REVIEW

Prevalence and Diagnosis of Sarcopenia in Residential Facilities: A Systematic Review

Ana Isabel Rodríguez-Rejón,[1] **María Dolores Ruiz-López**,[1,2] **Carmina Wanden-Berghe**,[3] **and Reyes Artacho**[1]

[1]Department of Nutrition and Food Sciences, Faculty of Pharmacy, and [2]Institute of Nutrition and Food Technology, Health Sciences Technology Park, University of Granada, Granada, Spain; and [3]General University Hospital of Alicante, Institute of Health and Biomedical Research of Alicante, Alicante, Spain

ABSTRACT

Assessing sarcopenia, the age-related loss of muscle mass and function, in institutionalized older adults is a challenging task. Data on its prevalence in residential facilities are scant and highly variable. Our objective was to report the prevalence of sarcopenia in older adults living in residential facilities (nursing/long term–care homes and assisted-living facilities) and review the criteria and methodologies used to diagnose sarcopenia in this setting. Bibliographic searches were carried out in 6 electronic databases (Medline via PubMed, Web of Science, Scopus, CINAHL, LILACS, and Cochrane) with the use of the Medical Subject Heading terms "Sarcopenia" and "Residential Facilities." We included studies that evaluated the prevalence of sarcopenia among older adults (aged ≥60 y) living in residential facilities. Forty-four studies were identified, of which 21 studies were included after applying eligibility criteria. The reported prevalence of sarcopenia ranged widely between 17.7% and 73.3% in long term-care homes and between 22% and 87% in assisted-living facilities. Most studies ($n = 14$) followed the consensus on sarcopenia diagnosis published by the European Working Group on Sarcopenia in Older People. In the other 7 studies, sarcopenia was diagnosed according to muscle mass, which was measured via 5 different techniques, most frequently bioelectrical impedance analysis, establishing cutoff scores for low muscle mass with the use of 5 different indexes, most frequently the skeletal muscle index. There are major differences in study design, methodology, and the approach to sarcopenia diagnosis in this setting, which would, in part, explain the enormous variability in the reported prevalence data. The lack of consensus on the correct diagnostic approach hampers the implementation of appropriate nutritional interventions. *Adv Nutr* 2019;10:51–58.

Keywords: sarcopenia, prevalence, residential facilities, nursing homes, diagnosis

Introduction

Sarcopenia, defined as age-related loss of muscle mass and function (1), is a severe public health problem with multiple negative consequences for older adults, including a high mortality index, functional decline, and increased risks of falls and hospitalization (2). The functional decline in sarcopenia leads to a loss of independence in older adults and is associated with a higher demand for services in residential facilities. These are defined as long term-care (LTC) facilities that provide assistance for activities of daily living and offer medical and nursing services; they include assisted-living facilities, group homes, homes for the aged, and nursing/LTC homes.

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Address correspondence to MDR-L (e-mail: mdruiz@ugr.es).
Abbreviations used: BIA, bioelectrical impedance analysis; CC, calf circumference; EWGSOP, European Working Group on Sarcopenia in Older People; LTC, long term-care; MeSH, Medical Subject Heading; SMI, skeletal muscle index; SMM, skeletal muscle mass.

Sarcopenia is considered to be a nutritional disorder by the European Society of Clinical Nutrition and Metabolism (3). The main modifiable risk factors for this geriatric syndrome are diet, especially low protein intake and vitamin D deficiency (4, 5), and the lack of physical activity (6), which are therefore the main targets of preventive and therapeutic interventions (7–10). However, there has been little transfer of research findings on sarcopenia to the clinical setting (11), possibly attributable to the lack of a wide consensus on its diagnosis and treatment (12). This hampers the development and implementation of clinical practice guidelines, including those followed in residential facilities for the aged.

Two systematic reviews published in 2014 by Cruz-Jentoft et al. (13) and Pagotto and Silveira (14) addressed the prevalence of sarcopenia. The former, which only selected studies that followed the consensus of the European Working Group on Sarcopenia in Older People (EWGSOP) (1), described prevalence values of 1–29% among older adults living at home, 14–68% among those in LTC homes, and 10% among people hospitalized in acute care. In their

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review, Pagotto and Silveira (14) included studies that followed different methodologies for sarcopenia diagnosis and reported prevalence values ranging between 0.1% and 33.6% in females and between 0.0% and 85.4% in males. Both reviews included studies conducted in different settings and noted that most research on sarcopenia has been on independent older adults living at home. Thus, only 2 of the 18 studies in the review by Cruz-Jentoft et al. and 3 of the 28 studies in the review by Pagotto and Silveira were conducted in residential facilities. Furthermore, investigations in this setting usually exclude residents with the worst health status, which may lead to an underestimation of the prevalence of sarcopenia. Dependent older adults pose a particular challenge for researchers, because advanced functional and cognitive impairment may limit their capacity to perform tests, especially those for speed and strength. A systematic review and meta-analysis published in 2017 by Shafiee et al. (15) addressed the worldwide prevalence of sarcopenia but excluded studies carried out in hospitals or nursing homes for older adults.

Given the few and highly variable data on the prevalence of sarcopenia in residential facilities, the question arises whether this variability is attributable to differences in diagnostic methods, in study eligibility criteria, and/or in the characteristics of study populations, such as sex or age. To our knowledge, no reviews have examined studies on the prevalence of sarcopenia in residential facilities, the objective of the present systematic review, which also investigated the criteria and methods utilized for sarcopenia diagnosis in this setting.

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (16).

Study eligibility

We searched for studies of "sarcopenia" in residential facilities published in English or Spanish, with no publication date limitation. The review inclusion criteria were as follows: *1*) the study population was settled in a residential facility (nursing/LTC home or assisted living) and *2*) the prevalence of sarcopenia was reported in participants aged ≥60 y. Although the review was focused on prevalence studies, we also included intervention studies that described the prevalence of sarcopenia when the diagnostic method was adequately reported.

Data sources

The systematic review of the literature was conducted with the use of 6 electronic databases: Medline via PubMed, Web of Science, Scopus, CINAHL, LILACS, and Cochrane. The first step was to select Medical Subject Headings (MeSH) as search terms. For PubMed, "Sarcopenia" and "Residential Facilities" were used as descriptors, constructing search equations with Boolean connectors. The equation was ["Sarcopenia" (Majr)] AND ["Residential Facilities" (MeSH) AND Humans (MeSH) AND aged (MeSH); filters: Humans, Aged: 60+ years]. The same search strategy was adopted for the other 5 databases, adapting the equation accordingly. The population, intervention, control, and outcomes (PICO) criteria are shown in Table 1. The search was not limited by publication date. Studies repeated in the different databases were identified as duplicates. The list of eligible studies was completed by scanning the reference lists of the selected articles, always respecting the inclusion criteria. In the case of various articles being published that used the same study population, the most complete study was selected. The final search was conducted in December 2017.

TABLE 1 PICO criteria for inclusion and exclusion of studies[1]

Criteria	Description
Population	Older adults living in residential facilities
Intervention	Diagnosis of sarcopenia
Comparison group	None
Outcomes	Prevalence

[1] PICO, population, intervention, control, outcome.

Study selection

Two researchers (AIR-R and RA) independently carried out the first screening of the located studies in a blinded fashion, reviewing all retrieved abstracts and selecting studies for complete text analysis. Studies that did not meet the review inclusion criteria were excluded. In a second stage, the same authors analyzed the full text of the selected articles and achieved consensus in a meeting on the final list of studies for inclusion; when the 2 researchers were unable to agree, a third (MDR-L) examined the article in question, and consensus was achieved after discussion among the 3 researchers.

Data extraction

After concluding the article selection process, 1 of the researchers (AIR-R) extracted data from the selected studies and the other 2 (AIR-R and RA) independently evaluated their quality following Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (17), which include 22 points on which information should be reported, scoring each item with 1 if the information was given in the article, 0 if it was not, and 0.5 if only partial information was provided. The evaluation of some items was deemed to be nonapplicable, and their scores were not counted in the total. When an item contained subitems, these were independently evaluated, and the average score was considered as the final score for the item. In cases of discrepancy between the independent evaluations of the 2 researchers, a third (CW-B) joined them in a consensus meeting to achieve agreement among the 3 researchers on the items in dispute.

The extracted data were compiled in 2 tables. One table gathered information on the study population (country, type of setting, size of the sample, age, sex), reasons for exclusions (e.g., incapacity to walk and/or the presence of cognitive impairment), and the recruitment rate, when indicated. The other table summarized the prevalence of sarcopenia

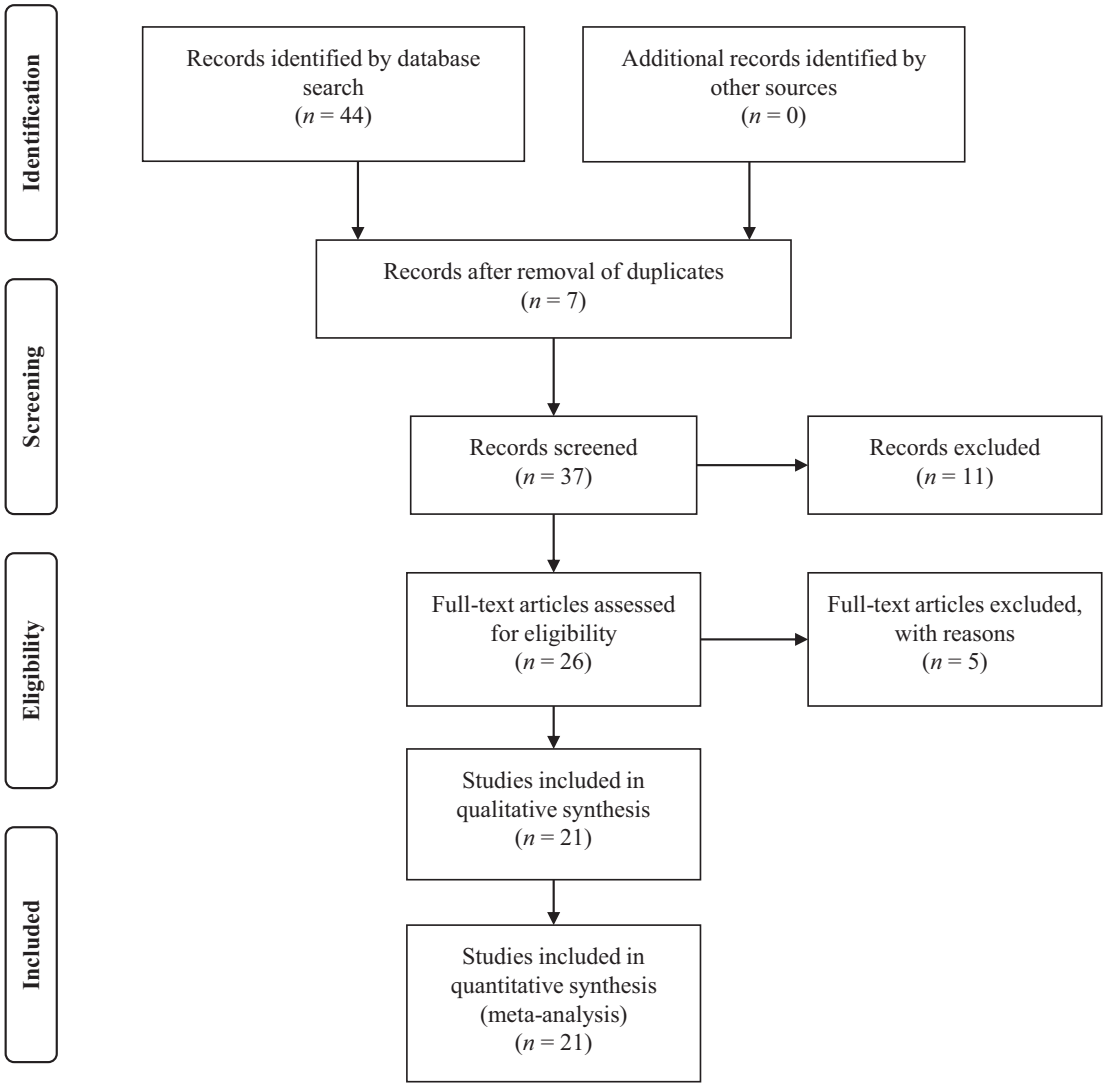

FIGURE 1 PRISMA flow diagram of records identified, screened, and included in the systematic review. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

(in the global study population and, when reported, in each sex), the diagnostic criteria for sarcopenia, and the cutoffs.

Results

Forty-four references were retrieved in the initial systematic search of the 6 databases (**Figure 1**), and 37 of these were considered as potentially eligible after excluding 7 duplicates. In the first screening, 7 of these articles were excluded because they did not measure sarcopenia, 4 because they were not conducted in residential facilities, and 5 for reporting previously published results or only the methodology used to obtained subsequently published results or only the methodology used to obtain subsequently published results. Therefore, 21 articles were considered for analysis and evaluation in the review (Figure 1).

The median (IQR) STROBE questionnaire quality score (17) was 18 (15.75–19.50) points; 75% of the studies obtained a score >15.75 points.

Table 2 lists the characteristics of the 21 selected studies: 17 were carried out in LTC homes (18–34), 2 in assisted-living facilities (35, 36), and 2 in mixed populations that also included independent people (37, 38). They were conducted in Australia, Belgium, Brazil, Canada, Colombia, Czech Republic, Egypt, Israel, Italy, Japan, Netherlands, Spain, and Turkey. The sample size ranged from 16 (28) to 711 (20) individuals. One of the studies only included women (28) and another only included men (18), whereas the remaining studies included both sexes. With respect to inclusion/exclusion criteria, 2 did not set a minimum age (28, 36), whereas the minimum age was 60 y in 5 studies (18, 23, 27, 32, 33), 70 y in 3 (22, 25, 34), and 65 y in the remaining 11 studies. People unable to walk were excluded in 10 studies

TABLE 2 Characteristics of study populations

Reference	Country	Total *n* (F,M)	Age,[1]	Exclusion criteria			Recruitment rate, n/total n
				Age, y	Unable to walk	Cognitive impairment	
Nursing/care homes							
Bahat et al. (18)	Turkey	157 (0, 157)	73.1 ± 6.7	<60	Yes	No	—
Díaz Muñoz et al. (19)	Colombia	108 (67, 41)	80.4 ± 7.7	<65	No	No	108/108
Halil et al. (20)	Turkey	711 (354, 357)	—	<65	No	Yes	—
Kimyagarov et al. (21)	Israel	109 (64, 45)	84.9 ± 7.4	<65	No	No	—
Landi et al. (22)	Italy	122 (91, 31)	84.1 ± 6.9	<70	No	No	122/146
Lardiés et al. (32)	Spain	339 (218, 121)	84.9 ± 7.6	<60	Yes	No	339/436
Mesquita et al. (33)	Brazil	216 (159, 57)	81.68 ± 8.4 (women) 72.35 ± 8.86 (men)	<60	No	No	216/412
Rahman et al. (23)	Egypt	357 (180, 177)	70.7 ± 7.8	<60	No	No	—
Rodríguez-Rejón et al. (34)	Spain	249 (187, 62)	84.9 ± 6.7	<70	No	No	249/300
Saka et al. (24)	Turkey	402 (199, 203)	78.0 ± 7.9	<65	No	Yes	402/539
Salvà et al. (25)	Spain	276 (190, 86)	87.2 (83.3–90.4)	<70	Yes	Yes	—
Sarabia et al. (26)	Spain	189 (140, 49)	82.3 (69–101)	<65	No	No	—
Senior et al. (27)	Australia	102 (71, 31)	84.5 ± 8.2	<60	No	Yes	102/709
Takeshima et al. (28)	Japan	16 (16, 0)	85 ± 9	—	Yes	No	—
Tasar et al. (29)	Turkey	211 (124, 87)	77.3 ± 7.20	<65	Yes	Yes	—
Van Puyenbroeck et al. (30)	Belgium	276	83.4	<65	No	Yes	276/737
Yalcin et al. (31)	Turkey	141 (62, 79)	79.17 ± 7.99	<65	Yes	Yes	—
Assisted-living facilities							
Campbell and Vallis (35)	Canada	36	86.7 ± 5.7	<65	Yes	Yes	36/400
Krause et al. (37)[2]	Canada	33 (22, 11)	81.5 ± 7.9	<65	Yes	Yes	—
Mijnarends et al. (38)[3]	Netherlands	227 (110, 117)	74.9 ± 7.2	<65	Yes	Yes	227/384
Steffl et al. (36)	Czech Republic	77 (60, 17)	83.0 ± 6.3	—	Yes	No	—

[1] Values are means ± SDs, means (ranges), or means depending on data available.
[2] The study population includes community-dwelling participants.
[3] The study population includes community-dwelling and residential living participants: independently living ($n = 157$), home care ($n = 28$), assisted living ($n = 13$), and residential living ($n = 29$).

and those with cognitive impairment were excluded in 10. The recruitment rate was reported in only 10 of the studies (19, 22, 24, 27, 30, 32–35, 38).

Sarcopenia prevalence values and diagnosis methods are exhibited in **Table 3**. The prevalence of sarcopenia ranged from 17.7% to 87% among the study populations in the selected studies, ranging from 14.4% to 82.9% among the women and from 8.4% to 87.7% among the men. Among LTC homes, the sarcopenia prevalence ranged from 17.7% to 73.3% (14.4–82.9% among the women and 8.4–87.7% among the men). In assisted-living facilities, the prevalence ranged from 22% to 87%, but there were inadequate data to differentiate by sex.

The sarcopenia diagnostic method proposed by the EWGSOP was followed in 14 of the studies (19, 22–27, 29, 31, 32, 34–36, 38), 1 of which compared this method with muscle mass and muscle strength measurements, omitting the measurement of gait speed (34). Muscle mass measurement was the sole diagnostic variable in the remaining 7 studies (18, 20, 21, 28, 30, 33, 37), 1 of which compared this method with a single muscle strength measurement (20). Fourteen studies used bioelectrical impedance analysis (BIA) to measure muscle mass (18, 22, 23, 25–27, 29–35, 38), 3 used anthropometry (19, 20, 24) [calf circumference (CC) or midupper arm muscle circumference], 1 used both (36), and 3 used other techniques: 24-h creatinine excretion (21), B-mode ultrasound assessment (28), and air displacement plethysmography (37). All studies that evaluated muscle strength used a dynamometer to measure handgrip strength. Physical performance was measured with a speed test over 4 m in 9 studies (19, 22–25, 31, 34, 36, 38), 5 m in 1 study (32), 6 m in 1 study (29), and 12 m in another (35); only 2 studies used the Short Physical Performance Battery (SPPB) of tests (26, 27).

BIA yielded 5 different indexes: skeletal muscle mass (SMM), skeletal muscle index (SMI = SM/ht^2, where ht is height in meters), weight-related skeletal muscle mass (SMM×100/wt), fat-free mass index, and fat-free mass according to the body surface area. Although the same indexes were used by different studies, the selection of cutoffs varied. The most frequently used index was the SMI in 10 studies (21, 22, 25, 27, 30–34, 38), 4 of which selected a cutoff of 6.42 kg/m^2 for females and 8.87 kg/m^2 for males (22, 27, 31, 32). In the studies that used anthropometry, the CC cutoff was 31 cm (19, 20, 24, 36) and the midupper arm muscle circumference cutoff was 23.3 cm for females and 23.8 cm for males. The muscle strength cutoff was 20 kg for females and 30 kg for males except in 1 study, which used the cutoffs proposed by the Cardiovascular Health Study, which are adjusted according to BMI (in kg/m^2) (20). The cutoff for studies measuring gait speed was 0.8 m/s.

Among the 14 articles that followed the EWGSOP methodology (19, 22–27, 29, 31, 32, 34–36, 38), the sarcopenia prevalence ranged from 17.7% to 73.3% (14.4–80.1% among women and 15.1–68% among men). Among the 7 articles in which muscle mass measurement was the sole diagnostic variable (18, 20, 21, 28, 30, 33, 37), sarcopenia prevalence ranged from 21.2% to 81.5% (31.1–82.9% among women and 8.4–85.4% among men). The only study that based the prevalence of sarcopenia on a single muscle strength measurement (20) reported a prevalence of 68% (63.8% in women and 72% in men).

Discussion

This systematic review gathered studies on sarcopenia prevalence in residential facilities and examined the criteria and methods used for its diagnosis. The term "residential facilities" was used because it covers the various types of provision for older adults (e.g., assisted-living facilities, group homes, homes for the aged, and nursing/LTC homes) and because utilization of the designation "nursing home" is not consistent in the literature (39). As in previous reviews (13, 14), we found a wide variability in the reported prevalence, from 17.7% to 87%. The selected studies also varied in inclusion/exclusion criteria, study population characteristics, and sarcopenia diagnostic methodology.

Our review does not elucidate whether the prevalence of sarcopenia is higher among women or men in this situation. Among the studies with mixed-sex populations, a higher prevalence was found among the men in 8 and among the women in 6, preventing any definitive conclusion on this issue. The characteristics of people living in residential facilities may differ between the sexes, and the sex distribution varied widely among the reviewed studies: 12 of them included more women than men, 1 more men than women, 5 similar numbers of women and men, 1 women alone, 1 men alone, and the remaining study did not report on prevalence by sex. Furthermore, cutoffs for muscle mass and muscle strength are higher in men than in women. Evidently, cutoff values must be appropriate to the specific population under investigation, but insufficient information was given on their selection in the reviewed studies. It would also be useful to know why study participants are in residential facilities, given likely differences in characteristics among those receiving assistance because of their cognitive impairment, functional deterioration, or desire for company, among other reasons. The heterogeneity usually observed in older adult populations appears to be even more evident in this setting.

Comparison among study results is hampered by the wide variability in sarcopenia diagnostic methodology (EWGSOP method, muscle mass alone, muscle strength alone), in the techniques used to measure muscle mass (e.g., BIA, anthropometry) and physical performance (4-m, 6-m, 12-m, or SPPB tests), in the muscle mass indexes used (SMI, SMM, SMM×100/wt, fat-free mass, fat-free mass index), and in the cutoffs applied. Some authors analyzed differences in prevalence results with the utilization of distinct diagnostic methods. For example, Mijnarends et al. (38) found large differences in prevalence (24.3–81.5%) among studies that used different muscle mass indexes and cutoffs, and Steffl et al. (36) reported a very wide variability (19.5–87%) according to the diagnostic approach used (EWGSOP algorithm, CC alone, muscle mass measurement

TABLE 3 Prevalence of sarcopenia, diagnostic methods, and cutoffs in residential facilities[1]

	Sarcopenia prevalence, %			Diagnostic method				Cutoffs: female–male		
Reference	Total	Women	Men	Method	Muscle mass	Muscle strength	Physical performance	Muscle mass index	Muscle strength	Physical performance
Nursing/care homes										
Bahat et al. (18)	—	—	85.4	Other	BIA	—	—	FFM (kg/BSA): 29.6	—	—
Díaz Muñoz et al. (19)	38.9	44.8	29.3	EWGSOP	CC	HS	GS (4 m)	CC (cm): 31	20–30 kg	0.8 m/s
Halil et al. (20)	68.0	63.8	72	Other	—	HS	—	—	CHS criteria	—
	21.2	—	—	—	CC	—	—	CC (cm): 31	—	—
Kimyagarov et al. (21)	26.6	—	—	Other	24-h creatinine excretion	—	—	SMI (kg/m^2): 8.5–10.5	—	—
Landi et al. (22)	32.8	21	68	EWGSOP	BIA	HS	GS (4 m)	SMI (kg/m^2): 6.42–8.87	20–30 kg	0.8 m/s
Lardies et al. (32)	38.1	39.4	35.5	EWGSOP	BIA	HS	GS (5 m)	SMI (kg/m^2): 6.42–8.87	20–30 kg	0.8 m/s
Mesquita et al. (33)	72.2	66.7	87.7	Other	BIA	—	—	SMI (kg/m^2): 10.76–6.76	—	—
Rahman et al. (23)	17.7	14.4	22.2	EWGSOP	BIA	HS	GS (4 m)	FFMI (kg/m^2): 13.9–15.9	20–30 kg	0.8 m/s
Rodríguez-Rejón et al. (34)	63.0	—	—	EWGSOP	BIA	HS	GS (4 m)	SMI (kg/m^2): 6.68–8.31	20–30 kg	0.8 m/s
	62.9	—	—	Other	BIA	HS	—	SMI (kg/m^2): 6.68–8.31	20–30 kg	—
	63.2	—	—	Other	BIA	HS	—	SMI (kg/m^2): 6.68–8.31	20–30 kg	—
Saka et al. (24)	73.3	80.1	65.9	EWGSOP	CC, MUAMC	HS	GS (4 m)	CC (cm); MUAMC (cm): 23.3–23.8	20–30 kg	0.8 m/s
Salvà et al. (25)	37	46.3	15.1	EWGSOP	BIA	HS	GS (4 m)	SMI (kg/m^2): 6.68–8.31	20–30 kg	0.8 m/s
Sarabia et al. (26)	68.8	—	—	EWGSOP	BIA	HS	SPPB	—	—	—
Senior et al. (27)	40.2	36.6	48.4	EWGSOP	BIA	HS	SPPB	SMI (kg/m^2): 6.42–8.87	20–30 kg	0.8 m/s
Takeshima et al. (28)	—	56	—	Other	BMUA	—	—	—	—	—
Tasar et al. (29)	33.6	18.5	55.2	EWGSOP	BIA	HS	GS (6 m)	FFM/BSA (kg/m^2): 24.43–30.03	20–30 kg	0.8 m/s
Van Puyenbroeck et al. (30)	24.3	31.1	8.4	Other	BIA	—	—	SMI (kg/m^2): 6.154–8.058	—	—
	81.5	82.9	78.3	—	—	—	—	SMM ∗100/wt: 24.76–33.94	—	—
	64.5	69.9	51.8	—	—	—	—	SMM (kg): 16.15–25.99	—	—
Yalcin et al. (31)	29.0	38.7	21.5	EWGSOP	BIA	HS	GS (4 m)	SMI (kg/m^2): 6.42–8.87	20–30 kg	0.8 m/s
Assisted-living facilities										
Campbell and Vallis (35)	22.0	—	—	EWGSOP	BIA	HS	12-m GAITRite	FFMI (kg/m^2): 12.6–15.5	20–30 kg	0.8 m/s
Krause et al. (37)[2]	42.4	36.3	54.5	Other	ADP	—	—	FFMI (kg/m^2): 13.1–16.3	—	—
Mijnarends et al. (38)[3]	23.3	22.7	23.9	EWGSOP	BIA	HS	GS (4 m)	SMI (kg/m^2): 6.75–10.75	20–30 kg	0.8 m/s
	12.1$^{\alpha}$	—	—	—	—	—	—	—	—	—
	39.3 $^{\beta}$	—	—	—	—	—	—	—	—	—
	46.2$^{\gamma}$	—	—	—	—	—	—	—	—	—
	58.6$^{\Omega}$	—	—	—	—	—	—	—	—	—
Steffl et al. (36)	44.2	—	—	EWGSOP	BIA	HS	GS (4 m)	SMI (kg/m^2): 6.75–10.75	20–30 kg	0.8 m/s
	87.0	—	—	Other	—	HS	—	—	20–30 kg	—
	19.5	—	—	Other	CC	—	—	CC (cm): 31	—	—
	80.5	—	—	Other	—	—	SPPB	—	—	6 points

[1] ADP, air displacement plethysmography; BIA, bioelectrical impedance analysis; BMUA, B-mode ultrasound assessment; BSA, body surface area; CC, calf circumference; CHS, Cardiovascular Health Study; EWGSOP, European Working Group on Sarcopenia in Older People; FFM, fat-free mass; FFMI, fat-free mass index; GS, gait speed; HS, handgrip strength; MUAMC, midupper arm muscle circumference; SMI, skeletal muscle index; SMM, skeletal muscle mass; SPPB, Short Physical Performance Battery.

[2] The study population includes community-dwelling participants.

[3] The study population includes community-dwelling and residential living participants: $^{\alpha}$ independently living, $^{\beta}$ home care, $^{\gamma}$ assisted living, $^{\Omega}$ residential living.

alone, or physical performance with SPPB alone). In contrast, Rodríguez-Rejón et al. (34) found no statistically significant difference among prevalence values obtained with the use of the EWGSOP algorithm and 2 EWGSOP-based algorithms that omitted gait speed measurement (63%, 62.9%, and 63.2%).

Despite these differences, most of the studies in our review followed the methodology proposed by EWGSOP, measuring muscle mass by BIA, muscle strength by dynamometry, and physical performance with a gait speed test. Most of the studies also use the same cutoff values to detect low muscle strength (20 kg in women and 30 kg in men) and physical performance (0.8 m/s gait speed). However, more frequent differences were found in the indexes and cutoff values applied for low muscle mass, considered by Masanés et al (40). to exert the greatest influence on sarcopenia prevalence and study comparability. As previously observed, the different cutoffs that can be applied with the EWGSOP method lead to variations in sarcopenia findings, and worldwide studies are warranted to establish reliable reference values (41, 42).

However, results have even differed among studies that used the EWGSOP methodology and exactly the same diagnostic methods and cutoffs, as in the case of the investigations by Landi et al. (22) in Italy and Yalcin et al. (31) in Turkey. These authors reported prevalence values in LTC homes that were globally similar (32.8% and 29%, respectively) but differed as a function of sex (21% and 38.7% in women and 68% and 21.5% in men, respectively). This discrepancy may be attributable to differences in the sex distribution and age of their study populations, with a majority of women in the former (22) and of men in the latter (31), whose subjects also had a lower mean age (84.1 ± 6.9 compared with 79.17 ± 7.99 y, respectively). The difference in age, which is a risk factor for sarcopenia (4), is likely attributable to the distinct inclusion criteria adopted by these authors (age of >70 y and >65 y, respectively). However, Rodríguez-Rejón et al. (34) and Salvà et al. (25) also used EWGSOP methodology and identical diagnostic methods and cutoffs in their studies of Spanish old people's homes but, despite applying the same age inclusion criterion (age >70 y), reported very different prevalence values (68% and 37%, respectively). One influential factor may be that individuals with cognitive impairment or inability to walk, known risk factors for sarcopenia (43, 44), were included by Rodríguez-Rejón et al. (34) but excluded by Salvà et al. (25).

The results of this systematic review underscore the importance of the eligibility criteria adopted in studies on sarcopenia prevalence in residential facilities. The selection of criteria has a major impact on the recruitment rate, which ranged widely (9–100%) among the reviewed studies and would in turn have a major influence on the prevalence statistics, leading to under- or overestimations.

One possible study limitation is that the literature search was based on MeSH search terms, which are not used in all studies, although reference lists were scanned to maximize the number of articles considered. A major strength of this review is that it is the first to contribute a detailed analysis of sarcopenia prevalence and diagnosis in residential facilities.

In conclusion, there is wide variability in the diagnostic criteria adopted to evaluate sarcopenia in residential facilities, including the participant selection criteria, methodology, reference indexes, and cutoffs. This likely explains, at least in part, the wide variability and difficult comparability of data on the prevalence of sarcopenia in residential facilities. We highlight that the lack of consensus on the correct diagnostic approach hampers the implementation of appropriate nutritional interventions, and there is a need to achieve consensus on these methodological questions.

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