Sarcopenia in Indonesian Community-Dwelling Elderly: The Prevalence and Influencing Factors within the Primary Care Setting

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Article Info

Abstract

Background: Determining the prevalence of sarcopenia and identifying associated factors can aid in early detection and treatment among community-dwelling elderly. **Objective**: This study aims to estimate the prevalence of sarcopenia and identify associated factors. **Method**: This cross-sectional study was conducted in the elderly community within the two areas of Public Health Center, Semarang, Indonesia, through random sampling. Sarcopenia was defined based on the 2019 Asian Working Group for Sarcopenia (AWGS) criteria. Data on socio-demographics, clinical, and functional status were collected and associated factors analyzed using multivariable logistic regression. **Results**: Of the 153 participants, the prevalence of severe sarcopenia was 50.33%, and overall sarcopenia prevalence was 44.44%. Elderly individuals with severe sarcopenia had a mean age of 69.45, with a higher occurrence in women (79.2%) compared to men. Age (p=0.003; APR: 1.105; 95% CI: 1.035-1.180), toilet type (p=0.002; APR: 4.194; 95% CI: 1.677-10.493), and being female (p=0.049; APR: 2.341; 95% CI: 1.003-5.460) were identified as risk factors for severe sarcopenia. **Conclusion**: The prevalence of severe sarcopenia is elevated among community-dwelling elderly. Sarcopenia was defined as low muscle mass with low handgrip strength and/or low gait speed. Routine check-ups are needed to detect sarcopenia and its risk factors in primary health care to enable early intervention for sarcopenia in the elderly.

INTRODUCTION

The World Health Organization (WHO) projects a substantial increase in the global elderly population (≥60 years old) to reach 1.5 billion by 2050, primarily in developing countries (WHO, 2024). While a growing elderly population can positively impact society when healthy and active, it poses a burden when health issues arise (Tang et al., 2022).

Among common health problems in the elderly, sarcopenia stands out, characterized by diminished muscle mass, strength, and ove-

rall function (Mesinovic et al., 2019). Globally, sarcopenia's prevalence in those ≥60 years is 10% (Shafiee et al., 2017), with community-dwelling elderly (≥50 years) experiencing rates between 1% and 29% (Zhong et al., 2022). In Asia, the Asia Working Group for Sarcopenia (AWGS) reports sarcopenia prevalence at 4.1–11.5% (Liu et al., 2020). Sarcopenia significantly impacts elderly lives, contributing to decreased functional status, falls, fractures, diminished quality of life, psychosocial changes, and increased mortality (Yeung et al., 2019).

Six screening tools are currently available, with the European Working Group on Sarcopenia in Older People (EWGS) 2010 guidelines being the most widely used (Cruz-Jentoft et al., 2019). The EWGS criteria include low muscle mass and low muscle function for sarcopenia diagnosis (Cruz-Jentoft et al., 2019). In Asian populations, AWGS recommends assessing sarcopenia in specific clinical conditions, combining low muscle mass, low muscle strength, and/or low physical performance (L. K. Chen et al., 2020)Asia included. The Asian Working Group for Sarcopenia (AWGS.

Indonesia, Southeast Asia's most populous country, anticipates a rise in the elderly population from 6.7% in 2021 to 19.9% in 2045 (Central Bureau of Statistics, 2021). However, according to Indonesia's Central Bureau of Statistics, in 2021, 42.22% of the elderly had experienced health complaints in the previous month (Central Bureau of Statistics, 2021) with sarcopenia emerging as a predominant health concern. Limited screening and insufficient knowledge contribute to sarcopenia being an iceberg phenomenon. A Surabaya City study using hand-grip strength and chair stand tests found 70% of those ≥60 years had possible sarcopenia (Kandinata et al., 2023). Another study on community-dwelling elderly reported a 50.25% sarcopenia prevalence, linking poor lung function to sarcopenia (Ridwan et al., 2021). Various factors, including age, gender, marital status, alcohol consumption, waist circumference, global cognition, and obesity, were associated with sarcopenia (Escribà-Salvans et al., 2022; Pang et al., 2021). Data on sarcopenia prevalence using gold standard measurements in Indonesian community-dwelling elderly are limited. This study aims to estimate sarcopenia prevalence and identify associated factors among community-dwelling elderly in Indonesia, providing insights crucial for early detection and intervention.

METHOD

Study design and population

This cross-sectional study was conducted in elderly communities in Semarang City, the capital of Central Java Province, Indonesia, from April to December 2022. The study adhered to the STROBE (STrengthening the Reporting of OBservational studies in Epidemiology) standard for cross-sectional studies. Elderly participants were recruited from two Primary Health Care (PHC) in Semarang City, namely Sekaran and Poncol PHC working area. In 2022, Semarang City's population was 1,656,564, with 11.16% being elderly (≥60 years) (Central Bureau of Statistics, 2022).

Sample size

The sample size calculation, based on research by Hao et al. (2018) (p=0.001; OR: 4.75; 95% CI: 2.45 - 9.20) (Hao et al., 2018), determined a minimum of 121 samples. The inclusion criteria were elderly aged ≥60 years, lived in the community, and were able to walk independently. Subjects with confirmed frailty status such as severe musculoskeletal disorders and subjects receiving prescribed medications such as undergoing cancer treatment for at least 5 years, long-term steroid therapy, which is known to affect changes in body composition, subjects who could not communicate with the others due to mental disorders, and severe cognitive impairment, were excluded. A total of 160 elderly individuals (≥60 years old) agreed to participate.

Ethical Consideration

To comply with research ethics, the research team explained the research objectives to respondents and provided an informed consent form as a sign of approval to take part in a series of research. Informed consent, signed by respondents or their legal guardians, was obtained. Ethical approval (number: 164/KEPK/EC/2022) was obtained from the Ethics and Research Committee of Universitas Negeri Semarang, Indonesia.

Study procedures and data collection

Based on the AWGS 2019 recommendations, sarcopenia was defined as low muscle mass with low handgrip strength and/or low gait speed (L. K. Chen et al., 2020)Asia included. The Asian Working Group for Sarcopenia (AWGS.

Muscle strength

Muscle strength was assessed using a handgrip strength test with the Takei T.K.K.

5401 digital dynamometer (Takei Scientific Instruments Co. Ltd., Tokyo, Japan). Participants positioned their arms straight, elbows at their sides, and gripped the dynamometer with their dominant hand, exerting maximum strength for 5 seconds. Handgrip strength measurements in individuals aged ≥60 years using the Takei digital dynamometer were both valid and reliable (ICC: 0.899, 95% CI: 0.856-0.930; p<0.001) (Savas et al., 2023)rehabilitation, and geriatrics to assess muscle strength, and to diagnose sarcopenia and frailty in older adults. There is a potential for measurement differences among different dynamometers available, and studies comparing GS measurements by variable tools have conflicting results. The two most frequently used dynamometers are the Jamar hydraulic (Jamar. Low muscle strength was defined as hand grip strength of <28 kg for males and <18 kg for females (L. K. Chen et al., 2020)Asia included. The Asian Working Group for Sarcopenia (AWGS.

Muscle mass

Muscle mass was measured via Bio-impedance analysis (BIA), a validated tool for assessing muscle mass in adults. Participants stood on the Bio-impedance device without assistance for a few seconds.

Physical performance

Physical performance was evaluated through gait speed time (GST) measurements. Participants walked a total of 6 meters, with the initial meter at a slow pace and the subsequent 4 meters at a normal pace, allowing the use of a cane or walker if necessary. Timing started when foot movement commenced at the 4-meter mark and stopped when one foot touched the ground after passing the 4-meter mark (Chambers & Sutherland, 2024)rotations through multiple joints, and physical forces that act on the body. Walking also requires motor control and motor coordination. Many orthopaedic surgical procedures are designed to improve ambulation by optimizing joint forces, thereby alleviating or preventing pain and improving energy conservation. Gait analysis, accomplished by either simple observation or three-dimensional analysis with measurement of joint angles (kinematics as per AWGS 2019, physical performance was considered low if GST <1 m/s (L. K. Chen et al., 2020)Asia included. The Asian Working Group for Sarcopenia (AWGS.

Assessment of covariates

Covariates were obtained through direct interviews and measurements, encompassing age, gender, education level, marital status, income source, living arrangement, toilet type, smoking status, clinical/functional status (including vision impairment, pacemaker, polypharmacy, hearing aids, and denture usage), weight, height, and calf circumference (considered low if <34 cm for men and <33 cm for women). Body mass index (BMI) was calculated as body mass (kg) divided by the square of height (m²).

Elderly quality of life

The World Health Organization's Quality of Life Questionnaire (WHOQoL-Bref) with 26 items was used to measure quality of life. The 5-scale Likert scale assessed responses, covering general quality of life, health, and four domains: physical health, psychological health, social relationships, and environment (Hidayati et al., 2018). The Indonesian version of WHOQoL-Bref complies with the WHO guidelines (WHO, 2020).

Elderly sleep quality

Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI) with 19 questions across seven subcategories, including subjective sleep quality, sleep latency, sleep duration, sleep habit efficiency, sleep disturbance, sleep medication use, and daytime dysfunction (Park, 2020)and to analyze the factors influencing sleep quality. METHODS: The study used a descriptive cross-sectional design and a self-report questionnaire. The participants were 744 middle-school students. The questionnaire included the PSQI and health-related questions, such as the types of diseases they had been diagnosed with and the frequency of hospital admissions. The data were analyzed using the independent t-test, analysis of variance, Pearson correlation coefficients, and linear multiple regression. RESULTS: The global PSQI score was 4.21, which indicated good sleep quality. The major factors that were associated with the sleep quality of middle-school students were the number of diseases they had been diagnosed with (β=.54, p=.001.

Elderly depression

The level of depression in the elderly was measured with the 15-item Geriatric Depression Scale. Interviews assessed the elderly's feelings during the past week (Alves Apóstolo et al., 2018).

Statistical analysis

Data analysis employed numerical variables presented with mean, standard deviation, and

median values, while categorical variables were represented as percentages. The prevalence of severe sarcopenia, sarcopenia, and no sarcopenia was calculated with a 95% confidence interval. The bivariate analysis involved the Chi-square test for dichotomous and ordinal variables and the T-test (or non-parametric Mann-Whitney test) for quantitative variables. Prevalence Ratio (PR) was calculated with a 95% confidence level. Multivariate analysis used logistic regression, testing variables with a p-value ≤0.25, and a p-value <0.05 was considered statistically significant.

RESULT AND DISCUSION
Description of the study population

Figure 1 illustrates the sarcopenia diagnosis identification process based on the AWGS 2019 criteria recommendations. A total of 160 elderly individuals (≥60 years old) agreed to participate. However, 7 elderly individuals were excluded due to the inability to take physical measurements. Consequently, the total number of elderly participants in this research was 153. The majority were women (74.5%), with a mean age of 67.71 years (median: 66 ± 8), at least primary school education (53.6%), and widow/widower status (50.3%). Additionally, 7.2% of the elderly lived alone, as indicated in Table 1.
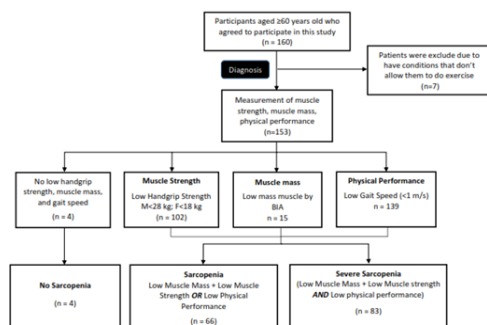

Figure 1. Flowchart for determining the sarcopenia population in the study based on the Asian Working Group for Sarcopenia (AWGS 2019) criteria.

Prevalence of sarcopenia and severe sarcopenia in community-dwelling elderly

The study revealed a higher prevalence of severe sarcopenia than sarcopenia or no sarcopenia. Severe sarcopenia affected 50.33% of the elderly, while sarcopenia had a prevalence of 44.44%. The mean age of individuals with severe sarcopenia was 69.45 years (median: 68 ± 10), and for those with sarcopenia, it was 66.35 years (median: 66 ± 8). Severe sarcopenia was more prevalent in women than men (79.2% vs. 20.8%),

as well as in elderly individuals with sarcopenia (69.1% vs. 30.9%), as presented in Table 1.

Table 2 summarizes clinical information, functional status, lifestyle, and sarcopenia status. Among those with severe sarcopenia, 55.8% had vision impairment, while only 1.5% of individuals with sarcopenia used pacemakers and hearing aids. Polypharmacy was more common in individuals with sarcopenia (42.6%) compared to those with severe sarcopenia (31.2%). Denture usage was 19.5% in individuals with severe sarcopenia and 7.2% in individuals with sarcopenia.

The mean BMI was 24.17 (SD: 8.17) kg/m2, with the majority categorized as normal BMI (54.2%). High blood pressure affected 52.3% of the participants, with 12.4% reporting a history of hypertension. Among individuals with severe sarcopenia, 57.1% had high blood pressure, and 7.8% were smokers. Abnormal calf circumference sizes were observed in 64.7% of the elderly.

Poor sleep quality was reported by 47.1% of the elderly, with 51.9% of those with severe sarcopenia experiencing poor sleep quality. Additionally, 30.1% of the elderly reported poor quality of life, with a higher prevalence among those with severe sarcopenia (36.4%) than those with sarcopenia or without sarcopenia. Severe depression was present in 0.7% of elderly individuals, while the majority were categorized as normal (81%), as presented in Table 2.

Associated factors of severe sarcopenia in community-dwelling elderly

Table 3 presents the bivariate analysis results of variables associated with severe sarcopenia status. Significant associations were found with age (p: 0.034), education level (p=0.017; PR: 2.829; 95% CI: 1.181-6.777), marital status (p=0.011; PR: 2.373; 95% CI: 1.218-4.624), and toilet type (p=0.003; PR: 3.485; 95% CI: 1.474-8.239). Additionally, calf circumference (p=0.030; PR: 2.175; 95% CI: 1.074-4.405) showed a significant association with severe sarcopenia. Variables with p≤0.25, including age, gender, education level, marital status, source of income, toilet type, polypharmacy, calf circumference, sleep quality, and depression level, were included in the multivariate analysis.

The multivariate analysis, presented in Table 4, identified three key variables as statistically significant risk factors for the severity of sarcopenia in community-dwelling elderly in Indonesia. These factors were age (p=0.003; APR: 1.105; 95% CI: 1.035-1.180), toilet type (p=0.002; APR: 4.194; 95% CI: 1.677-10.493), and being female (p=0.49; APR: 2.341; 95% CI: 1.003-5.460).

Table 1. Socio-demographic characteristics of respondents and sarcopenia status (n=153)

Variables	Total, n (%)	Severe sarcopenia, n (%)	Sarcopenia, n (%)	No sarcopenia, n (%)
No.		77 (50.33)	68 (44.44)	8 (5.23)
Age (years), mean (SD); median±IQR	67.71 (SD: 6.46); 66.00±8.00	69.45 (SD: 7.64); 68.00±10.00	66.35 (SD: 4.35); 66.00±8.00	62.83 (SD: 2.67); 61.50±4.00
Gender				
Male	39 (25.5)	16 (20.8)	21 (30.9)	2 (25)
Female	114 (74.5)	61 (79.2)	47 (69.1)	6 (75)
Education level				
No formal education	41 (26.8)	26 (33.8)	14 (20.6)	1 (12.5)
Primary school	82 (53.6)	43 (55.8)	36 (52.9)	3 (37.5)
Secondary school and higher	30 (19.6)	8 (10.4)	18 (26.5)	4 (50)
Marital status				
Widowed	77 (50.3)	47 (61)	28 (41.2)	3 (37.5)
Married	75 (49)	30 (39)	40 (58.8)	5 (62.5)
Source of income				
Work	66 (43.1)	32 (41.6)	33 (48.5)	1 (12.5)
Pension fund	17 (11.1)	1 (1.3)	12 (17.6)	4 (50)
Family	70 (45.8)	44(57.1)	23 (33.8)	3 (37.5)
Living arrangement				
Alone	11 (7.2)	4 (5.2)	6 (8.8)	1 (12.5)
Family/others	142 (92.8)	73 (94.8)	62 (91.2)	7 (87.5)
Type of toilet				
Squat toilet	118 (77.1)	67 (87)	47 (69.1)	4 (50)
Sitting toilet	35 (22.9)	10 (13)	21 (30.9)	4 (50)

Note. SD: standar deviation; IQR: Interquatile range

Table 2. Clinical information, functional status, lifestyle, and sarcopenia status (n=153)

Variables	Total, n (%)	Severe sarcopenia, n (%)	Sarcopenia, n (%)	No sarcopenia, n (%)
No.		77 (50.33)	68 (44.44)	8 (5.23)
Vision				
Yes	94 (61.4)	43 (55.8)	45 (66.2)	6 (75.0)
No	59 (38.6)	34 (44.2)	23 (33.8)	2 (25.0)
Pacemaker				
Yes	1 (0.7)	0 (0.0)	1 (1.5)	0 (0.0)
No	152 (99.3)	77 (100.0)	67 (98.5)	8 (100.0)
Hearing aids				
Yes	1 (0.7)	0 (0.0)	1 (1.5)	0 (0.0)
No	152 (99.3)	77 (100.0)	67 (98.5)	8 (100.0)
Polypharmacy				
Yes	55 (35.9)	24 (31.2)	29 (42.6)	2 (25.0)
No	98 (64.1)	53 (68.8)	39 (57.4)	6 (75.0)
Dentures				
Yes	27 (17.6)	15 (19.5)	11 (7.2)	1 (0.7)

No	126 (82.4)	62 (80.5)	57 (83.8)	7 (87.5)
Height (cm), mean (SD); median±IQR	149.96 (SD: 8.17); 148±12	147.48 (SD: 6.72); 147±8.50	152.33 (SD: 8.86); 152.28±15.00	153.66 (SD: 8.32); 151±6.75
Weight (kg), mean (SD); median±IQR	54.59 (SD: 11.38); 53.7 ± 15.55	51.75 (SD: 11.75); 48.90±17.10	57.17 (SD: 10.48); 55.95±12.58	59.95 (SD: 8.50); 58.15±17.15
BMI (kg/m^2), mean (SD); median±IQR	24.17 (SD: 4.31); 23.89 ± 5.33	23.71 (SD: 5.02); 22.94±6.00	24.53 (SD: 3.35); 24.83±4.22	25.55 (SD: 4.04); 25.31±6.47
BMI Category				
Underweight (<18.5 kg/m^2)	9 (5.9)	8 (10.4)	1 (1.5)	0 (0.0)
Normal (18.5-25.0 kg/m^2)	83 (54.2)	44 (57.1)	35 (51.5)	4 (50.0)
Overweight (25.1-27.0 kg/m^2)	29 (19.0)	9 (11.7)	19 (27.9)	1 (12.5)
Obese (>27.0 kg/m^2)	32 (20.9)	16 (20.8)	13 (19.1)	3 (37.5)
Blood pressure				
High	80 (52.3)	44 (57.1)	34 (50.0)	2 (25.0)
Pre-hypertension	50 (32.7)	24 (31.2)	21 (30.9)	5 (62.5)
Normal	23 (15.0)	9 (11.7)	13 (19.1)	1 (12.5)
Current smoking status				
Yes	13 (8.5)	6 (7.8)	6 (8.8)	1 (12.5)
No	140 (91.5)	71 (92.2)	62 (91.2)	7 (87.5)
Medical Conditions				
Diabetes	3 (2.0)	2 (2.6)	0 (0.0)	1 (12.5)
Hypertension	19 (12.4)	11 (14.3)	8 (11.8)	0 (0.0)
High uric acid	3 (2.0)	2 (2.6)	1 (1.5)	0 (0.0)
Others	19 (12.4)	6 (7.8)	12 (17.6)	1 (12.5)
1-3	14 (9.2)	6 (7.8)	8 (11.8)	0 (0.0)
Unknown conditions	95 (62.1)	50 (64.9)	39 (57.4)	6 (75.0)
Calf Circumference				
Abnormal (M:<34 cm; F:<33 cm)	99 (64.7)	57 (74.0)	38 (55.9)	4 (50.0)
Normal	54 (35.3)	20 (26.0)	30 (44.1)	4 (50.0)
Sleep Quality				
Poor	72 (47.1)	40 (51.9)	27 (39.7)	5 (62.5)
Good	81 (52.9)	37 (48.1)	41 (60.3)	3 (37.5)
Quality of Life				
Poor	46 (30.1)	28 (36.4)	18 (26.5)	0 (0.0)
Good	107 (69.9)	49 (63.6)	50 (73.5)	8 (100.0)
Level of Depression				
Severe depression	1 (0.7)	0 (0.0)	1 (1.5)	0 (0.0)
Moderate depression	7 (4.6)	5 (6.5)	2 (2.9)	0 (0.0)
Mild depression	21 (13.7)	14 (18.2)	7 (10.3)	0 (0.0)
Normal	124 (81.0)	58 (75.3)	58 (85.3)	8 (100.0)

Note. SD: Standar deviation; IQR: Interqatile range; F: female; M: male

Table 3. Associations between socio-demographic characteristics, clinical information, functional status, and lifestyle with sarcopenia and severe sarcopenia (n=145)

Factors	p-value	PR (95% CI)
Age**	0.034*[a]	
Gender		
Male	0.136[a]	0.562 (0.262-1.205)
Female		
Education level		
No formal education and primary school	0.017*[a]	2.829 (1.181-6.777)
Secondary school and higher		
Marital status		
Widowed	0.011*[a]	2.373 (1.218-4.624)
Married		
Source of income		
Work, pension fund, others	0.050[a]	0.516 (0.266-1.002)
Family		
Living arrangement		
Alone	0.874	0.901 (0.249-3.258)
Family/others		
Type of toilet		
Squat toilet	0.003*[a]	3.485 (1.474-8.239)
Sitting toilet		
Vision		
Yes	0.573	0.825 (0.422-1.613)
No		
Polypharmacy		
Yes	0.192[a]	0.637 (0.323-1.257)
No		
Dentures		
Yes	0.552	1.297 (0.550-3.055)
No		
Obesity		
Yes (BMI >25 kg/m^2)	0.068[a]	0.534 (0.271-1.050)
No (BMI ≤25 kg/m^2)		
Hypertension		
Yes	0.480	1.266 (0.658-2.436)
No		
Current smoking status		
Yes	0.861	0.900 (0.276-2.934)
No		
Calf Circumference		
Abnormal (M:<34 cm; F:<33 cm)	0.030*[a]	2.175 (1.074-4.405)
Normal		
Sleep Quality		

Poor		0.195[a]	1.543 (0.799-2.981)
Good			
Quality of Life			
Poor		0.302	1.450 (0.715-2.940)
Good			
Level of Depression			
Mild to severe depression		0.114[a]	1.967 (0.842-4.591)
Normal			

Note. PR: Prevalence Ratio; CI: Confidence Interval; BMI: Body Mass Index; M: Male; F: Female *Statistically significant (<0.05); **Using Mann Whitney Test; [a]p≤0.25 multivariate analysis

Table 4. Logistic regression analysis on factors associated with the severity of sarcopenia in community-dwelling older adults.

Factors	Beta	Wald	p-value	APR (95% CI)
Age	0.100	8.862	0.003[a]	1.105 (1.035-1.180)
Female	-0.850	3.872	0.049[a]	2.341 (1.003-5.460)
Squat toilet	1.434	9.391	0.002[a]	4.194 (1.677-10.493)

Note. APR: Adjusted Prevalence Ratio; CI: Confidence Interval; [a]Statistically significant (<0.05)

The study revealed a high sarcopenia prevalence of 94.77%. According to AWGS 2019 criteria, 44.44% had sarcopenia, and 50.33% had severe sarcopenia. A Taiwan-based cross-sectional study in hospitals reported a 31% prevalence among the elderly, with females constituting the majority (Hao et al., 2018). In nursing homes, the prevalence ranged from 6-81.7%, with 60.5% probable, 18.3% confirmed, and 6.7% severe sarcopenia based on EWGSOP2 criteria (Escribà-Salvans et al., 2022). A systemic review found sarcopenia prevalence between 22-85.4% in the elderly (Shen et al., 2019). Compared to these, our study indicates a high prevalence, especially with more cases of severe sarcopenia, possibly due to the older age of participants.

Our research identified age as a risk factor for sarcopenia severity in individuals ≥60 years old, aligning with a Japanese study (mean age: 72.9 years, min-max: 65-95 years) associating age with sarcopenia and severe sarcopenia (Ohta et al., 2023). A Singapore study, using AWGS 2019 criteria, linked age with sarcopenia incidence, with 32.2% at ≥60 years old and 6.9% in younger age groups (Pang et al., 2021). Sarcopenia and age are interrelated; as individuals age, their strength and muscle function decline, increasing the risk of disability, falls, and the need for long-term care (Cruz-Jentoft et al., 2019; Yuan & Larsson, 2023).

Gender showed an association with sarcopenia and its severity, with higher prevalence in women. Severe sarcopenia was 2.3 times more prevalent in elderly women. Several previous studies in different populations agree with these results. A study conducted on community-dwelling elderly in the UK explained that the prevalence of sarcopenia and severe sarcopenia was higher in women than in men (Papadopoulou et al., 2020). Another study in Korea also reported a higher prevalence of sarcopenia in women compared to men (26.4% and 19.2%, respectively) (Hwang & Park, 2022). Similarly, a study on 1,921 elderly in community-dwelling Japan, found the prevalence of sarcopenia was 16.56% in women and 10.34% in men (Hwang & Park, 2022). Hormonal changes in women, particularly the faster loss of sex hormones like estrogens and androgens which may lead to faster skeletal muscle loss, may contribute to this discrepancy (Collins et al., 2019).

Toilet type emerged as a risk factor for sarcopenia severity, with elderly using squat toilets being 4.19 times more likely to have severe sarcopenia. In Asia, especially Indonesia, there are still many people who have squat toilets, where to defecate they have to position their bodies squatting over the toilet. In Indonesia, squat toilets are common due to their affordability, but they pose challenges for the elderly, potentially causing injuries and discomfort. Some studies report that the squatting position can cause discomfort in the back, legs, and even the whole body (Straub & Powers, 2024; Y. Chen et al., 2021; Hajaghazadeh et al., 2019). Elderly who continue to experience a decline in balance, ability, and muscle function may suffer injuries if they use squat toilets continuously. While not advocating against squat toilets, it is crucial to encourage preventive me-

asures, like occasional use and promoting physical activities to counteract sarcopenia risk factors (Dhar et al., 2022).

Limitations include potential recall bias in self-reported questionnaires for covariates such as quality of life, sleep, and client information. However, interviews were conducted by expert researchers, and some elderly had companions, enhancing information extraction. Being cross-sectional, the study establishes relationships between sarcopenia and related factors but does not imply causation.

CONCLUSION

The prevalence of sarcopenia severity among community-dwelling elderly individuals is high. The aging process is intricately linked to both the occurrence and intensity of sarcopenia, with women being more vulnerable to its severe manifestations compared to men. The AWGS 2014 criteria prove effective in diagnosing sarcopenia, underscoring the importance of routine measurements within primary health care to proactively address sarcopenia in the elderly. Implementing strategies to enhance daily physical activity among the elderly is crucial for mitigating the risk of sarcopenia.

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