

Prevalence of Sarcopenia and Associated Factors Among Elderly Individuals in Mbarara District, Southwestern Uganda

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Abstract

Background

Sarcopenia, the progressive loss of skeletal muscle mass, strength, and performance with age, is a growing public health concern worldwide. It is associated with disability, poor quality of life, and increased mortality, yet data on its prevalence and determinants in low and middle-income countries remain scarce. This study aimed to determine the prevalence and associated factors of Sarcopenia among elderly individuals in Mbarara District, Uganda.

Methods

A cross-sectional study was conducted among 332 randomly selected elderly participants (≥ 60 years) attending community gatherings organized by the Ankole Older Persons Foundation. Sarcopenia was diagnosed using the EWGSOP2 criteria based on handgrip strength, calf circumference, and gait speed. Data was collected using structured interviews and nutritional status. Data was entered with checks in Ms Excel, exported to the Stata v17 software, and cleaned prior to analysis. Continuous variables were presented using frequencies, median. Categorical variables were presented using Descriptive statistics were used to summarize participant characteristics, while modified Poisson regression with robust variance was applied to identify factors independently associated with Sarcopenia.

Results

The study enrolled 332 participants of which over half were female, 61.7% (205/332). The median age of the study population was 70 years (IQR: 63-77.5). Over a third, 38.9% (129/332) of the study participants had Sarcopenia. Sarcopenia was common in females 21.4% (71/332), and individuals aged 70–79 years, 13% (43/332). Sarcopenia among the study population was significantly associated with the following factors, age category 80–89 (aPR: **2.45 95% CI: 1.47–4.09; P-value: 0.001**), low loneliness (aPR: **1.68 95%CI: 1.07–2.66; P-value: 0.026**), malnutrition (aPR: **1.67 95%CI:1.04–2.69; P-value: 0.033**).

Conclusion

Over a third of the study population had Sarcopenia and was significantly associated with low loneliness, malnutrition and being between 80–89 years of age. These findings underscore the need for Ministry of Health to undertake routine screening, nutrition-focused interventions, and psychosocial support in communities targeting elderly population.

INTRODUCTION

Sarcopenia, first defined in 1989, is recognized as the progressive and generalized loss of skeletal muscle mass and function with advancing age (1). Medically, it is described as the age-related gradual loss of muscle mass, strength, and function (2). As a global public health concern, sarcopenia is associated with a marked increase in adverse health outcomes among the elderly, including functional impairments, disability, falls, longer hospital stays, and increased mortality (3, 4).

The rapid demographic transition projected by the World Health Organization (WHO) suggests that the global population aged 60 years and older will reach 2 billion by 2050. This trend is expected to increase the burden of age-related chronic conditions like sarcopenia worldwide. Across international studies, the prevalence of sarcopenia in individuals aged 60 years and older ranges from 10% to 27% (5). In Africa, the weighted prevalence has been estimated to be around 25.72% (6). However, detailed data on the prevalence and determinants of sarcopenia remain scarce, particularly in low- and middle-income countries like Uganda.

Uganda is undergoing demographic shifts, with individuals aged 60 years and older accounting for approximately 5.0% of the total population as of the 2024 national census preliminary results (7). Despite this trend, there is limited data regarding sarcopenia prevalence in the Ugandan elderly, especially in rural areas such as Mbarara District. This gap limits understanding of how local socio-economic factors, poor nutritional intake, physical inactivity, and restricted access to healthcare services influence the onset and progression of sarcopenia. The debilitating effects of sarcopenia which include reduced independence, higher healthcare costs, and increased risk of falls and chronic health problems underscore the urgent need for context-specific research in this region.

This study aims to address the critical evidence gap by determining the prevalence and identifying the independently associated factors of sarcopenia among elderly individuals (aged 60 years and above) residing in Mbarara District, Uganda. We hypothesize that socioeconomic, nutritional, and psychological factors unique to this rural setting will play a significant role in determining the disease burden.

METHODOLOGY

The study design

The study was a cross-sectional descriptive study. It was carried-out in the Mbarara district using gatherings from the Ankole Older Persons Foundation. The study site was chosen since the Mbarara had elderly individuals who had been screened of being sarcopenic and with the limited data on sarcopenia across the health facilities around Mbarara district.

The study population, sample size determination and sampling

Participants aged ≥ 60 years attending community gatherings organized by the Ankole Older Persons Foundation were recruited in the study within Mbarara district. The sample size of this study was

determined using Kish and Leslie formula with consideration of 95% confidence interval, Z-score being 1.96, margin-of-error being 0.05 and the assumed true population prevalence of sarcopenia in Africa being 25.72% (6). The estimated sample size was 294. With respect to a 10% non-responsive rate of the estimated sample size, the sample size became $294/0.9 = 327$. The sampling procedure followed a probability proportionate to size sampling based on previous attendance records of the selected 3 gatherings organised by the Ankole Older Persons Foundation in Mbarara district and collectively the sample size was achieved. Each elderly resident in Mbarara district attending the elderly meetings had an equal chance of being selected since participants were selected using random numbers at each study site.

Data collection procedures

Data was collected using questionnaires through face-to-face interviews. The study questionnaire was developed by primary investigator and was validated through a pilot study that was done in Lyantonde district and it was also translated into Runyankore language. The study tool included socio-demographics, lifestyle, comorbidities, health-related factors and tools for assessing sarcopenia according to the EWGSOP2 criteria(8)(9). The research assistants including (**Laston Athieno and Maria Sonia Tolley**) were trained adequately, whereby, the questionnaire was presented, explained in detail with practical on all the anthropometric measurements, handgrip measurements and gait speed. Research assistants were also enriched with communication skills and interpersonal relationships.

Data management and analysis

Upon collection, data from the structured questionnaires were double-entered by the primary researcher into Microsoft Excel at the end of each study day to ensure accuracy and minimize errors. A pilot study was conducted on elderly individuals from Lyantonde district to pre-test the questionnaire and ensure its clarity. The questionnaire was translated into Runyankore to ensure proper data collection from non-English speaking participants and maintain the integrity of the data. Research assistants received training that included practical sessions on all anthropometric and functional measurements (handgrip strength, gait speed) to standardize data collection procedures. The data were subsequently imported into STATA version 17 software for statistical analysis. Descriptive statistics were used to summarize the characteristics of the participants. Continuous data that were not regularly distributed were presented as median with interquartile range (IQR). The Wilcoxon rank-sum test was used to compare medians between groups. Categorical data were presented as percentages, and comparisons between categories were performed using the chi-square test. The prevalence of sarcopenia was estimated and reported as a proportion with a 95% confidence interval (CI). Bivariate analysis was performed to identify factors associated with sarcopenia, with variables having a P-value < 0.2 being considered for the next stage. Variables with biological and social plausibility were also included in the subsequent model. A multivariable modified Poisson regression model with robust variance was applied to identify factors independently associated with sarcopenia. Adjusted prevalence ratios (aPRs) and their corresponding

95% CIs were reported for variables independently associated with sarcopenia. A P-value of less than 0.05 was considered statistically significant for all analyses.

RESULTS

Description of characteristics Study Population

A total of 332 elderly participants (aged 60 years) were enrolled in the study. The median age for the entire cohort was 70 years (IQR: 63–77.5), and the majority of participants were female (61.7%). The median age for participants with sarcopenia was significantly higher at 77 years (IQR: 70–86) compared to 66 years (IQR: 62–72) for those without sarcopenia ($p < 0.001$). The age category 60–69 years was predominantly without sarcopenia (65.5%), while the > 90 years' group was predominantly with sarcopenia (16.3% vs. 1.0% in the non-sarcopenia group). Females were more common in the non-sarcopenia group (66.0% vs. 55.0% in the sarcopenia group) ($p = 0.045$). Lack of formal education was significantly more prevalent among those with sarcopenia (51.9% vs. 26.6% in the non-sarcopenia group) ($p < 0.001$). Rural residence was significantly more frequent among participants with sarcopenia (85.3% vs. 64.5% in the non-sarcopenia group) ($p < 0.001$). Low income was significantly higher in the sarcopenia group (79.1% vs. 59.6% in the non-sarcopenia group) ($p < 0.001$). Occupation: Not being employed was more common in the sarcopenia group (63.6% vs. 48.8% in the non-sarcopenia group) ($p = 0.016$). The comprehensive socio-demographic profile of the study participants is summarized in Table 1.

Table 1
Socio-demographic characteristics of elderly participants (≥ 60 years) in Mbarara District, Uganda,
June–July 2025

Variable	Description	Frequency n(%)	Prevalence of Sarcopenia n(%)	p- value
age category (years)	60–69	163 (49.1%)	30 (23.3%)	< 0.001
	70–79	97 (29.2%)	43 (33.3%)	
	80–89	49 (14.8%)	35 (27.1%)	
	≥ 90	23 (6.9%)	21 (16.3%)	
Sex	female	205 (61.7%)	71 (55.0%)	0.045
	male	127 (38.3%)	58 (45.0%)	
Marital status	Separated/Divorced	55 (16.6%)	21 (16.3%)	1.00
	married	268 (80.7%)	105 (81.4%)	
	single	9 (2.7%)	3 (2.3%)	
Level of education	none	121 (36.4%)	67 (51.9%)	< 0.001
	primary	159 (47.9%)	50 (38.8%)	
	secondary	44 (13.3%)	11 (8.5%)	
	tertiary	8 (2.4%)	1 (0.8%)	
Residence	rural	241 (72.6%)	110 (85.3%)	< 0.001
	urban	91 (27.4%)	19 (14.7%)	
Home ownership	Belongs to the child/relatives	47 (14.2%)	22 (17.1%)	0.005
	Belongs to them/partner	255 (76.8%)	103 (79.8%)	
	rent	30 (9.0%)	4 (3.1%)	
Occupation	Self employed	123 (37.0%)	41 (31.8%)	0.016
	employed by someone	28 (8.4%)	6 (4.7%)	
	not employed	181 (54.5%)	82 (63.6%)	
Income level	high (> 1,000,000	14 (4.2%)	5 (3.9%)	< 0.001
	low (0–250,000	223 (67.2%)	102 (79.1%)	
	middle (> 250,000– 1,000,000	95 (28.6%)	22 (17.1%)	

Prevalence of sarcopenia among elderly individuals in Mbarara District, South-western Uganda

Out of the 332 participants, 129 participants had sarcopenia giving an overall prevalence of 38.9% (95% CI: 33.7–44.2). The distribution across socio-demographic factors shows a strong and statistically significant association with advancing age ($p < 0.001$), with prevalence rates rising sharply from 18.4% (30/163) in the 60–69 age group to 91.3% (21/39) in the ≥ 90 age group. Furthermore, sarcopenia was significantly more prevalent among rural residents [85.3% (110/129) of the sarcopenia group], those with no formal education [51.9% (67/129) of the sarcopenia group], those who were not employed [63.6% (82/129) of the sarcopenia group], and those reporting a low income [79.1% (102/129) of the sarcopenia group], highlighting a disproportionate burden of the condition among socio-economically vulnerable elderly individuals.

Factors associated with sarcopenia among the elderly individuals in the Mbarara district

The bivariate analysis identified a comprehensive list of factors significantly associated with the crude prevalence of sarcopenia at a threshold of $P < 0.2$. Advancing age showed the strongest association, with the crude prevalence ratio (cPR) increasing substantially across age groups, reaching 4.96 for the ≥ 90 years' group (95% CI: 3.50–7.02, $P < 0.001$) compared to the 60–69 age group. Other socio-demographic factors associated with a higher crude prevalence included male sex (cPR: 1.32, $P = 0.043$), rural residence (cPR: 2.19, $P < 0.001$), and not being employed (cPR: 1.36, $P = 0.043$). Lifestyle factors showing significant crude associations included low physical activity (< 600 MET-min/week; cPR: 4.13, $P < 0.001$), current smoking (cPR: 2.01, $P < 0.001$), and current alcohol consumption (cPR: 1.60, $P = 0.002$). Health and psychological factors with strong crude associations were low Body Mass Index (BMI < 25 kg/m², $P = 0.002$), malnutrition (cPR: 3.83, $P < 0.001$), risk of malnutrition (cPR: 2.31, $P < 0.001$), presence of chronic illness (cPR: 1.54, $P = 0.003$), COPD (cPR: 2.06, $P < 0.001$), use of > 4 medications (cPR: 1.71, $P = 0.005$), depression (cPR: 2.69, $P < 0.001$), and loneliness (low and moderate categories, $P < 0.001$). Additionally, variables with P values between 0.1 and 0.2, and thus included for multivariate modeling, were 10km distance from a health facility ($P = 0.073$), diabetes ($P = 0.064$), hypertension ($P = 0.104$), and tertiary level of education ($P = 0.113$).

In the subsequent multivariable analysis, only three factors remained independently and significantly associated with sarcopenia after adjusting for potential confounders: advancing age, nutritional status, and loneliness. The detailed crude and adjusted prevalence ratios for all evaluated factors are presented in Table 2. Compared to the 60–69 age group, advancing age continued to be a potent predictor, with adjusted prevalence ratios (aPRs) ranging from 1.83 (ages 70–79) up to 2.45 (ages 80–89). Malnutrition was independently associated with a 67% higher prevalence of sarcopenia (aPR: 1.67, 95% CI: 1.04–2.69) compared to normal nutritional status, and reporting low loneliness (ULCA score 20–29) was associated with a 68% increased prevalence (aPR: 1.68, 95% CI: 1.07–2.66) compared to not being

lonely. The associations observed for sex, residence, lifestyle habits, and comorbidities in the bivariate analysis did not maintain statistical significance in the adjusted model.

Table 2
Factors associated with sarcopenia among elderly participants (≥ 60 years) in Mbarara District, Uganda

Variable	Bivariate analysis	Multivariate analysis	
	cPR(95%CI)	aPR(95%CI)	P-value
Age			
60–69	1.00	1.00	
70–79	2.41 (1.63–3.57)	1.83 (1.19–2.83)	0.006
80–89	3.88 (2.68–5.61)	2.45 (1.47–4.09)	0.001
≥ 90	4.96 (3.50–7.02)	2.40 (1.36–4.24)	0.002
Sex			
Female	1.00	1.00	
Male	1.32 (1.01–1.72)	1.34 (0.96–1.87)	0.083
Level of education			
Non	1.00	1.00	
Primary	0.57 (0.43–0.75)	0.93 (0.68–1.27)	0.661
Secondary	0.45 (0.26–0.77)	1.35 (0.71–2.54)	0.357
Tertiary	0.23 (0.04–1.43)	0.65 (0.17–2.47)	0.526
Residence			
Rural	2.19 (1.43–3.34)	1.11 (0.60–2.03)	0.745
Urban	1.00	1.00	
Home ownership			
Belongs to the child/relatives	1.16 (0.83–1.63)	0.88 (0.63–1.23)	0.455
Belongs to them/partner	1.00	1.00	
Rent	0.33 (0.13–0.83)	0.53 (0.20–1.36)	0.185
Occupation			
Self employed	1.00	1.00	
Employed by someone	0.64 (0.30–1.37)	1.12 (0.59–2.44)	0.614
Not employed	1.36 (1.01–1.83)	0.76 (0.50–1.18)	0.212
Physical activity (MET mins per week)			

Variable	Bivariate analysis	Multivariate analysis	
	cPR(95%CI)	aPR(95%CI)	P-value
Age			
<600	4.13 (2.25–7.58)	1.72 (0.96–3.08)	0.067
600–2999	1.81 (0.99–3.30)	1.54 (0.93–2.56)	0.094
≥3000	1.00	1.00	
Body mass index(kg/m²)			
<25	1.00	1.00	
25-29.9	0.56 (0.36–0.80)	0.92 (0.64–1.32)	0.657
≥30	0.63 (0.47–0.84)	0.82 (0.60–1.11)	0.200
Smoking status			
Smoker	2.01 (1.52–2.65)	1.20 (0.83–1.74)	0.328
Non smoker	1.00	1.00	
Alcohol consumption			
Consumer	1.60 (1.18–2.17)	0.88 (0.61–1.27)	0.485
Non consumer	1.00	1.00	
Chronic illness			
Absent	1.00	1.00	
Present	1.54 (1.16–2.04)	0.57 (0.23–1.40)	0.222
Number of drugs routinely taken			
None	1.00	1.00	
1–3	1.56 (1.15–2.11)	1.73 (0.71–4.22)	0.230
≥4	1.71 (1.17–2.50)	1.50 (0.58–3.89)	0.409
Depression			
No depression	1.00	1.00	
Depression	2.69 (1.88–3.86)	1.11 (0.71–1.74)	0.636
Loneliness			
Not lonely	1.00	1.00	

Variable	Bivariate analysis	Multivariate analysis	
	cPR(95%CI)	aPR(95%CI)	P-value
Age			
Low	2.35 (1.51–3.64)	1.68 (1.07–2.66)	0.026
Moderate	3.70 (2.48–5.52)	1.46 (0.91–2.35)	0.116
High	2.85 (0.68–11.98)	2.07 (0.64–6.72)	0.227
Nutritional status			
Malnourished	3.83 (2.82–5.20)	1.67 (1.04–2.69)	0.033
At risk of malnutrition	2.31 (1.68–3.18)	1.29 (0.90–1.85)	0.160
Normal nutritional status	1.00	1.00	

DISCUSSION

This current study investigated the prevalence of sarcopenia and its related factors among elderly individuals in the Mbarara District, Uganda. This study found a high prevalence of sarcopenia at 38.9% among the elderly participants in the Mbarara District, and was determined using 3 instruments; handgrip strength was measured using a handgrip dynamometer, physical performance was measured via the usual gait speed and muscle mass was determined through the calf circumference. This figure exceeds the average weighted prevalence for Africa (25.72%) reported by a systematic review and meta-analysis of observational studies (6), and also exceeds the general global range of 10% to 27% reported for community-dwelling populations (5). This higher rate may be related to the characteristics of the study population, which included individuals from a rural setting who may face socio-economic limitations like reduced access to quality nutrition, healthcare, and physical activity opportunities. The elevated prevalence suggests a critical, underestimated public health burden in this low-resource setting. This may be attributed to a confluence of unaddressed socio-economic vulnerabilities, including reduced access to quality nutrition and structured healthcare services, which often characterize rural African communities (6). The multivariable analysis successfully identified three independent determinants of sarcopenia: age, poor nutritional status, and low loneliness.

The finding that age is the strongest independent predictor of sarcopenia is consistent with extensive global literature, reinforcing the understanding of sarcopenia as a fundamental, age-related degenerative condition. Participants aged 80–89 years and those ≥ 90 years had over two-and-a-half times the prevalence of sarcopenia compared to the 60–69 age group. This biological inevitability is driven by underlying physiological changes, including chronic inflammation, hormonal shifts, and mitochondrial dysfunction (5, 8, 10, 11).

Malnutrition emerged as a critical modifiable factor, independently increasing the prevalence of sarcopenia by 67%. This aligns with evidence from diverse international cohorts, including those in Ireland, Taiwan, and stroke patients, where poor nutrition accelerates muscle degradation and physical decline. Protein-energy malnutrition compromises muscle protein synthesis and function, directly contributing to the catabolic state characteristic of sarcopenia (12–15). Given the strong association observed in this rural setting, nutritional deficiencies appear to be a central driver, potentially exacerbated by low income and challenges in obtaining adequate food intake.

The association between loneliness (specifically the low category) and an increased sarcopenia prevalence highlights the significant psychosocial dimension of the condition. While moderate loneliness did not maintain significance, the overall result supports the role of social health. Loneliness and social isolation are linked to elevated inflammatory markers, and critically, they can negatively impact health behaviors such as engaging in exercise and maintaining a proper diet (2, 16). Socially isolated elderly individuals may also face practical limitations in food preparation and access to care, indirectly compounding the risk of malnutrition and subsequent muscle wasting. This suggests that effective strategies in this population must integrate psychosocial support and community engagement to address sarcopenia's multifactorial etiology.

In comparison with Bivariate Findings, it is noted that several factors with strong crude associations, such as rural residence, low BMI, smoking, alcohol use, physical inactivity, and depression, did not remain significant in the multivariable model. This suggests that their individual effects are likely mediated or confounded by the stronger, foundational independent variables, particularly age and nutritional status (8, 17, 18). For instance, low income (a crude predictor) may lead to poor nutritional status, which is the direct biological mechanism for muscle loss, thus explaining the lack of independent significance for the socio-economic variables in the adjusted model. Similarly, the effect of physical inactivity may be captured by the severity of the sarcopenia itself or mediated through nutritional deficiencies.

Limitations

The study's cross-sectional design is a primary limitation, preventing the establishment of a causal relationship between the identified factors and sarcopenia. We can only infer associations, not temporal relationships. Furthermore, the reliance on participants recruited from community gatherings organized by the Ankole Older Persons Foundation may introduce selection bias, as the results may not be generalizable to the entire elderly population, particularly the frail, homebound, or institutionalized. Finally, the use of calf circumference as a proxy for muscle mass, while pragmatic for a field study in a low-resource setting, is less precise than advanced imaging techniques (e.g., DEXA).

CONCLUSION

In conclusion, sarcopenia is a major and highly prevalent public health challenge among the elderly in Mbarara District, Uganda. The key determinants are advancing age, malnutrition, and loneliness, highlighting the urgent need for a shift toward integrated, multi-disciplinary geriatric care in this region.

Declarations

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Authors' contribution

P.S participated in the conceptualization of the study. C.N.B and P.S performed data analysis and result interpretation. P.S, E.M.M, C.N.B, M.T.S contributed to writing the first draft of the manuscript with E.M.M, M.T.S, J.K providing critical revisions. Final manuscript was read and approved by all authors.

Ethics approval and consent to participate

Ethical clearance was obtained from the Research Ethics Committee (REC) of the Mbarara University of science and technology (REC number: MUST-2025-280) on 8th May 2025 to conduct the Primary study. All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki and its later amendments. All participants provided written informed consent prior to enrollment. To ensure comprehension, the consent forms were translated into the local language (Runyankore). Formally educated participants gave consent by signing the written forms. For participants with no formal education, the written informed consent form was read aloud in Runyankore to ensure comprehension, followed by the administration of a comprehension screening tool approved by the Mbarara University of Science and Technology Research Ethics Committee (MUST REC). Only participants who demonstrated clear understanding were permitted to consent, which they validated by placing a thumbprint on the form. Participant confidentiality was strictly maintained by assigning unique, non-traceable study codes. To safeguard patient privacy, all personal identifiers were removed, and the dataset was fully de-identified prior to analysis. Additionally, formal permission to conduct this secondary analysis was obtained from the Principal Investigator of the primary study.

Consent for Publication

Not applicable

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Data availability

The study used a primary dataset.

Competing Interests

The authors declare that they have no competing interests.

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Supplementary Files

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