



Original Article

The Asian working group for sarcopenia's new criteria updated in 2019 causing a change in sarcopenia prevalence in Japanese older adults requiring long-term care/support

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Abstract. [Purpose] The Asian Working Group for Sarcopenia (AWGS) criteria were recently updated. However, whether these changes would result in a difference in sarcopenia prevalence was unclear. We therefore focused on Japanese older adults who required long-term care/support and determined the differences in sarcopenia prevalence between the new and old criteria. [Participants and Methods] This cross-sectional study included 161 Japanese older adults aged ≥ 65 years who required long-term care/support along with ongoing daycare. Handgrip strength, usual gait speed, and skeletal muscle mass index were measured. We analyzed the difference in sarcopenia prevalence between the 2019 and 2014 AWGS criteria using the McNemar test. [Results] The overall sarcopenia prevalence rates were 60.2% and 53.4%, and the prevalence rates of sex-specific sarcopenia were 63.6% and 55.7% among males and 56.2% and 50.7% among females when the 2019 and 2014 AWGS criteria were used, respectively. Overall, males exhibited a significantly higher prevalence with the new than criteria than with the old. [Conclusion] With the 2019 AWGS criteria, more older males who required long-term care/support were diagnosed as having sarcopenia. Conversely, the sarcopenia diagnosis in females statistically remained unchanged. Thus, a mismatch might exist between the two criteria regarding sarcopenia prevalence in males.

Key words: Asian Working Group for Sarcopenia, Sarcopenia prevalence, Japanese older adults requiring long-term care

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INTRODUCTION

Due to population aging worldwide, there has been a growth in research into sarcopenia, and several groups have proposed their definitions. Representative examples for sarcopenia include the European Working Group on Sarcopenia in Older People (EWGSOP) 2010, the Asian Working Group for Sarcopenia (AWGS) 2014, and the EWGOSP2 in 2018¹⁻³). More recently,

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AWGS 2019 was announced, with introduction of major changes to AWGS 2014⁴). The reference values were changed for handgrip strength in males and gait speed in males and females from 26 to 28 kg and 0.8 to 1.0 m/s, respectively⁴). Therefore, we hypothesized that these changes would increase the number of people meeting the criteria for sarcopenia. The impact of changes between the EWGSOP and EWGSOP2 criteria has been reported but that between the AWGS 2019 and AWGS 2014 criteria remains unpublished^{5, 6}).

In a systematic review and meta-analysis of the AWGS 2014 criteria, a previous study showed that the pooled prevalence of sarcopenia for Japanese community-dwelling older adults was 9.9% overall, 9.8% among males, and 10.1% among females⁷). However, these older adults who were included to achieve that figure were generally healthy and were living in a community. In the other words, those who required long-term care, or had Alzheimer's disease, diabetes mellitus, spinal disease, or other diseases were excluded. In research on Japanese older nursing home residents with certification of requiring long-term care, the prevalence of sarcopenia was 45.2%⁸). Moreover, we hypothesized that the changes in criteria might further affect older adults requiring long-term care/support with high sarcopenia prevalence and low muscle strength and physical performance.

This study primarily examined the differences in sarcopenia prevalence between the AWGS 2019 and 2014 criteria for Japanese older adults requiring long-term care/support. It is important to understanding the substantial mismatch of prevalence for sarcopenia treatment.

In the view of Japanese medical health care policy, older people are often divided into two groups: those aged 65–74 (young–old adults), and aged ≥ 75 years (old–old adults)^{9, 10}). Our second objective was to clarify the difference in sarcopenia prevalence between these two age groups according to the Japanese medical insurance system. We hypothesized that older adults aged ≥ 75 years requiring long-term care/support might have a higher sarcopenia prevalence than those aged between 65 and 74 years.

PARTICIPANTS AND METHODS

We conducted this cross-sectional study from March 2018 to August 2019. We recruited participants by making announcements at a day care center. The inclusion criteria were as follows: individuals who availing day care via the long-term care insurance system and those who agreed to participate in the study. A total of 201 individuals were approached, 3 refused, and the rest consented to the study. The participants included 198 older adults aged ≥ 65 years all who were certified as requiring long-term care/support. They were community-dwelling individuals receiving daycare via the long-term care insurance system at least once a week. The exclusion criteria were as follows: those in whom it was difficult to measure body composition in a standing position, those with cardiac pacemakers, those who had difficulty understanding instructions (e.g., due to severe dementia), and those for whom measurement data were missing. In other words, a certain number of participants was excluded. Physical therapists measured the handgrip strength, gait speed, and muscle mass. All measurements were performed before the exercise therapy in the day care and at least 1 h after eating. Each participant or the family member responsible for their care signed a written consent form. The study complied with the declaration of Helsinki and was approved by the Ethics Review Committee (approval number: 17-10-189-7).

Handgrip strength was measured using a Smedley-type digital grip dynamometer (Grip D, T.K.K.5401, Takei Scientific Instrument, Japan). Participants gripped the dynamometer with maximum effort while seated. The measurement was performed twice each side, and the maximum value on the left and right was used as the representative value¹¹). Gait speed was measured as the usual walking speed over 5 m of an 11 m walking path (between points marked at 3 m and 8 m). Consistent with relevant guidelines, only one measurement was performed¹¹). Participants used their usual walking aids. Muscle mass and body weight were measured by multifrequency bioelectrical impedance analysis (BIA) using a body composition analyzer (InBody 520, InBody, Japan). All participants were required to stand during measurement. The skeletal muscle mass index (SMI) was then calculated by dividing the appendicular skeletal muscle mass by the square of the participant's height. We measured height according to recommended practice¹²). Sarcopenia was assessed based on the criteria of the AWGS 2019 algorithm. Participants who met the criteria of both low handgrip strength and/or low gait speed and low muscle mass were considered to have sarcopenia⁴). Sarcopenia was also assessed using AWGS 2014 for comparison²). The long-term care insurance system classified levels one and two as the lowest levels of support, and followed these with five additional levels of care (levels 1–5)¹³). For the current study, we converted this system to a seven-step ordinal scale from support level one to care level 5.

The clinical characteristics and measurement data of males and females were compared by unpaired *t* tests. Certification levels in the insurance system for long-term care were compared by Mann-Whitney *U* tests. Main diagnosis was compared by the Fisher exact test. Regarding the comparison of the number of cases of sarcopenia and those with handgrip strength and usual gait speed measurements below the reference values between AWGS 2019 and AWGS 2014, we performed McNemar tests to compare the overall and sex. We also divided the participants by age into those aged 65–74 years and those aged ≥ 75 years and compared the prevalence for the AWGS 2019 criteria using the χ^2 test in terms of both overall and sex. All statistical analyses were carried out using IBM SPSS version 25 (IBM Japan, Tokyo, Japan), with $p < 0.05$ considered statistically significant.

RESULTS

In total, 198 candidates were identified. After applying the exclusion criteria, 161 older adults were included (88 males, 73 females). Among those excluded, 29 were because we could not measure body composition in a standing position. Single cases were also excluded for the following reasons: extreme leg length differences, inability to perform body composition analysis due to rheumatic deformation of the hand, lower leg amputation, cardiac pacemaker, and difficulty understanding instructions due to cognitive symptoms. Finally, there were missing data in three cases. Table 1 showed the clinical characteristics and measurements of the study participants. Table 2 showed the prevalence of sarcopenia based on the AWGS 2019 and AWGS 2014 criteria. McNemar test revealed that the difference in prevalence between the AWGS 2019 and AWGS 2014 criteria was only significantly different in the overall and male groups. Table 3 indicated the study participants with handgrip strength and usual gait speed measurements below the reference values. Regarding handgrip strength and gait

Table 1. Clinical characteristics and measurements of the study participants

	Overall (n=161)	Males (n=88)	Females (n=73)	p-value
Age (years)	78.6 ± 7.9	77.0 ± 7.6	80.6 ± 7.8	0.003*
Height (cm)	157.7 ± 7.7	162.7 ± 5.5	151.7 ± 5.1	<0.001*
Body weight (kg)	55.0 ± 10.1	59.8 ± 7.8	49.2 ± 9.6	<0.001*
BMI (kg/m ²)	22.1 ± 3.4	22.7 ± 2.9	21.4 ± 3.9	0.025*
Handgrip strength (kg)	21.3 ± 7.4	25.2 ± 6.8	16.5 ± 4.8	<0.001*
Gait speed (m/s)	0.7 ± 0.3	0.7 ± 0.3	0.6 ± 0.3	0.048*
SMI (kg/m ²)	6.1 ± 0.9	6.5 ± 0.8	5.6 ± 0.7	<0.001*
Certification level (1–7)	2.9 ± 1.4	2.9 ± 1.4	2.9 ± 1.4	0.839
Main diagnosis (number)				
Cerebrovascular disease	51	35	16	0.018**
Intractable neural diseases	20	14	6	0.158
Fracture	18	1	17	<0.001**
Spine disease	17	10	7	0.800
Cancer	13	10	3	0.145
Osteoarthritis	13	4	9	0.086
Dementia diseases	10	3	7	0.187
Circulatory disease	7	4	3	1.000
Renal failure	3	2	1	1.000
Respiratory disease	3	2	1	1.000
Depression	2	2	0	0.501
Diabetes mellitus	2	0	2	0.204
Liver disease	1	1	0	1.000
Skin disease	1	0	1	0.453

Values are presented as mean ± standard deviation.

* Unpaired t-test of males versus females, p<0.05. ** Fisher's exact test of males versus females, p<0.05.

BMI: body mass index; SMI: skeletal muscle mass index.

Table 2. Prevalence of sarcopenia in Japanese older adults requiring long-term care/support

	AWGS 2019 Sarcopenia	AWGS 2014 Sarcopenia	Difference	p-value
Overall (n=161)	97 (60.2%)	86 (53.4%)	6.8%	0.001*
Males (n=88)	56 (63.6%)	49 (55.7%)	7.9%	0.016*
Females (n=73)	41 (56.2%)	37 (50.7%)	5.5%	0.125

* McNemar test for AWGS 2019 criteria versus AWGS 2014 criteria, p<0.05.

Difference indicates the difference in prevalence calculated using the AWGS 2014 criteria subtracted by that calculated using the AWGS 2019 criteria.

AWGS: Asian Working Group for Sarcopenia.

Table 3. Number of study participants with handgrip strength and usual gait speed values below reference values

	AWGS 2019	AWGS 2014	Difference	p-value
Handgrip strength				
Overall (n=161)	101 (62.7%)	90 (55.9%)	6.8%	0.001*
Males (n=88)	54 (61.4%)	43 (48.9%)	17.5%	0.001*
Females (n=73)	47 (64.4%)	47 (64.4%)		
Usual gait speed				
Overall (n=161)	135 (83.9%)	104 (64.6%)	19.3%	<0.001*
Males (n=88)	73 (83.0%)	52 (59.1%)	23.9%	<0.001*
Females (n=73)	62 (84.9%)	52 (71.2%)	13.7%	0.002*

* McNemar test for AWGS 2019 criteria versus AWGS 2014 criteria, $p < 0.05$.

Difference indicates the difference in prevalence calculated using the AWGS 2014 criteria subtracted by that calculated using the AWGS 2019 criteria. No change in reference value of handgrip strength in female.

AWGS: Asian Working Group for Sarcopenia.

Table 4. Prevalence of sarcopenia in Japanese older adults requiring long-term care/support by age

	Young-old adults (65–74 years)	Old-old adults (≥75 years)	p-value
Overall (n=161)	33/56 (58.9%)	64/105 (61.0%)	0.803
Males (n=88)	23/40 (57.5%)	33/48 (68.8%)	0.275
Females (n=73)	10/16 (62.5%)	31/57 (54.4%)	0.563

P-value was calculated using χ^2 test. AWGS 2019 criteria were used.

AWGS: Asian Working Group for Sarcopenia.

speed, McNemar test revealed significant differences between the AWGS 2019 and AWGS 2014 criteria except for the unchanged handgrip strength in female groups. Table 4 showed that there was no significant difference in the prevalence of sarcopenia between the young-old and old-old adults either overall or by gender. The measurement data of male in the non-sarcopenia and sarcopenia groups were 29.4 ± 6.3 kg, 0.8 ± 0.3 m/s, and 7.3 ± 0.6 kg/m² and 23.2 ± 6.6 kg, 0.7 ± 0.3 m/s, and 6.1 ± 0.6 kg/m² for handgrip strength, usual gait speed, and SMI, respectively. The measurement data of females in the non-sarcopenia and sarcopenia groups were 18.5 ± 4.6 kg, 0.7 ± 0.4 m/s, and 6.2 ± 0.5 kg/m² and 15.0 ± 4.4 kg, 0.6 ± 0.3 m/s, and 5.1 ± 0.5 kg/m² for handgrip strength, usual gait speed, and SMI, respectively.

DISCUSSION

In a previous study on older nursing home Japanese residents requiring long-term care, muscle mass was predicted using a formula based on height, weight, and optical density⁸). All guidelines for sarcopenia diagnosis recommend the use of dual-energy X-ray absorptiometry or BIA to measure muscle mass¹⁻⁴). The use of BIA, which is a more accurate method, to measure muscle mass for a similar older adult group is an advantage of our study. They often find it difficult to maintain a standing position in BIA measurement. Therefore, few reports on sarcopenia have focused on older adults requiring long-term care. The study results suggested that the sarcopenia prevalence in older adults requiring long-term care/support and utilizing day care was extremely high reaching 60.2%. Internationally, Japan has the highest proportion of older adults of the total population, and one in every five to six older adults require long-term care/support^{7, 8}). Therefore, sarcopenia prevention and treatment might be the focus of care for older adults requiring long-term care/support.

We anticipated that there would be an increase in the prevalence of sarcopenia after the introduction of the AWGS 2019 criteria because of the change in reference values for handgrip strength in males and gait speed overall. In this study, the overall prevalence increased by 6.8%, with a 7.9% increase in prevalence for males and 5.5% for females between the AWGS 2019 and 2014 criteria, supporting our hypothesis. We consider that the prevalence in males probably increased significantly due to the larger change in the two reference values for handgrip strength and gait speed. By contrast, the prevalence did not increase significantly in females because only gait speed had changed. Gender-based differences were found as a result of applying the new AWGS 2019 criteria. Hence, a mismatch in sarcopenia prevalence might exist among older male adults requiring long-term care/support. Although the number of people with handgrip strength and usual gait speed values below reference values increased significantly, the prevalence of sarcopenia possibly influenced the requirement that non-updated SMI must be below the reference value. Our study included community-dwelling older adults certified as requiring long-term care or support. For example, in previous research among healthy older males, the average handgrip strength and usual gait

speed were 34.3 ± 6.7 kg and 1.47 ± 0.29 m/s, respectively¹⁴). Handgrip strength and gait speed among older adults requiring long-term care/support were below the reference values for sarcopenia; but regarding healthy older adults, these values were clearly higher than the reference values for sarcopenia. Thus, the AWGS 2019 criteria are associated with an increased prevalence of sarcopenia in older groups with low muscle mass and low physical performance. Sarcopenia components were associated with mortality, care prevention and economic health policy^{6, 15, 16}). Considering the reported impact between the new and old criteria in Europe, understanding the differences between the new and old criteria in Asia can be beneficial for sarcopenia treatment^{5, 6}).

We also found that the prevalence of sarcopenia did not differ significantly between the young-old and old-old adults requiring long-term care/support. However, Yamada et al. reported that the prevalence of sarcopenia in males and females without certification by long-term care insurance service increased by age group¹⁷). They reported prevalence rates of 2.6%, 5.3%, 23.3%, 43.9%, and 75.0% in males aged 65–69, 70–74, 75–79, 80–84, and 85–89 years, respectively; the corresponding rates in females were 11.5%, 11.8%, 27.1%, 35.6%, and 54.3%, respectively. Therefore, we identified two features about age for Japanese older adults requiring long-term care/support as follows: there were no differences in the sarcopenia prevalence between the two age groups and the young-old adults had greater levels of sarcopenia than their healthy peers of the same age. Because the etiology of sarcopenia is multifactorial, it may not be possible to characterize each condition individually.

There were some limitations to the present study. First, we could not measure body composition in 29 older adults because they had difficulty standing; considering that they were at risk of sarcopenia, it is likely that the true prevalence was higher than 60.2%. However, the guidelines recommend BIA for muscle mass measurement; thus, we need to exclude them^{1–4}). The eligible participants in our study were older adults requiring long-term care/support and could undergo muscle mass measurement in “the standing position”. Second, this study began before SARC-F was recommended in the EWGSOP2, for which no case finding has been verified. Therefore, further studies are warranted to assess SARC-F, SARC-Calf, and calf circumference. Third, we focused on older adults who availed day care via the long-term care insurance system. In other words, our study targeted a population that has a potential for bias such as primary disease, physical function, and care levels. It should be noted that this was a single-center study and that further multi-center studies and classification of the disease are needed to confirm our findings and reduce the bias.

In conclusion, this study revealed two aspects of the AWGS 2019 criteria for Japanese older adults requiring long-term care/support. First, higher numbers of older male adults were diagnosed with sarcopenia through the AWGS 2019 criteria compared with the old criteria. Conversely, sarcopenia diagnoses in females statistically remained unchanged. Hence, a mismatch might exist in sarcopenia prevalence in males between the AWGS 2019 and 2014 criteria. Second, those who aged 65–74 years requiring long-term care/support had a higher sarcopenia prevalence than their healthy peers of the same age.

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Conflict of interest

The authors declare no conflict of interest.

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