International Population Conference 2021 - Extended Abstract (C-87)

Levels and Patterns of Sarcopenia among Older Filipinos

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ABSTRACT

This study aims to provide the first country estimate on the prevalence of sarcopenia, a geriatric syndrome that has recently gained momentum among scholars in Asia. The study aims to describe the levels and patterns of sarcopenia by age and sex among older people (OPs) in the Philippines using the Longitudinal Study of Ageing and Health in the Philippines (LSAHP) baseline data and the cutoffs set by the 2019 Asian Working Group for Sarcopenia. We measured sarcopenia based on (1) the appendicular skeletal muscle mass index (ASMI) and the levels of physical performance and (2) ASMI and handgrip or muscle strength. Results from these two measures yielded similar patterns in sex and age differentials – sarcopenia and severe sarcopenia are significantly more prevalent among males and those in the oldest age cohort (80+).

Keyword: Sarcopenia, aging, health, Philippines

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Background

The Asian Working Group for Sarcopenia (AWGS) defined 'Sarcopenia' as the "age-related loss of skeletal muscle mass plus loss of muscle strength and/or reduced physical performance without reference to comorbidity" (Chen et al., 2020). Since October 1, 2016, the International Classification of Disease, tenth revision, clinical modification defines sarcopenia as a disease (Cao & Morley, 2016). Sarcopenia is a major clinical problem that mostly affects older people with adverse outcomes, including poor quality of life (Rizzoli et al., 2013), increases in falls, fractures, disabilities (Lauretani et al., 2003), institutionalization, and increased mortality risks (Rantanen, 2003; Shafiee et al., 2017). In this context, the study of sarcopenia gained particular importance amid a rapidly aging global population.

In the Philippines, knowledge on this geriatric syndrome and the extent to which it affects older people in the country is limited (Chua & Tee, 2020; Gabat et al., 2018; Ramos Jr., 2015; Tee et al., 2016). This study pioneers estimating the prevalence of sarcopenia among older Filipinos ages 60 years and the extent to which this condition varies by age and sex. The study population is representative of the older adults in the Philippines and is not limited to those in the clinical setting. Findings will also address the current knowledge gaps on the health conditions of our older Filipinos and contribute to the formulation of evidence-based interventions for the promotion of their health and well-being.

Data and Methodology

This study employs the baseline data of the Longitudinal Study of Ageing and Health in the Philippines (LSAHP), the first nationally representative panel study on aging in the country. The Demographic Research and Development Foundation, Inc. in partnership with the Economic Research Institute for ASEAN and East Asia conducted the LSAHP. The survey used a multi-stage sampling design with provinces as the primary sampling units (PSUs), barangays (villages) as the secondary sampling units (SSUs), and OPs as the ultimate sampling units. It covered 11 provinces, 167 barangays, and 5,985 individual respondents aged 60 years old and over. To ensure enough number of respondents in the succeeding rounds of the survey, the number of respondents in the age groups 70-79 and 80 and over were oversampled by a factor of 2 and 3, respectively. Sampling weights are applied to the data used in the analysis to nationally represent the older population in the Philippines. A more detailed discussion of the survey methodology can be found elsewhere (Cruz, Cruz, and Saito, 2019). We examined two methodologies in measuring sarcopenia provided by the AWGS 2019 definition. Both measures distinguish between 'with sarcopenia' and 'with severe sarcopenia' as defined in Table 1 below.

Table 1. Measures of sarcopenia and severe sarcopenia

	With Sarcopenia	With Severe Sarcopenia
Measure 1	Low Appendicular Skeletal Muscle Mass (ASM) Low Physical Performance or Gait Speed (PP)	Low Appendicular Skeletal Muscle Mass (ASM) Low Physical Performance or Gait Speed (PP) Low Hand Grip or Muscle Strength (GS)
Measure 2	Low Appendicular Skeletal Muscle Mass (ASM) Low Hand Grip or Muscle Strength (GS)	

Source: 2019 Asian Working Group on Sarcopenia

The study used the cutoff scores of sarcopenia based on the 2019 consensus update on sarcopenia diagnosis and treatment of AWGS (Chen et al., 2020). As provided in the operational definition three components were used in the definition of sarcopenia: Appendicular Skeletal Muscle Mass (ASM), Physical Performance or Gait Speed (PP), and Hand Grip or Muscle Strength (GS). These three components were collected in the Anthropometric Questionnaire of the LSAHP.

Appendicular skeletal muscle mass index (ASMI)

Bioelectrical Impedance Analysis (BIA) is the most commonly used modality in Asia in estimating skeletal muscle mass (Chen et al., 2020). In the LSAHP, the Tanita Segmental Body Composition Monitor (Model: BC-545N) was utilized for the collection of the segmental muscle mass data of older person respondents (OPR). For the study, the appendicular skeletal muscle mass index (ASMI) was computed as the sum of lean muscle mass from all four limbs divided by the height in meter square (Buckinx et al., 2018; Chen et al., 2014). Cutoff scores for low muscle mass are characterized as ASMI <7.0kg/m^2 in males and <5.7 kg/m^2 for females.

Handgrip or muscle mass strength (GS)

In the LSAHP, handgrip or muscle mass strength was collected using a Smedley spring-type dynamometer (Hand Grip Meter, No. 6103-BL (75 kg); TANITA, Tokyo, Japan). Muscle mass strength was computed following the measurement protocol recommended by 2019 AWGS of taking the maximum reading of the 3 trials "using either both hands or the dominant hand in a maximum-effort isometric contraction, rather than using a fixed acquisition time." Recommend cutoff scores of GS for males is <28kg. and <18kg. for females.

Physical Performance (PP) or Gait Speed

The LSAHP study collected gait speed by measuring the duration (in seconds) it takes for the OPR to walk for 5 meters (2.5 meters forward and back). This method was employed to make the study results comparable with the Health and Retirement Study in the United States and its sister surveys (*HRS*, n.d.). This differs from the methodology recommended by the 2019 AWGS which measures the time it takes the OPR to walk 6 meters straight (Chen et al., 2014; Chen et al., 2020).

To reconcile the difference in measure, we derived a correction factor based on the absolute mean difference in the duration between walking forward and back versus walking in a straight distance. This was taken from a sub-study conducted using a non-random sample of 801 OP covering respondents who were not part of the original sample. The study sample was taken from all over the country (Luzon, Visayas, and Mindanao), with representation from both sexes, age groups, and health status groups. The sub-study asked OP respondents to walk for 5 meters straight and 2.5 meters forward and back. It was expected that it would take a longer time to cover the 5-meter distance if the OP must make a U-turn after walking 2.5 meters since they are anticipated to slow down after reaching the 2.5-meter mark to walk back for another 2.5 meters. Further, we separately divided the two LSAHP gait speed variables by 5 meters and then multiplied them by 6 meters to be consistent with the 6-meter 2019 AWGS recommended gait speed, assuming that the speed it took for OPs to walk the 6-meter walk was constant.

Using the data collected from the sub-study, we computed the average gait speed. The absolute mean differences in the duration between walking forward and back versus walking in a straight distance of 6 meters, respectively, was used as a correction factor to adjust the gait speed data in the LSAHP. Results from the sub-study show that on average, it takes 2.8 seconds longer or 24.2% longer for OPs to walk a 6-meter distance (3 meters forward and back) relative to the straight 6-meter walk.

The final gait speed measure used in the present study was computed by adjusting the 5-meters-and-back data to 6-meter straight gait speed from the LSAHP and then consequently adjusted again using the 6-meter correction factor derived from the sub-study.

Table 2 summarizes the cutoff score for the components of sarcopenia indicators as recommended by the 2019 Asian Working Group for Sarcopenia.

Table 2. Input data and cutoff scores of sarcopenia indicators

Measures	Cutoff scores	
	Males	Females
Hand grip or muscle mass strength (kg.)	<28	<18
Appendicular skeletal muscle mass index (kg/m^2)	<7	<5.7
Physical performance or gait speed (m/s)	<0.8	<0.8

Source: 2019 Asia Working Group on Sarcopenia

We limit our analysis to OP respondents without proxy interviews as anthropometric measurements were not obtained through the proxy. Of the 5,454 respondents, a total of 3,860 (70%) unweighted cases were found to have complete information on the key anthropometric variables needed to measure sarcopenia (muscle strength, muscle mass of both arms and legs, height, and gait speed). All analyses were carried out using Stata 14, adjusting for age-adjusted sampling weights and complex survey design.

Findings

More older males score below the recommended cutoff for muscle mass and muscle strength. The reverse is true, however, for the physical performance test in which more older females consistently fared worse. Relative to older males, a greater percentage of older females demonstrated low gait speed even after making the necessary adjustments. On average, OPs in the analytic sample are 68 years old, with significantly more females in the older age cohorts (70-79, 80+) compared to males (Table 3).

Table 3. Distribution of study variables, overall and by sex.

Variables	Total	Male	Female	P-value
	Mean $\pm$ SD/Percentage	Mean $\pm$ SD/Percentage	Mean $\pm$ SD/Percentage	
Appendicular muscle mass (kg/m^2)	8.2 $\pm$ 5.41	8.6 $\pm$ 3.05	8.0 $\pm$ 6.55	0.0270

Variables	Total	Male	Female	P-value
	Mean ± SD/Percentage	Mean ± SD/Percentage	Mean ± SD/Percentage	
Have low Appendicular muscle mass	10.1	17.7	4.9	0.0000
Muscle strength (kg.)	21.6 ± 6.46	26.7 ± 5.49	18.0 ± 4.33	0.0000
Have low muscle strength	46.8	51.9	43.3	0.0326
Gait speed/Physical performance (m/s)	0.59 ± 0.237	0.65 ± 0.243	0.56 ± 0.227	0.0000
Have low gait speed/physical performance	85.0	79.5	88.7	0.0001
Age (years)				
Mean ± SD	68.49 ± 7.145	67.89 ± 6.750	68.91 ± 7.376	0.1000
60-69	65.4	70.3	62.1	
70-79	24.9	21.1	27.6	0.0286
80+	9.6	8.7	10.3	
N	4,442	1,808	2,634	

[a] Based on Chi-square test (categorical variables) or *t*-test (continuous variables).

Table 4 presents the prevalence of sarcopenia and severe sarcopenia by sex and age. Results show that overall, the level of sarcopenia among older Filipinos using measure 1 and measure 2 are 9% and 6.8%, respectively. Severe sarcopenia among older Filipinos is lower at 6.4%.

Across the different methods, significant age and sex differences are apparent with the males showing significantly higher levels compared to the females. Prevalence of sarcopenia and severe sarcopenia increases dramatically with age.

The present study shows that older Filipinos registered a relatively lower prevalence of sarcopenia when compared to their counterparts in Asia (H. Wang et al., 2018; Hai, Cao, et al., 2017; Han et al., 2017; Hai, Wang, et al., 2017; T. Wang et al., 2016). Prevalence of the disease based on these studies that used BIA and 60 age cutoff range from 7.1% to 12.0%. A caveat, however, is that these studies utilized the AWGS 2014 criteria.

Table 4. Percentage of older Filipinos with sarcopenia and severe sarcopenia by sex and age

	Sex		P-value	Age			P-value	Total
	Male	Female		60-69	70-79	80+		
Sarcopenia (Measure 1)	15.2	4.7	0.0000	6.7	12	16.6	0.0061	9.0
Sarcopenia (Measure 2)	11.5	3.6	0.0000	4	10.7	1.64	0.0000	6.8
Severe sarcopenia	10.5	3.6	0.0001	3.6	10.1	16.3	0.0000	6.4
N	1808	2634		2906	1108	428		4442

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