Original Article

Sarcopenia and Its Connection with Geriatric Dysfunctionality in a Family Medicine Unit

Sarcopenia y su relación con disfuncionalidad geriátrica en una unidad de medicina familiar

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Summary

Objective: to identify the prevalence of sarcopenia and its connection with geriatric dysfunction in a family medicine unit. **Methods:** descriptive study; 174 patients over 65 years of age of both sexes were included. Non-probabilistic convenience non-probabilistic sampling. The SARC-F questionnaire was used for screening, the EWGSOP2 algorithm to determine the presence and degree of sarcopenia and the Katz test to assess the degree of functional dependence with basic activities of daily living. Statistical analysis was carried out using the SPSS v program. 22. To relate the presence and degree of sarcopenia with functional dependence, the χ^2 test was used with a significance level of 0.05 and Spearman's Rho was used. **Results:** it was observed that women have a higher prevalence of sarcopenia, the highest age was 80 years and older. The variables with association were presence and degree of sarcopenia with the degree of functional dependence, Spearman's Rho 0.491 and 0.411, respectively; with statistical significance ($p<0.000$). **Conclusion:** age and female sex influence the development of sarcopenia. The prevalence of the latter, and the dependence on basic activities of daily living, will depend on the biological and social factors of each individual; because of this, it is necessary to carry out an exhaustive search for cases with risk factors in order to have a timely impact on these patients and avoid complications.

Keywords: Sarcopenia; Dysfunction; Aging; Activities of daily living

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Resumen

Objetivo: identificar la prevalencia de sarcopenia y su relación con disfuncionalidad geriátrica en una unidad de medicina familiar. **Métodos:** estudio descriptivo; participaron 174 pacientes mayores de 65 años de ambos sexos. Se realizó muestreo no probabilístico por conveniencia. Se aplicó el cuestionario SARC-F como cribado, el algoritmo de EWGSOP2 para determinar la presencia y el grado de sarcopenia y el test de Katz para evaluar el grado de dependencia funcional con las actividades básicas de la vida diaria. El análisis estadístico se llevó a cabo mediante el programa SPSS v. 22. Para relacionar la presencia y grado de sarcopenia con la dependencia funcional se usó la prueba de χ^2 con nivel de significancia de 0.05 y se utilizó Rho de Spearman. **Resultados:** se observó que las mujeres presentan mayor prevalencia de sarcopenia, la edad más alta fue de 80 años y más. Las variables con asociación fueron: presencia y grado de sarcopenia con el grado de dependencia funcional, Rho de Spearman 0.491 y 0.411, respectivamente; con significancia estadística (p<0,000). **Conclusión:** la edad y el sexo femenino influyen en el desarrollo de sarcopenia. La prevalencia de esta última, y la dependencia de las actividades básicas de la vida diaria, dependerá de los factores biológicos y sociales de cada individuo; debido a esto, es necesario realizar una búsqueda exhaustiva de los casos con factores de riesgo para incidir oportunamente en estos pacientes y evitar complicaciones.

Palabras clave: sarcopenia, disfunción, envejecimiento, actividades de la vida diaria

Introduction

According to the World Health Organization, by 2050 the population over 60 years of age will double to 2 billion (22%).[1] According to the 2018 National Survey of Demographic Dynamics (ENADID), in Mexico there were 15.4 million (12.3%) older adults, with a higher proportion of women compared to men.[2] Currently, 27.1% of them have a disability, while 42.3% present a limitation for basic activities of daily living.[1]

One of the causes of disability in older adults is sarcopenia, which is characterized by a reduction in muscle mass function due to the aging process, and has a prevalence of 5-15%; however, it can increase up to 50% in people over 80 years of age.[3]

Shafiee et al.[3] reported a worldwide prevalence of 10%, predominant in non-Asian countries. Furthermore, Kim et al.[4] obtained a prevalence in patients 70-84 years of age of 4.6-14.5% in men and 6.7-14.4% in women.

In Latin America there are no specific and current data on the behavior of sarcopenia; an example is Colombia where in 2018 they could not define the incidence and prevalence due to lack of registration and identification of the pathology.[2] This disease is under diagnosed, despite the existence of an ICD-10 for its registration, as well as questionnaires and algorithms for its identification and diagnosis.[5-9]

In 2018 the Mexican Social Security Institute (IMSS) conducted a study with information from the 2012 National Health and Nutrition Survey, which determined that the prevalence of sarcopenia in older adults over 60 years of age was 13.30%, with a higher frequency in older aged women.[10]

This disease, with a multi factorial etiology, is considered a geriatric syndrome associated with functional deterioration and early institutionalization.[11-13] However, there are few studies on the relationship between dysfunction and sarcopenia, such is the case of Lara et al.[14] who conducted a study in which they identified the relationship between sarcopenia and functionality in older adults. This study reports that 80% of geriatric patients are dependent for basic and instrumental activities of daily living; however, the sample was not very representative and the qualitative measurement instruments did not determine the presence of true sarcopenia.

Given the relationship of the factors discussed above, the objective of this study was to identify the prevalence of sarcopenia and its connection with geriatric dysfunction in a family medicine unit.

Methods

A descriptive cross-sectional study was conducted, with the participation of 174 eligible beneficiaries who had outpatient visits at Family Medicine Unit No. 28, in Mexico City, of both sexes, over 65 years of age, without the use of orthoses; in the period from July to November 2021. After acceptance by the local research ethics committee and signature of informed consent. Patients with lower limb(s) amputations, sensory deficits (visual and auditory), neuromuscular and autoimmune diseases (myasthenia gravis, Guillain Barré, etc.) and severe physical or mental impairments that prevented them from participating in the study were excluded. Patients who lost eligibility and revoked their consent were eliminated. The sample size was calculated by means of the infinite population

formula, with a 95% confidence interval, with a critical Z equal to 1.96; with p of 0.13,[10] with q of 0.87 and absolute precision of 0.05. Non-probabilistic convenience sampling was used.

An identification form was filled out and the SARC-F questionnaire (> 4 points), already validated for the Mexican population, was completed in 20 minutes to screen for sarcopenia. The EWGSOP2 algorithm endorsed by the European Sarcopenia Consensus was used to determine the presence and degree of sarcopenia by performing measurements (grip strength with a CAMRY EH101 dynamometer certified by ISO 9001 SGS with cut-off point Men <27 kg and cut-off point Women <16 kg, gait speed at four meters distance with cut-off point < or = 0.8 m/sec and calf circumference with cut-off point <31 cm), as well as the Katz test to assess the degree of functional dependence in Basic Activities of Daily Living (BADLS). With the data obtained, descriptive statistics were performed for the sociodemographic variables and the presence of sarcopenia, obtaining frequencies and percentages. To relate risk factors and the Katz index with patients who presented a diagnosis of sarcopenia χ^2 and Fisher's exact test with significance level <0.05 were used. Spearman's Rho was used to associate the degree of sarcopenia with the Katz index. Statistical analysis was performed with the SPSS v program. 22.

According to the design of this study, the potential biases that occurred and the maneuvers to avoid them were: data collection bias, which was avoided by assigning the same person to carry out the questionnaire and measurements; screening bias, which was controlled through the inclusion criteria; data recording bias, which was controlled by performing a double check when creating the database, as well as double data recording bias, which was avoided by using the social security number as a unique identifier, thus eliminating duplicates in the database.

Results

Among the general characteristics of the population (n=174), the frequency of distribution by sex was 39.7% for men (n=69) and 60.3% for women (n=105), with a mean age of 71 years. The most frequently observed marital status was married with 54.6% (n=95) and the most frequently and equally frequent education was high school and bachelor's degree with 30.5% (n=53), see Table 1.

As associated factors, the presence of comorbidities was found in 70.1% (n=122). Systemic arterial hypertension was the most frequent with 48.1% (n=91), followed by type 2 diabetes mellitus with 30.7% (n=58). In descending order of frequency, the other associated factors found were overweight 48.3% (n=84); history of falls 15.5% (n=27); treatment with statins 12.1% (n=21); history of hospitalizations 4.6% (n=8) and, finally, functional dependence 1.1% (n=2), see Table 2.

Of the total sample (n=174), 11.49% of patients scored ≥4 points on the SARC-F questionnaire (n=20), 2.29% presented pre-sarcopenia (n=4), 4.6% presented sarcopenia (n=8) and, of the latter, 1.14%

Table 1. General characteristics of the population

	N= 174
Sex, n (%)	
Male	69 (39.7)
Female	105 (60.3)
Age (years)*	71 (67, 77)
Marital status, n (%)	
Single	28 (16.1)
Married	95 (54.6)
Divorced	6 (3.4)
Widowed	45 (25.9)
Common law marriage	0 (0)
Education, n (%)	
Illiterate	1 (0.6)
Elementary School	35 (20.1)
Middle School	28 (16.1)
High School	53 (30.5)
Bachelor's Degree	53 (30.5)
Graduate Degree	4 (2.3)

*Median and Interquantile Range

Table 2. Comorbidities and associated factors

	N= 174
Nutritional status BMI, n (%)	
Malnutrition	1 (0.6)
Normal weight	57 (32.8)
Overweight	84 (48.3)
Obesity class 1	26 (14.9)
Obesity class 2	6 (3.4)
Obesity class 3	0 (0)
Comorbidity, n(%)	
No comorbidity	52 (29.9)
With comorbidity	122 (70.1)
Diabetes mellitus type 2	58 (30.7)
Systemic arterial hypertension	91 (48.1)
Dyslipidemia	22 (11.7)
Chronic renal insufficiency	4 (2.1)
COPD	12 (6.4)
Heart failure	1 (0.5)
Liver failure	1 (0.5)
Statin treatment >3 months, n(%)	
Yes	21 (12.1)
No	153 (87.9)
Hospitalizations in the last year, n (%)	
Yes	8 (4.6)
No	166 (95.4)
Falls in the last year	
Yes	27 (15.5)
No	147 (84.5)
Functional dependence, n (%)	
Yes	2 (1.1)
No	172 (98.9)

Table 3. Frequency and degree of sarcopenia

	N= 174
SARC F Questionnaire, n (%)	
≥4 points	20 (11.49)
<4 points	154 (85.5)
Sarcopenia, n (%)	
Yes	8 (4.6)
No	166 (95.4)
Degree of sarcopenia, n (%)	
Normal	162 (93.1)
Pre-sarcopenia	4 (2.3)
Mild sarcopenia	2 (1.1)
Severe sarcopenia	6 (3.4)

presented mild sarcopenia (n=2) and 3.44% presented severe sarcopenia (n=6).

When associating the presence and degree of sarcopenia with the degree of functional dependence, using Spearman's Rho, we obtained 0.491 and 0.411 respectively with statistical significance (p=0.000) for both and with moderate association, see Table 3.

It was observed that women had a higher prevalence of sarcopenia 3.44% (n=6). Widowed patients showed the same value thereof. Patients with elementary and high school had a prevalence of 1.72% (n=3) and patients with normal weight had a prevalence of 2.87% (n=5). The variables related to the development of sarcopenia, with statistical significance, were age (p<0.0001 with a confidence interval 1.93-2.26), marital status (p<0.0132 with a confidence interval 2.23-2.54), education (p<0.0002 with a confidence interval 3.59-3.94) and nutritional status (p<0.0001 with a confidence interval of 2.76-2.99).

The relationship of sarcopenia with functional dependence for BADL presented statistical significance (p<0.00010 with a confidence interval of 0.99-1.02), as well as the relationship of sarcopenia with the degree of sarcopenia (p<0.00017 with a confidence interval of 1.05-1.23). Risk factors related to the

Table 4. Relationship of sarcopenia with dysfunction and other risk factors

				Statistical Significance
			N= 174	
	With sarcopenia n (%)	OR (95% CI)	Without sarcopenia n (%)	OR (95% CI)
Sex				p=0.387 1.60 (1.53-1.62)
Male	2 (1.14)	1.97 (1.93-2.011)	67 (38.50)	
Female	6 (3.44)	1.94 (1.89-1.98)	99 (56.89)	
Age (years)				p=0.0001* 2.10 (1.93-2.26)
65 to 69 years old	1 (0.57)	1.98 (1.95-2.01)	68 (39.08)	
70 to 74 years old	0 (0)	2 (2-2)	45 (25.86)	
75 to 79 years	1 (0.57)	1.96 (1.90-2.03)	32 (18.39)	
80 years and over	6 (3.44)	1.77 (1.61-1.94)	21 (12.06)	
Marital status				P= 0.0132* 2.39 (2.23-2.54)
Single	0 (0)	2 (2-2)	28 (16.09)	
Married	2 (1.14)	1.97 (1.94-2.00)	93 (53.44)	
Divorced	0 (0)	2 (2-2)	6 (3.44)	
Widower	6 (3.44)	1.86 (1.76-1.96)	39 (22.41)	
Common law marriage	0 (0)	2 (2-2)	0 (0)	
Education				P= 0.0002* 3.77 (3.59-3.94)
Illiterate	1 (0.57)	1	0 (0)	
Elementary School	3 (1.72)	1.91 (1.81-2.01)	32 (18.39)	
Middle School	1 (0.57)	1.94 (1.87-2.00)	27 (15.51)	
High School	3 (1.72)	1.96 (1.88-2.04)	44 (25.28)	
Bachelor's Degree	0 (0)	2 (2-2)	53 (30.45)	
Graduate Degree	0 (0)	2 (2-2)	4 (2.29)	
Nutritional Status				P=0.0001* 2.87 (2.76-2.99)
Malnutrition	1 (0.57)	1	0 (0)	
Normal weight	5 (2.87)	1.91 (1.83-1.98)	52 (29.88)	
Overweight	1 (0.57)	1.98 (1.96-2.01)	83 (47.70)	
Obesity Class 1	1 (0.57)	1.96 (1.88-2.04)	25 (14.36)	
Obesity Class 2	0 (0)	2 (2-2)	6 (3.44)	
Obesity Class 3	0 (0)	2 (2-2)	0 (0)	
Comorbidities				p=0.631 1.29 (1.23-1.36)
Yes	5 (2.87)	1.95 (1.92-1.99)	67 (38.50)	
No	3 (1.72)	1.94 (1.87-2.00)	49 (28.16)	
Statin treatment > 3 months				p=0.285 1.87 (1.83-1.92)
Yes	0 (0)	2 (2-2)	21 (12.06)	
No	8 (4.59)	1.94 (1.91-1.98)	145 (83.33)	
Hospitalizations in the last year				p=0.276 1.95 (1.92-1.98)
Yes	1 (0.57)	1.87 (1.57-2.17)	7 (4.02)	
No	7 (4.02)	1.95 (1.92-1.98)	159 (91.37)	

Falls in the last year				p=0.450 1.84 (1.79-1.89)
Yes	2 (1.14)	1.92 (1.82-2.03)	25 (14.36)	
No	6 (3.44)	1.95 (1.92-1.99)	141 (81.03)	
Functional Dependency				p=0.00010* 1.01 (0.99-1.02)
Present (does not perform 1 BADL or more)	2 (1.14)	1.96 (1.93-1.99)	0 (0)	
Absent (performs all BADLs)	6 (3.44)	1 (1-1)	166 (91.95)	
Degree of sarcopenia				p=0.00017* 1.14 (1.05-1.23)
Normal	0 (0)	2 (2-2)	162 (93.10)	
Pre-sarcopenia	0 (0)	2 (2-2)	4 (2.29)	
Mild sarcopenia	2 (1.14)	1 (1-1)	0 (0)	
Severe sarcopenia	6 (3.44)	1 (1-1)	0 (0)	

p= statistical significance obtained by χ^2 of Pearson. OR: Odds Ratio. 95% CI: 95 percent confidence interval. BADL: Physical Activity of Daily Living.
n= 174, Kruskal Wallis*

development of sarcopenia without statistical significance were sex (OR= 1.60), presence of comorbidities (OR= 1.29), statin treatment (OR= 1.87), presence of hospitalizations (OR= 1.95) and falls (OR= 1.84), see Table 4.

Discussion

According to sociodemographic characteristics, the geriatric population with sarcopenia most frequently presents the following risk factors: age over 60 years, female sex and high marginalization.[10] In this study it was observed that the population presented a higher frequency of distribution by sex in women with 3.44%, behaving in accordance with what is referred to in the literature; however, there was no statistical significance (p=0.387) for the development of sarcopenia. This could be explained by the fact that it is a disease with multicausality; moreover, marital status (p<0.0132) and level of education (p<0.0002) were statistically significant; however, these are not referred to as risk factors in the literature.

According to various authors, the worldwide prevalence of sarcopenia varies between 5-15%, and increases in those over 80 years of age by up to 50%.[3] In this study, the age group in which it occurred most frequently was precisely this age group, due to the fact that older age leads to anatomical and pathophysiological changes at the osteomuscular level, which in turn leads to the development of sarcopenia.[8,15]

The prevalence of sarcopenia obtained by means of the EWGSOP2 algorithm was 4.6%, close to the worldwide prevalence obtained by DEXA.[6,8,16] This algorithm brings us closer to the option of using it as a tool for consultation at the first level of care, since it is quick and easy to apply. Studies are still required to evaluate a larger sample and to assess sensitivity and specificity for its application as a screening or diagnostic test.

The etiology of sarcopenia is given by age, inactivity, chronic degenerative diseases, history of falls, poor nutritional status and intake of drugs such as statins.[11,12,16,17] The results obtained in this study indicate that the statistically significant risk factors for the development of sarcopenia differ from those discussed by various authors, such is the case of nutritional status (p<0.0001). In addition, the risk factors related to the development of sarcopenia without statistical significance were sex (OR= 1.60), the presence of hospitalizations (OR= 1.95) and falls (OR= 1.84), the result was not as expected since these are referred to in the literature as risk factors for developing sarcopenia. These differences are probably secondary to the population characteristics of the region where this study was carried out, since, according to the medical information and clinical file area, most of the beneficiaries have access to social security (90%) and are located in neighborhoods with a high level of purchasing power. The presence of comorbidities (OR= 1.29) and the history of statin intake (OR= 1.87) in this study did not report statistical significance, which could be due to the fact that in most of the population there is good control of the underlying pathologies by means of hygienic-dietary or pharmacological measures.

Studies show that using the validated SARC-F questionnaire can have a timely impact on preventive measures for the development of sarcopenia.[13,18] The questionnaire was applied to the entire sample, showing 4.59% with mild to severe sarcopenia, the remaining 2.29% presented a high likelihood of developing it in the future and were referred to their family physician for follow-up and control.

Lara et al.[14] mention that late diagnosis of sarcopenia results in cognitive impairment and dysfunction, as well as a history of hospitalizations and frequent falls. The characteristics of the population with disabilities reported in the literature are over 65 years of age, female sex and their role within the family dynamics.[19] When associating the presence and degree of sarcopenia with the degree of functional dependence using Spearman's Rho (0.491 and 0.411 respectively), statistical significance (p=0.000) was obtained for both with a moderate association, indicating that presenting sarcopenia with an increase in the degree of severity can cause greater functional dependence and, therefore, an increase in the number of complications such as falls, early institutionalization and death.

The scope of this study is to provide the tools to diagnose sarcopenia and implement preventive measures at the first level of care. The sample size and type of sampling are limitations, which do not allow us to establish external validity of the results obtained; similarly, the medium-high socioeconomic level of the patients may have influenced the findings of this study.

Conclusion

Age and female sex influence the development of sarcopenia. The prevalence of this disease and the dependence on basic activities of daily living will depend on the biological and social factors of each individual; because of this, a comprehensive approach is needed from the first level of care, in order to have a timely impact on patients at high risk of developing complications.

Contribution of the Authors

J L V-B: conceptualization, development, writing, analysis of data and results, discussion of results and writing. J M V-R: conceptualization, survey application, analysis of data and results, discussion of results and writing.

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Conflicts of interest

The authors state they have no conflicts of interest.

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