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ORIGINAL RESEARCH

Evaluation of the Diagnosis Accuracy of the AWGS 2019 Criteria for "Possible Sarcopenia" in Thai Community-Dwelling Older Adults

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Background: The term "possible sarcopenia" was introduced in the Asian Working Group for Sarcopenia (AWGS) 2019 guidelines to characterize individuals at high risk for sarcopenia in primary care settings. However, studies that support the diagnostic accuracy of this criteria remain scarce. Accordingly, the primary aim of this study was to assess the diagnostic accuracy of the AWGS 2019 "possible sarcopenia" criteria for detecting sarcopenia in Thai community-dwelling older adults. Our secondary aim was to explore the use of adjunct variables to improve the diagnostic accuracy of the "possible sarcopenia" criteria for detecting sarcopenia.

Methods: This study is a secondary analysis of an epidemiological investigation of the prevalence of sarcopenia among Thai older adults that was conducted during 2021–2022. We assessed the performance of the "possible sarcopenia" criteria against sarcopenia diagnoses based on the AWGS 2019 guidelines. In an attempt to improve the diagnostic performance of the AWGS 2019 criteria, we combined the AWGS 2019 criteria with age, sex, height, body weight, or BMI to create modified criteria. The variable that influenced the highest area under the receiver operating characteristic curve (AUC) was incorporated in the modified AWGS 2019 criteria.

Results: A total of 2456 participants (mean age 69.0 ± 6.1 years, 63.6% female) were included. Of these, 445 (18.1%) patients were diagnosed with sarcopenia. The "possible sarcopenia" criteria showed a sensitivity of 94.6%, a specificity of 54.0%, and an AUC of 74% for detecting sarcopenia. Incorporating BMI improved the AUC by 17%. A BMI cutoff value <24 kg/m² was shown to increase specificity to 72.7%, while maintaining sensitivity at 89.9%.

Conclusion: The AWGS 2019 criteria for "possible sarcopenia" showed excellent sensitivity in detecting sarcopenia but lacked sufficient specificity. The modified AWGS "possible sarcopenia" criteria, which includes a BMI cutoff of <24 kg/m², increased the specificity for detecting sarcopenia while preserving high sensitivity among Thai community-dwelling older adults.

Keywords: evaluation, diagnostic accuracy, Asian Working Group for Sarcopenia 2019 criteria, "possible sarcopenia", Thai community-dwelling older adults

Background

Sarcopenia is an age-related progressive reduction in skeletal muscle mass and quality.[1,2] Sarcopenia is recognized as a major risk factor for falls, fragility fractures, physical disability, morbidity, poor quality of life, and mortality.[3] Early diagnosis of sarcopenia can help prevent its adverse consequences via rapid interventions to improve muscle mass and function. However, methods for diagnosing sarcopenia have evolved and continue to change due to variability in factors such as ethnicity, lifestyle, and regional health disparities.[2,4] In general, diagnosing sarcopenia typically involves evaluating appendicular skeletal muscle mass (ASM) using dual-energy X-ray absorptiometry (DXA) or bioelectrical impedance analysis (BIA).[1,4] However, these modalities are not widely available in community settings, which may influence suboptimal sarcopenia screening and may lead to delays in detecting and treating the condition.[1,5]

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To address this diagnostic resource limitation, the Asian Working Group for Sarcopenia (AWGS) 2019 guidelines introduced a simplified approach to detecting those at high risk for developing sarcopenia. These AWGS 2019 criteria are able to detect "possible sarcopenia" without the need for ASM evaluation.[1] This approach aims to facilitate screening in primary care settings that result in the early identification of patients who may require early interventions and further assessment of muscle mass. The "possible sarcopenia" criteria focus on easily measurable factors, such as grip strength and physical performance, that can be more easily measured in primary care and community settings.

Nevertheless, the diagnostic accuracy of the AWGS 2019 "possible sarcopenia" criteria needs to be assessed and validated in specific Asian populations before clinical implementation. This is necessary to ensure the effectiveness and reliability of the criteria across different Asian groups. However, studies and data that support the diagnostic accuracy of the AWGS 2019 criteria remain limited. In 2021, Ueshima et al reported excellent diagnostic accuracy of the "possible sarcopenia" criteria in Japanese geriatric patients who visited a frailty and locomotive syndrome clinic.[6] To date, no studies have been conducted in Thai community-dwelling older adult population to investigate the effectiveness of the AWGS 2019 "possible sarcopenia" criteria.

Accordingly, the primary aim of this study was to evaluate the diagnostic accuracy of the AWGS 2019 "possible sarcopenia" criteria for detecting sarcopenia in community-dwelling older adults in Thailand's primary care setting. Our secondary aim was to explore the use of adjunct variables, such as age, sex, body weight, height, or body mass index (BMI), to improve the diagnostic accuracy of the AWGS criteria for detecting sarcopenia in Thai population.

Materials and Methods

This study is a secondary analysis of an epidemiological study investigating the prevalence of osteoporosis, sarcopenia, and falls risk in Thai older adults from 2021 to 2022.[7] The original study was a nationwide cross-sectional survey that employed stratified multistage sampling, which ensured equal representation of the sample population from Thailand's six geographical regions. Thai older adults aged 60 years and above were eligible for inclusion. Individuals with major health issues that prevented them from completing the physical performance tests were excluded. Participant demographic and clinical information, including age, sex, body weight, height, body mass index (BMI), and comorbidities, were collected. Participant risk of having sarcopenia was evaluated using SARC-F (strength, assistance with walking, rising from a chair, climbing stairs, and falls), SARC-CalF (strength, assistance with walking, rising from a chair, climbing stairs, and calf circumference), and calf circumference by trained investigators. The protocols for this study were reviewed and approved by Siriraj Institutional Review Board and conducted following the ethical standards outlined in the 1964 Declaration of Helsinki. Written informed consent to participate in the original study was obtained from all enrolled study subjects.

The AWGS 2019 guideline recommends assessing muscle strength via maximum hand grip strength measurement. In this study, a Smedley-type digital handgrip dynamometer (TKK model 5401; Takei, Tokyo, Japan) was used. Participants were asked to perform a hand grip maneuver with maximal effort using their dominant hand in a standing position with full elbow extension. The test was performed twice on each hand, and the dominant hand was defined as the one with the highest grip strength. If a participant could only use one hand, the measurement from that hand was used for analysis.[1]

For physical performance evaluations, the AWGS 2019 guideline recommends the use of gait speed or a 5-time sit-to-stand test. To assess gait speed, participants were asked to walk on a flat surface covering a distance of six meters at the participant's normal pace and starting from a standing position without slowing down. The time needed to complete this walk was recorded in meters per second.[1] For the 5-time sit-to-stand test, participants were seated upright in an armless chair with their back supported by the backrest. They were then instructed to perform five repetitions of standing up straight as quickly as possible with their arms crossed and maintaining an upright trunk. The time each participant took to complete the test was recorded in seconds.[8]

The ASM was evaluated using a dual-frequency bioelectrical impedance analysis (DF-BIA) device (RD-545; Tanita Corporation, Tokyo, Japan). According to the AWGS 2019 guideline, multifrequency BIA (MF-BIA) devices are recommended for assessing lean muscle mass. However, DF-BIA devices are more widely available, practical, and easy to use. Furthermore, DF-BIA devices have demonstrated validated accuracy against DXA results in Thai population.[9] All participants underwent a standardized 4-hour fasting period before BIA measurements to minimize

the influence of hydration status. Additionally, all measurements were conducted within the same timeframe (08:00–-16:00) to ensure consistency.

The Definition of "Possible Sarcopenia"

The AWGS 2019 guideline suggests identifying "possible sarcopenia" patients without requiring ASM evaluation to expedite preventive interventions.[1] The process begins with case finding via simple questionnaires and physical examinations, including the SARC-F, the SARC-CalF, and calf circumference measurements. The AWGS 2019 guideline recommends that patients with a small calf circumference (male <34 cm, female <33 cm), a SARC-F score ≥4, or a SARC-CalF score ≥11 should undergo further evaluation for muscle strength and performance. "Possible sarcopenia" is diagnosed in patients who exhibit poor muscle strength (male <28 kg, female <18 kg) or poor physical performance, determined by either 5-time sit-to-stand test results (≥12 seconds) or slow gait speed (<1 m/s).

The Definition of Sarcopenia

According to the AWGS 2019 guideline, diagnosing sarcopenia requires confirming low muscle mass in addition to meeting the criteria for "possible sarcopenia". Using a BIA device, low muscle mass is defined as ASM/height^2 below 7.0 kg/m^2 for men and below 5.7 kg/m^2 for women. AWGS 2019 defines sarcopenia as low muscle mass accompanied by decreased muscle strength or impaired physical performance.

Statistical Analysis

All statistical analyses were conducted using Stata Statistical Software, release 16 (StataCorp LLC, College Station, TX, USA). A p-value of less than 0.05 was considered to be statistically significant. Data distribution was assessed using the Shapiro–Wilk test. All continuous data were found to be normally distributed and are presented as mean ± standard deviation (SD). Categorical data are given as numbers and percentages. We assessed the diagnostic accuracy of the AWGS 2019 "possible sarcopenia" criteria by calculating their sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) using the AWGS 2019 sarcopenia criteria as the gold standard reference.

To explore the potential for improving the accuracy of the AWGS 2019 "possible sarcopenia" screening criteria, we developed modified criteria that incorporated adjunct continuous variables that included age, sex, body weight, height, or BMI. These variables were selected based on a literature review, prioritizing simplicity and availability in primary care settings.[10] We evaluated these modified criteria by assessing the area under the receiver operating characteristic curve (AUC), and the AUC values were compared using the method published by DeLong et al in 1988.[11] The "possible sarcopenia" criteria and adjunct variable combination that produced the highest AUC value was selected as the most effective modification. For practical screening purposes, we then evaluated the identified optimal adjunct variable (ie, BMI) in receiver operating characteristic (ROC) curve analysis to determine the optimal cutoff value. This value was then selected to maximize sensitivity while maintaining high specificity for detecting "possible sarcopenia".

Results

Among the 2,991 patients enrolled in the original study, 535 did not have ASM evaluations. The remaining 2,456 patients were included in the final analysis of the present study. The demographic and anthropometric characteristics of all patients and compared between those with and without sarcopenia are shown in Table 1. We observed that individuals with sarcopenia were significantly older, had lower body weight, greater height, and lower BMI, and that the prevalence was higher in males. Therefore, these five variables were considered to be adjunct factors that, when individually combined with the AWGS 2019 "possible sarcopenia" criteria, would help to develop modified AWGS 2019 criteria for detecting sarcopenia. Moreover, we found no significant difference in SARC-F scores between patients with and without sarcopenia. Interestingly, there were significant differences in gait speed between sarcopenia and non-sarcopenia groups, while no statistically significant difference in the five-times sit-to-stand (5TSTS) test was observed between the 2 groups.

Table 2 shows the diagnostic properties of the AWGS 2019 "possible sarcopenia" criteria. The case-finding process, which utilizes SARC-F, SARC-CalF, and calf circumference, demonstrated a sensitivity of 94.6%, but a specificity of only 50.6%. Incorporating muscle strength and performance assessments increased the specificity by approximately 4%.

Table 1 Demographic and Anthropometric Characteristics of All Patients and Compared Between Those with and without Sarcopenia

Characteristics	Total (N = 2456)	Sarcopenia (n = 445, 18.1%)	Non-Sarcopenia (n = 2,011, 81.9%)	*p*-value
Age (year), (mean ± SD)	69.0 ± 6.1	71.3 ± 7.0	68.5 ± 5.8	<0.001
Female, n (%)	1562 (63.6%)	208 (46.7%)	1,354 (67.3%)	<0.001
Weight (kg), (mean ± SD)	59.0 ± 11.6	48.9 ± 8.6	61.2 ± 11.0	<0.001
Height (cm), (mean ± SD)	156.1 ± 8.1	157.8 ± 8.1	155.7 ± 8.1	<0.001
Body mass index (kg/m^2), (mean ± SD)	24.2 ± 4.3	19.6 ± 2.8	25.2 ± 3.9	<0.001
Body mass index category, n (%)				<0.001
Underweight (<18.5 kg/m^2)	197 (8.0%)	160 (36.0%)	37 (1.8%)	
Normal weight (18.5–24.9 kg/m^2)	1,279 (52.1%)	270 (60.7%)	1,009 (50.2%)	
Overweight (25.0–29.9 kg/m^2)	744 (30.3%)	13 (2.9%)	731 (36.4%)	
Obesity (≥30 kg/m^2)	236 (9.6%)	2 (0.5%)	234 (11.6%)	
Calf circumference (cm)	33.6 ± 4.3	30.5 ± 6.9	34.3 ± 3.1	<0.001
Low leg calf circumference, n (%)	1203 (49.0%)	411 (92.4%)	792 (39.4%)	<0.001
SARC-F	1.7 ± 2.0	1.7 ± 2.2	1.7 ± 2.0	0.677
SARC-F>4	446 (18.2%)	94 (21.1%)	352 (17.5%)	0.077
SARC-Calf	6.6 ± 3.3	10.9 ± 3.3	5.6 ± 5.3	<0.001
SARC-Calf>11	690 (28.1%)	235 (52.8%)	455 (22.7%)	<0.001
ASM/$height^2$ (kg/m^2)	7.1 ± 1.2	5.8 ± 0.7	7.3 ± 1.1	<0.001
Low ASM/ $height^2$ (Male<7 kg/m^2, Female<5.7 kg/m^2), n (%)	464 (18.9%)	445 (100.0%)	19 (0.9%)	<0.001
Hand-grip strength (kg)	21.9 ± 7.0	20.3 ± 6.6	22.2 ± 7.0	<0.001
Low hand-grip strength (Male<28 kg, Female<18 kg), n (%)	1113 (45.3%)	314 (70.6%)	799 (39.7%)	<0.001
Gait speed (m/s)	1.2 ± 0.3	0.9 ± 0.2	1.0 ± 0.2	0.016
Low gait speed (<1.0 m/s), n (%)	1681 (68.4%)	334 (75.1%)	1347 (67.0%)	0.001
Five times sit-to-stand test	16.3 ± 4.8	16.7 ± 5.1	16.2 ± 4.7	0.057
Slow Five times sit-to-stand test (≥12 s), n (%)	2100 (85.5%)	395 (88.8%)	1705 (84.8%)	0.031

Abbreviations: SARC-F, Strength, assistance with walking, rising from a chair, climbing stairs, and falls questionnaire; SARC-CalF, SARC-F combined with calf circumference; ASM, Appendicular skeletal muscle mass.

In simple terms, the original "possible sarcopenia" correctly identified 94.6% of sarcopenic patients (high sensitivity). However, 46% (925 cases) of non-sarcopenic patients were falsely classified as high risk (false positives). The AUC for the original "possible sarcopenia" was 0.74 (Figure 1).

We then explored how individually combining age, sex, body weight, height, or BMI with the AWGS 2019 "possible sarcopenia" criteria (to create modified "possible sarcopenia" criteria) would affect the diagnostic accuracy of the AWGS 2019 "possible sarcopenia" criteria. Including BMI influenced the most significant improvement in the AUC compared to

Table 2 The Sensitivity, Specificity, Positive Predictive Value (PPV), and Negative Predictive Value (NPV) of the AWGS 2019 "Possible Sarcopenia" Criteria for Detecting Sarcopenia

		Sarcopenia	Non-Sarcopenia	Sensitivity	Specificity	PPV	NPV
		445 (18.1%)	2011 (81.9%)				
Step 1: Case finding							
• Calf circumference (Male: <34 cm, Female: <33cm) or • SARC-F ≥4 or • SARC-CalF ≥11	Positive	421 (94.6%)	994 (49.4%)	94.6%	50.6%	29.8%	97.7%
	Negative	24 (5.4%)	1017 (50.6%)				
Step 2: Assessment							
• Handgrip strength (Male: <28 kg, Female: <18kg) or • 5-time chair stand test ≥12 s or • Gait speed <1.0 m/s	Positive	421 (94.6%)	925 (46.0%)	94.6%	54.0%	31.3%	97.8%
	Negative	24 (5.4%)	1086 (54.0%)				

Abbreviations: SARC-F, Strength, assistance with walking, rising from a chair, climbing stairs, and falls questionnaire; SARC-CalF: SARC-F combined with calf circumference.

weight, height, sex, age, and the original criteria (Figure 1 and Table 3). Accordingly, BMI was chosen to be included in our modified version of the AWGS 2019 "possible sarcopenia" criteria in the present study. We determined the optimal BMI cutoff for the modified "possible sarcopenia" criteria by assessing the sensitivity and specificity across various BMI values (Figure 2 and Table 4). Based on expert judgment, we aimed to identify a cutoff value that yields a high sensitivity of at least 80% while maximizing specificity to preserve the screening effectiveness of the original criteria. The

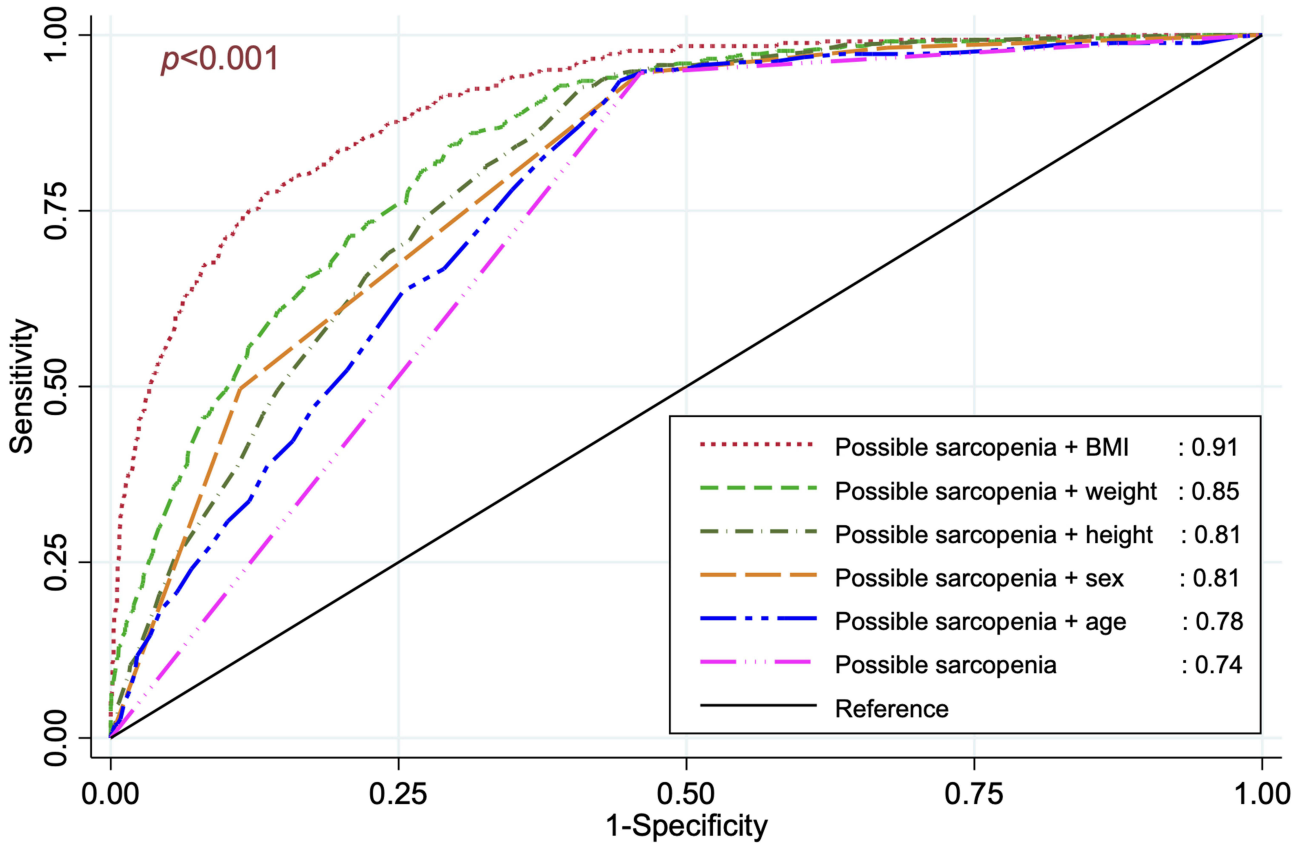

Figure 1 Area under the receiver operating characteristic curve (AUC) values for the Asian Working Group for Sarcopenia (AWGS) 2019 criteria for "possible sarcopenia" compared among "possible sarcopenia" alone and "possible sarcopenia" plus body mass index (BMI), weight, height, sex, or age.

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Table 3 Difference in Area Under the Receiver Operating Characteristic Curve (AUC) Between the Modified Criteria with BMI and Other Models

Model Comparison	Δ AUC (Change from the Reference Model)	95% CI	p-value
AWGS + BMI vs	**Reference**		
AWGS + weight	−0.060	−0.058 to −0.061	<0.001
AWGS + height	−0.095	−0.093 to −0.097	<0.001
AWGS + sex	−0.100	−0.098 to −0.101	<0.001
AWGS + age	−0.128	−0.127 to −0.131	<0.001
AWGS	−0.164	−0.163 to −0.166	<0.001

Abbreviations: AWGS, Asian Working Group for Sarcopenia 2019 "possible sarcopenia" definition; BMI, Body mass index.

diagnostic accuracy when using the modified "possible sarcopenia" criteria (the AWGS 2019 criteria plus BMI) and a BMI cutoff value of <24 kg/m^2 yielded a sensitivity of 89.9% and a specificity of 72.7%. With our modification, 89.9% of sarcopenic patients were correctly identified, while the misidentification of non-sarcopenic patients (false positives) was reduced by 18.6% (375 cases fewer false positive cases). Subgroup analysis showed that our modified criteria reduced false positive cases in males and females (Supplement Table 1) and in individuals with a normal BMI (BMI 18.5 to 24.9 kg/m2) (Supplement Table 2).

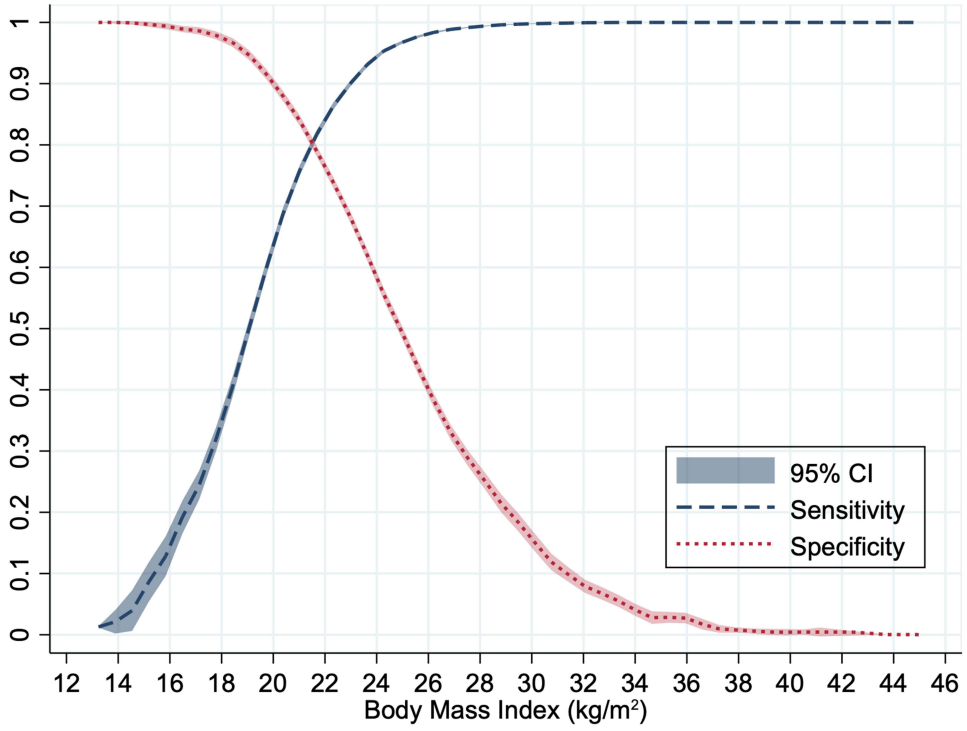

Figure 2 Sensitivity and specificity with 95% confidence intervals (CI) for the modified possible sarcopenia at different BMI cutoff values.

Table 4 The Sensitivity, Specificity, Positive Predictive Value (PPV), and Negative Predictive Value (NPV) of the Modified AWGS 2019 "Possible Sarcopenia" Criteria Include Body Mass Index (BMI) at Various Cutoff for Detecting Sarcopenia

		Sarcopenia	Non-Sarcopenia	Sensitivity	Specificity	PPV	NPV
BMI (kg/m^2)		**445 (18.1%)**	**2011 (81.9%)**				
<18	Positive	128 (28.8%)	15 (0.75%)	28.8%	99.3%	89.5%	86.3%
	Negative	317 (71.2%)	1996 (99.3%)				
<19	Positive	188 (42.3%)	44 (2.2%)	42.2%	97.8%	81.0%	88.4%
	Negative	257 (57.8%)	1967 (97.8%)				
<20	Positive	258 (58.0%)	108 (5.4%)	58.0%	94.6%	70.5%	91.1%
	Negative	187 (42.0%)	1903 (94.6%)				
<21	Positive	315 (70.8%)	195 (9.7%)	70.8%	90.3%	61.8%	93.3%
	Negative	130 (29.2%)	1816 (90.3%)				
<22	Positive	350 (78.7%)	304 (15.1%)	78.7%	84.9%	53.5%	94.7%
	Negative	95 (21.4%)	1701 (84.9%)				
<23	Positive	382 (85.8%)	456 (22.7%)	85.8%	77.3%	45.6%	96.1%
	Negative	63 (14.2%)	1555 (77.3%)				
<24	Positive	400 (89.9%)	550 (27.4%)	89.9%	72.7%	42.1%	97.0%
	Negative	45 (10.1%)	1461 (72.7%)				
<25	Positive	407 (91.5%)	646 (32.1%)	91.5%	67.9%	38.7%	97.3%
	Negative	38 (8.5%)	1365 (67.9%)				

Discussion

The results of this study showed that the AWGS 2019 "possible sarcopenia" criteria demonstrate excellent sensitivity with only 5.4% false negatives for detecting sarcopenia. However, its low specificity results in a high false positive rate of up to approximately 46%, which can lead to over-investigation that can overburden a limited resource setting. Our analysis demonstrates that combining BMI with the AWGS 2019 "possible sarcopenia" criteria to create modified AWGS 2019 "possible sarcopenia" criteria yielded an increased overall AUC and specificity while maintaining sensitivity, which emphasizes the practical advantages of this modification.

The term "possible sarcopenia" was introduced by the AWGS 2019 consensus guideline to identify patients at high risk for sarcopenia.[1] Our findings are consistent with previous studies showing that the SARC-F has limited effectiveness in identifying sarcopenia, as it primarily assesses functional limitations but does not account muscle mass.[12] Additionally, self-reported measures may lead to overestimation of mobility, leading to misclassification.[13] Therefore, the AWGS 2019 recommendation, along with several other studies, suggests using SARC-Calf, which incorporates calf circumference to enhance screening accuracy.[1,12] This early identification enables physicians to recommend interventions, such as lifestyle modification, diet, and exercise, as well as make referrals for diagnostic confirmation. Consistent with the study's results by Ueshima et al, our findings confirm that the "possible sarcopenia" criteria has excellent sensitivity for detecting sarcopenia.[6] However, the specificity observed in our study was significantly lower than that reported in their study – possibly due to differences between study populations. This suggests that although the AWGS 2019 consensus was designed to be more specific for Asian populations, it does not fully account for variations across different Asian

populations. Given the ongoing discussions on a global consensus definition (eg, by Global Leadership Initiative in Sarcopenia: GLIS),[14] our findings highlight the need for further investigation into regional differences in sarcopenia diagnosis and the potential refinement of consensus criteria. Nevertheless, our research focused on community-dwelling older adults, whereas their study focused on older adults who visited a frailty and locomotive syndrome clinic. Accordingly, we believe that the results of our study accurately reflect the performance of the AWGS 2019 "possible sarcopenia" criteria in our target population within a real-world primary care setting.

The original AWGS 2019 guideline advises early intervention for patients labeled as having "possible sarcopenia" and recommends further muscle mass evaluation using DXA or BIA.[1] However, these methods are often unavailable in primary care settings, especially in resource-limited countries.[5] Our findings suggest that the AWGS 2019 "possible sarcopenia" criteria may falsely identify approximately 46% of patients as high-risk, which may lead to the unnecessary utilization of resources. Therefore, enhancing the robustness of the criteria's specificity value is needed to reduce the false positive rate, which will improve the efficient use of available resources. Our results also revealed that combining BMI (cutoff <24 kg/m^2) with the AWGS 2019 "possible sarcopenia" criteria significantly reduces the false positive rate by 18% when compared to the original criteria while, at the same time, maintaining high sensitivity. Using this proposed modified version of the AWGS 2019 criteria will improve screening accuracy and minimize the risk of overtreatment without compromising the screening performance of the original criteria.

Our findings emphasize a strong relationship between BMI and sarcopenia diagnosis. Similarly, previous studies demonstrate that low BMI is associated with reduced muscle mass, strength, and performance, which are key indicators of sarcopenia.[15–17] Furthermore, BMI measurement is easy and practical, which makes it suitable for sarcopenia screening. The Foundation for the National Institutes of Health (FNIH) recommends using the ratio of appendicular lean muscle mass (ALM) to BMI for sarcopenia screening in older adults from Western countries.[18] Thus, incorporating BMI into the modified "possible sarcopenia" criteria enhances screening accuracy while maintaining the simplicity of the evaluation process.

This study has several strengths. First, by including a relatively large sample of community-dwelling older adults from a nationwide study, we aimed for a representative sample from all six regions of Thailand. Second, this is the first study to evaluate the screening performance of the AWGS 2019 "possible sarcopenia" criteria among Thai community-dwelling older adults in a primary care setting. Third, the modified AWGS 2019 "possible sarcopenia" criteria proposed in this study will enhance sarcopenia screening accuracy among Thai older adult population.

There are also some limitations that need to be addressed. First, the original study included only healthy community-dwelling older adults. Accordingly, the results of the present study may not be generalizable to hospitalized or non-ambulatory individuals.[7] Moreover, although the original study used stratified sampling to improve representation from all six regions of Thailand, this method still had limitations and might not fully represent the entire population. Second, this study utilized BIA to assess skeletal lean muscle mass, which is not considered the gold standard. Nevertheless, DF-BIA has demonstrated sufficient accuracy and has been validated for assessing muscle mass compared to DXA scans.[9] Third, while the present study used the 5-times-sit-to-stand test as a measure of physical performance in accordance with the AWGS 2019 criteria, several studies have regarded this test as a measure of lower limb strength.[4] This might explain why the five-times sit-to-stand test results did not differ between sarcopenic and non-sarcopenic individuals in our study. Therefore, the definition of sarcopenia based on the AWGS 2019 criteria may require reconsideration in light of these updated findings. Fourth, the average BMI in our study was relatively low, with less than 10% of participants classified as obese and only 2 individuals diagnosed with both obesity and sarcopenia, which is known as sarcopenic obesity. Subgroup analyses showed that while our modified criteria significantly improve overall specificity, they may miss some sarcopenia cases in the overweight and obese groups, which are uncommon in our population. Consequently, our findings may not fully elucidate the relationship between obesity and sarcopenia. Further research is needed to establish appropriate screening criteria for this specific group, incorporating additional factors such as fat mass.

Conclusions and Implications

The AWGS 2019 "possible sarcopenia" criteria demonstrated excellent sensitivity for detecting sarcopenia. However, it was found to lack sufficient specificity, which resulted in a high false positive rate. The modified AWGS "possible

sarcopenia" criteria, which includes a BMI cutoff of <24 kg/m², increased the specificity for detecting sarcopenia while preserving high sensitivity among Thai community-dwelling older adults. Nevertheless, this modification has limitations in obese patients and may require further research to develop more accurate criteria for this specific group.

Disclosure

All authors declare no personal or professional conflicts of interest relating to any aspect of this study.

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