://doi.org/10.1080/09638288.2022.2118869

Yao, X., Liu, B., Hua, N., Huang, J., & Zhao, X. (2023). Physical Activity Mediates the Relationship Between Sarcopenia and Cognitive Function Among Older Adults in Nursing Homes. *Clinical Interventions in Aging*, *Volume 18*, 1863–1871. https://doi.org/10.2147/CIA.S425271

Yuan, S., & Larsson, S. C. (2023). Epidemiology of sarcopenia: Prevalence, risk factors, and consequences. *Metabolism*, *144*, 155533. https://doi.org/10.1016/j.metabol.2023.155533

Zhang, Y., Chen, X., Hou, L., Lin, X., Qin, D., Wang, H., Hai, S., Cao, L., & Dong, B. (2020). Prevalence and Risk Factors Governing the Loss of Muscle Function in Elderly Sarcopenia Patients: A Longitudinal Study in China with 4 Years of Follow-Up. *The Journal of Nutrition, Health and Aging*, *24*(5), 518–524. https://doi.org/10.1007/s12603-020-1361-0