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PREVALENCE OF SARCOPENIA IN OLDER AGE HOSPITALIZED PERSONS, AS DETERMINED BY DIFFERENT SETS OF DIAGNOSTIC CRITERIA

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ABSTRACT

Background: Sarcopenia is a geriatric syndrome characterised by the progressive loss of skeletal muscle mass, muscular strength, and physical performance; it carries the risk of physical incapacity and reduced quality of life. This work reported the prevalence of sarcopenia in people aged ≥65 years, all in-patients at the *Hospital Central de la Defensa Gómez Ulla*, as determined by three sets of diagnostic criteria. The suitability of the indistinct use of these criteria sets was discussed.

Methods: This was a cross sectional study. Sarcopenia was diagnosed depending on muscle mass, strength and functionality according to the European Working Group on Sarcopenia in Older People (EWGSOP), EWSOP2 and SARCF criteria. This study involved 295 people, all aged ≥65 years, and all of whom had been admitted to the above hospital between 1st March and 30th September 2018. Sampling was consecutive and performed at the internal medicine ward.

Results: The overall prevalence of sarcopenia was 43.7% [95%CI 38-49.4%] according to the EWGSOP criteria, 28.5% [23.3-33.7%] according to EWGSOP2, and 37.6% [32-43.1%] according to SARCF. The EWGSOP criteria showed sarcopenia to be significantly more common among men than women ($p<0.05$).

Conclusions: The prevalence of sarcopenia recorded differed depending on the set of criteria used; they cannot, therefore, be used indistinctly for the diagnosis of this condition. Rather, given the results obtained, it would seem reasonable, in Europe, to continue using the EGSWOP criteria while research continues in this area

Key words: Older age persons, Muscular Strength, Reference Standards, Sarcopenia, Frailty

RESUMEN

Prevalencia de sarcopenia determinada por diferentes criterios diagnósticos en ancianos hospitalizados.

Fundamentos: La sarcopenia es un síndrome geriátrico caracterizado por la pérdida progresiva de masa muscular esquelética, disminución de fuerza y rendimiento físico. El objetivo de este estudio fue conocer la prevalencia de la sarcopenia en la población anciana mayor o igual a 65 años en el Hospital Central de la Defensa Gómez Ulla (Madrid), según tres criterios diagnósticos.

Métodos: Se realizó un estudio transversal entre 295 personas con edad mayor o igual a 65 años a fecha de inicio del estudio, ingresados en el citado hospital entre el 1 de marzo y el 30 de septiembre de 2018. La sarcopenia se definió en función de la masa muscular, la fuerza muscular y la funcionalidad, de acuerdo al criterio EWGSOP, EWGSOP2 y SARC-F. Se compararon usando la prueba de McNemar y el Índice Kappa.

Resultados: La prevalencia de sarcopenia según el criterio EWGSOP fue del 43,7% (IC 95%; 38%-49,4%), según EWGSOP2 del 28,5% (23,3%-33,7%) y según el criterio SARC-F del 37,6% (32%-43,1%), siendo mayor en hombres que en mujeres con diferencia estadísticamente significativa ($p<0,05$). No se halló significación ($p=0,116$) para emplear de forma indistinta un criterio u otro. Se buscó relación entre los criterios EWGSOP y los ítems del cuestionario SARC-F, hallándose diferencias entre el número de caídas y la masa muscular, entre la fuerza muscular y el rendimiento físico, y entre el ítem levantar/llevar 0,5 kg y la fuerza muscular.

Conclusiones: La prevalencia de sarcopenia es diferente dependiendo del criterio de medida. No es posible intercambiar los criterios EWGSOP, EWGSOP2 y el cuestionario SARC-F para minimizar recursos.

Palabras clave: Anciano, Fuerza muscular, Estándar de referencia, Sarcopenia, Síndrome, Fragilidad.

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INTRODUCTION

Sarcopenia is a geriatric syndrome characterised by the progressive and generalised loss of skeletal muscular mass (MM), muscular strength (MS), and physical performance (PP); it carries the risk of physical incapacity, reduced quality of life, and even death[1]. The prevalence of sarcopenia differs from one region to another and between age groups, and in general is reported - using different diagnostic criteria - to reach 29% among the older age[2,3,4].

Diagnosing this syndrome is complicated given the existence of different sets of diagnostic criteria, a lack of consensus regarding what variables should be taken into account, and where their cut-offs should lie. In the European setting, the set of criteria published by the European Working Group on Sarcopenia in Older People (EWGSOP)[2] was updated in September 2018, and given the name EWGSOP2[5]. This new set of criteria included the SARCF questionnaire[6] as a means of detecting probable cases of sarcopenia. A further novelty over EWGSOP was to measure MS first, then MM, and finally PP as required. The classification outcomes were also modified to probable sarcopenia, confirmed sarcopenia, and severe sarcopenia, and the cut-off points of the variables involved were re-set.

A few studies have examined the prevalence of sarcopenia in Spanish populations according to different sets of diagnostic criteria[7,8,9], but none has used EWGSOP2 and compared the results with its predecessor EWGSOP[10,11]. The aims of the present work were: 1) to compare the prevalence of sarcopenia, including by sex, in patients aged ≥65 years at the *Hospital Central de la Defensa Gómez Ulla* (HCD) using the EWGSOP, EWGSOP2 and SARCF diagnostic criteria, 2) to determine the prevalence of the different grades of sarcopenia using the EWGSOP and EWGSOP2 criteria (including by sex), and 3) to examine the suitability of using these three sets of criteria indistinctly.

MATERIALS AND METHODS

The sample size for this cross-sectional study was determined taking into account an expected prevalence of sarcopenia[[11,12] of 25% (95% confidence interval; maximum assumed error 7%); the minimum number of subjects required was 147. Given that sex differences in the prevalence of sarcopenia are known to exist[6] analyses were planned with this in mind; the final sample therefore consisted of 148 women and 147 men (total 295). Subjects were required to be ≥65 years old at the start of the study, to be an in-patient at the HCD between 1st March and 30th September 2018, and to provide their informed consent to be included. Persons diagnosed with dementia or cognitive alterations that reduced their capacity to take part were excluded. Also excluded were those who were bed-ridden, blind (or who had severe difficulty seeing), those with oedema in the legs, and those who had suffered lower limb amputations.

Sampling was consecutive and performed at the internal medicine ward (according to 2017 data it was where eligible subjects would most likely be found). The prevalence of sarcopenia was recorded as determined by the EWGSOP, EWGSOP2 and SARCF sets of criteria. According to the EWGSOP criteria, subjects with a low MM (component 1) have presarcopenia, those with a low MM plus a low MS (component 2) or low PP (component 3) have sarcopenia, and those who have low values for all these variables have severe sarcopenia[2,3]. According to the EWGSOP2 criteria, those with a positive SARCF questionnaire result plus a low MS are classified as having probable sarcopenia; if they also have a low MM they are classified as having confirmed sarcopenia; those who also have a low PP are said to have severe sarcopenia.

For both sets of EWGSOP criteria, MM was determined by measuring the circumference of the calf, with values of <31 cm understood to be below normal[2,13,14]; measurements were taken with an inelastic tape at the largest part of the right calf, with the subjects sitting with their feet slightly separated from the chair.

MS was determined via the hand grip test using a Takei Hand Grip 5401 dynamometer following the method of the American Society of Hand Therapists[15]. All subjects were encouraged verbally to do their best during the procedure. A value of <30 kg for men and <20 kg for women was deemed below normal[16].

Following the methodology of the International Academy Nutrition and Aging, PP was determined as subject walking speed over a 4 m/s path on a flat surface[17]. This was performed in duplicate and the quicker speed recorded for analyses. Walking speed (and therefore PP) was deemed low at <0.8 m/s and normal above this value.

Finally, the SARCF questionnaire was used. This questionnaire records data on five components: strength, the need for help when walking, the ability to get out of a chair, the ability to climb stairs, and information regarding falls. Each component is marked on a 0-2 scale (0=no difficulty, 1= ome difficulty 2=much difficulty); these scores are summed to provide a final score (0-10). An overall SARCF score of ≥4 was deemed to indicate the presence of sarcopenia[5].

The study was approved by the HCD Ethics Committee for Research Involving Medication, and performed adhering to the principles of the Declaration de Helsinki (2013), to the norms of the Good Clinical Practice guidelines, and to current Spanish legislation (*Real Decreto 223/2004*). According to Spanish law (*Ley Básica de Autonomía del Paciente 41/2002*, especially Article 8.4), at the moment of their enrolment the subjects were informed verbally and in writing that the collected data were to be used in a research project. All data were treated confidentially according to Spanish law (*Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y Garantía de los Derechos Digitales*).

Statistical analysis. Results for the examined quantitative variables are presented as means ± standard deviations. The prevalence of sarcopenia (plus the 95% confidence interval [CI]) was determined for both men and women using all three sets of criteria, and compared using the McNemar test and the K agreement test. All calculations were performed using SPSS v.21.0 software for Windows.

RESULTS AND DISCUSSION

The mean age of the subjects was 75.8±8.5 years; mean calf circumference was 30.1±3.3 cm, mean MS 16.4±5.1 N, and mean walking speed 1.2±0.3 m/s (table 1). The women had a significantly larger calf circumference and walking speed, while the men showed significantly greater MS (table 1).

The overall prevalence of sarcopenia (i.e., EWGSOP - patients with sarcopenia or severe sarcopenia; EWGSOP2 - patients with confirmed sarcopenia or severe sarcopenia; SARCF - positive questionnaire result) was 43.7% [95%CI 38.0-49.4%] according to the EWGSOP criteria, 28.5% [23.3-33.7%] according to EWGSOP2, and 37.6% [32.97-43.1%] according to SARCF. The EWGSOP criteria determined the overall prevalence of sarcopenia to be significantly greater among men (table 2). According to this set of criteria, 48.8% [42.3-53.7%] of subjects showed no sarcopenia, 35.9% [29.6-40.4] had sarcopenia, and the remainder were divided between presarcopenia and severe sarcopenia (table 3).

Table 1
Characteristics of the sample population.

Variables		Total N=295	Men n=147	Women n=148	p value
Education Level	Illiterate	31 (10.5)	12 (8.2)	19 (12.8)	0.031
	Level 1/2 education	97 (32.9)	48 (32.7)	49 (33.1)	
	A-level education	46 (15.6)	16 (10.9)	30 (20.3)	
	Professional studies (FP) and Baccalaureate	88 (29.8)	49 (33.3)	39 (26.4)	
	Higher Education	33 (11.2)	22 (15)	11 (7.4)	
Take medication	Yes	268 (90.8)	138 (93.9)	130 (87.8)	0.072
	No	27 (9.2)	9 (6.1)	18 (12.2)	
Kind of disease	Acute	262 (88.8)	132 (89.8)	130 (87.8)	0.594
	Chronic	33 (11.2)	15 (10.2)	18 (12.2)	
Smoke	Yes	36 (12.2)	28 (19.0)	8 (5.4)	P<0.001
	No	259 (87.8)	119 (81.0)	140 (94.6)	
Take alcohol	Yes	43 (14.6)	34 (23.1)	9 (6.1)	P<0.001
	No	252 (85.4)	113 (76.9)	139 (93.9)	
Physical Activity	Yes	270 (91.5)	132 (89.8)	138 (93.2)	0.288
	No	25 (8.5)	15 (10.2)	10 (6.8)	
Physical activity frequency	Nothing	25 (8.5)	15 (10.2)	10 (6.8)	0.626
	Once	67 (22.7)	35 (23.8)	32 (21.6)	
	Twice	98 (33.2)	49 (33.3)	49 (33.1)	
	More three times	104 (35.3)	48 (32.7)	56 (37.8)	
Age		75.8 ± 8.5	75.5 ± 8.5	76.0 ± 8.5	0.620
Calf circumference (MM) (cm)		30.1 ± 3.3	28.3 ± 3.6	30.6 ± 3.0	<0.001
Muscular strength (MS) (kg)		16.4 ± 5.1	17.5 ± 8.9	16.6 ± 4.3	0.030
Physical performance (PP) (m/s)		1.2 ± 0.3	1.1 ± 0.3	1.2 ± 0.3	0.020

Source: Own Elaboration; cm: centimetres; kg: kilograms; m/s: meter/second; p<0.005;
$\bar{x}$: arithmetic average.

Table 2
Prevalence of sarcopenia as returned by the different sets of criteria.

Variables		EWGSOP					EWGSOP2					SARCF				
		Yes (n)	95% IC	No (n)	95% IC	p value	Yes (n)	95% IC	No (n)	95% IC	p value	Yes (n)	95% IC	No (n)	95% IC	p value
Total		129	43.7 (38.0-49.4)	166	56.3 (50.6-62.0)		84	28.5 (23.3-33.7)	211	71.5 (66.3-76.7)		109	37.6 (32.0-43.1)	186	63.0 (57.5-68.5)	
Sex	Men	81	55.1 (47.1-63.1)	66	44.9 (36.9-52.9)	<0.001	44	29.9 (24.7-35.1)	103	70.1 (64.9-75.3)	0.58	49	33.3 (25.7-40.9)	98	66.7 (59.1-74.3)	0.244
	Women	48	32.4 (24.9-39.9)	100	67.6 (60.1-75.1)		40	27.0 (21.9-32.1)	108	73.0 (67.1-78.1)		60	40.6 (32.7-48.5)	88	59.4 (51.5-67.3)	

Table 3
Prevalence of sarcopenia by different grades according to EWGSOP and EWGSOP2 classifications.

Variables		EWGSOP									EWGSOP2								
		No sarcopenia	95% IC	Presarcopenia (n)	95% IC	Sarcopenia (n)	95% IC	Severe sarcopenia (n)	95% IC	p value	No sarcopenia	95% IC	Presarcopenia (n)	95% IC	Sarcopenia (n)	95% IC	Severe sarcopenia (n)	95% IC	p value
Total		144	48.8 (42.3-53.7)	23	7.8 (4.7-10.9)	106	35.9 (29.6-40.4)	22	3.3 (1.1-4.9)		211	71.5 (65.8-76.2)	40	13.6 (9.2-16.8)	38	12.9 (8.3-15.7)	6	2.0 (0.4-3.6)	
Sex	M	53	18.0 (13.6-22.4)	12	4.1 (1.5-5.9)	63	21.3 (16.4-25.6)	13	4.4 (1.8-6.2)	0.033	103	70.1 (64.8-75.2)	17	11.6 (7.4-14.6)	22	15.0 (10.8-19.2)	5	3.4 (1.1-4.9)	0.042
	W	91	30.8 (24.8-35.2)	11	3.7 (0.5-14.1)	43	14.5 (10.0-18.0)	3	1.0 (0.0-2.1)		108	73.0 (67.9-78.1)	23	15.5 (10.9-19.1)	16	10.8 (6.6-13.4)	1	0.7 (0.0-1.7)	

Source: Own Elaboration; p<0.005; n: absolute frequency; IC: confidence interval.

Pairwise comparisons revealed no significant agreement between the results provided by EWGSOP and EWGSOP2 (p=0.543), EWGSOP2 and SARCF (p=0.065), or EWGSOP and SARCF (p=0.129).

The present results suggest that the EWGSOP, EWGSOP2 and SARCF criteria cannot be used indistinctly; they appear to return quite different results. For example, they returned different values for the overall prevalence of sarcopenia (EWGSOP 43.7% [38.0-49.4%] vs. EWGSOP2 28.5% [23.3-33.7%] vs. SARCF 37.6% [32.7-43.1%] (p>0.05). An earlier study performed in Sweden with 144 subjects[18] compared the overall prevalence results returned by EWGSOP and EWGSOP2, and reported values similar to those recorded in the present work (EWGSOP 41±27.7% vs. EWGSOP2 26±18.1% [p<0.05]). In the present study, the lower values returned by EWGSOP2 were largely due to this set of criteria diagnosing fewer men with the condition (EWGSOP2 29.9% vs. EWGSOP 55.1%), a consequence of cut-off point modifications. Among the women subjects the reduction was much less (EWGSOP2 27.0% vs. EWGSOP 32.4%). Similar results for the prevalence of sarcopenia have been reported in other studies: in men 37.9% (EWGSOP1) vs. 19.4%, 49.1%,

50.7% and 51.8% (EWGSOP2), and in women 22.1% (EWGSOP1) and 17.4%, 32.4%, 30.2% and 29.7 % (EWGSOP2)[18,19,20,21].

Using the EWGSOP set of criteria alone, Tasar *et al*[22] reported the prevalence of sarcopenia to be 55.2% in men, less than the 81.5% reported by Landi *et al*[23]. A Spanish study, also involving the use of the EWGSOP criteria alone, reported a prevalence of 52.7% in women[24] and 22.6% in men. In contrast, the ELLI study[25] (which again used only the EWGSOP criteria) reported a total prevalence of sarcopenia of 36.6%, with a higher prevalence in women (46.3%) than in men (15.1%), while the BELFRAIL study[26] reported a greater prevalence in women aged over 80 years (8%) than in similarly aged men (4.5%). These differences might be explained by differences in the populations studied (age, sex ratio, nutritional status, physical activity level, etc.)

The different classifications used by the EWGSOP2 criteria are different to those pondered by the EWGSOP criteria. The EWGSOP classification of "sarcopenia" (with a reduction in MM and PP) is not contemplated by EWGSOP2. This is problematic since 35.9% of the present subjects were thus classified using EWGSOP. While perhaps less important at the epidemiological level, it can certainly hinder decision-making at the clinical level and when making comparisons[18]. In addition, the number of subjects classified as having "severe sarcopenia" by EWGSOP was nearly twice that returned by EWGSOP2. In contrast, the above-mentioned Swedish study reported similar numbers of subjects with severe sarcopenia to be returned by both sets of criteria[18]. It should be noted, however, that the subjects in that study were not post-hospitalized.

The present work suffers from the limitation that the sample population was formed entirely by hospitalized subjects at a single centre; the results may not be translatable to another populations.

CONCLUSIONS

The different sets of criteria returned different prevalence values for sarcopenia. The EWGSOP criteria returned the highest values, and showed men to be more often affected. Clearly, these sets of criteria cannot be used indistinctly; the same subject can be classified as normal by one set, and as having sarcopenia by another. Their indistinct use could also lead to confusion regarding trends over time, and when examining differences between regions or countries: a universally accepted definition of sarcopenia needs to be reached as soon as possible. Given the results obtained, it would seem reasonable - in Europe at least - to continue using the EGSWOP criteria while research continues in this area.

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