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Trabajo Original

Nutrición en el anciano

Prevalence of sarcopenia in elderly users of the primary health care system

Prevalencia de la sarcopenia entre los ancianos usuarios del sistema de atención primaria

Patrícia de Carli Tonial[1], Eliane Lucia Colussi[2], Ana Luisa Sant'Anna Alves[2], Jaqueline Stürmer[1] and Luis Antônio Bettinelli[2]

[1] Nutrition Clinic. Passo Fundo, RS, Brazil. [2] Postgraduate Program in Human Ageing. Universidade de Passo Fundo. Passo Fundo, RS. Brazil

Abstract

Objective: to identify the prevalence of sarcopenia in elderly primary care users, and the relationship of nutritional status with sarcopenia.

Material and methods: the study was a cross-sectional study with elderly users of the primary health care network. The participants were evaluated for the diagnosis of sarcopenia, which involved calculation of muscle mass, grip strength, and walking speed, as well as sociodemographic, anthropometric and nutritional variables. Nutritional status was evaluated through the body mass index (BMI) and the Mini Nutritional Assessment (MNA) instrument. The study was conduted at eleven family health centers in Marau, Rio Grande do Sul, and included elderly subjects aged 65 years and over (n = 148).

Results: of the elderly subjects evaluated, 72.3 % were female; mean age was 73.6 years (SD: 5.5), ranging from 65 to 89 years. The prevalence of sarcopenia was 14.2 %, 47.3 % of the sample had low manual grip strength, and 53.7 % had inadequate walking speed. Regarding BMI, 10.8 % of participants were classified as underweight, and 75 % of these were diagnosed with sarcopenia. Sarcopenia was significantly associated with the oldest age group ($p = 0.046$) and with higher BMI ($p < 0.001$).

Conclusions: results show the importance of assessing nutritional status and a potential diagnosis of sarcopenia, mainly since this syndrome is highly associated with inappropriate food intake, which is often impaired among the elderly because of economical and/or physiological reasons.

Keywords:

Eldery. Sarcopenia. Nutritional status. Geriatric.

Resumen

Objetivo: identificar la prevalencia de la sarcopenia en personas mayores de atención primaria y la relación entre el estado nutricional y la sarcopenia.

Material y métodos: el estudio fue un estudio transversal de usuarios mayores de la red de atención primaria de salud. Los ancianos se evaluaron para ver si tenían diagnóstico de sarcopenia, lo que implica calcular la masa muscular, la fuerza de agarre y la velocidad al caminar, así como variables sociodemográficas, antropométricas y nutricionales. El estado nutricional se evaluó a través del índice de masa corporal (IMC) y el instrumento Mini Evaluación Nutricional (MNA). El estudio se llevó a cabo en once centros de salud familiar de Marau, Rio Grande do Sul, Brasil, y contó con ancianos de 65 o más años de edad (n = 148).

Resultados: de los ancianos evaluados, el 72,3 % eran mujeres; la edad media fue de 73,6 años (DE: 5,5) con un rango de 65 a 89 años. La prevalencia de la sarcopenia fue del 14,2 %, el 47,3 % de los ancianos tenían una fuerza de agarre manual baja y el 53,7 % tenían una velocidad de marcha insuficiente. Con respecto al IMC, el 10,8 % de los ancianos se clasificaron como de bajo peso y el 75 % de estos se diagnosticaron de sarcopenia. La sarcopenia se asoció significativamente al grupo de mayor edad ($p = 0,046$) y al de mayor IMC ($p < 0,001$).

Conclusiones: estos resultados muestran la importancia que tiene evaluar el estado nutricional junto con al posible diagnóstico de sarcopenia, principalmente porque el síndrome está relacionado con la ingesta inapropiada de alimentos, que muchas veces aparece deteriorada en las personas mayores por motivos económicos y/o fisiológicos.

Palabras clave:

Anciano. Sarcopenia. Estado nutricional. Geriátrico.

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Correspondence:

Ana Luisa Sant'Anna Alves. Universidade de Passo Fundo. Passo Fundo, RS. Brasil
e-mail: alves.als@upf.br

INTRODUCTION

The aging process is followed by many physical, biological and psychological changes. An acute alteration associated to ageing, a progressive reduction in skeletal muscle mass, resulys in impaired mobility, balance, strength, and function (1).

This change in body composition, in which there is reduced muscle mass, together with impaired muscle function, is called sarcopenia. Currently, it has been suggested its being a geriatric syndrome (1), which may lead to worsening in health conditions, and difficulties to carry out the basic and instrumental activities that are part of daily life (2,3).

Therefore, sarcopenia is characterized as a progressive and generalized loss of skeletal muscle mass associated with a reduction in strength and/or physical performance, which results in more falls, worse quality of life, functional incapacity, and higher mortality (4,5). In September 2016 sarcopenia was recognized as a disease state, and awarded an ICD-10-CM code (M62.84) (6) .

The prevalence of sarcopenia varies considerably among elderly men and women, mainly due to the chosen method of diagnosing. After the creation of the European group "European Working Group on Sarcopenia in Older People" (EWGSOP), new epidemiological studies were performed using their criteria, which were proposed in 2010 (4). In this way the incidence of sarcopenia has varied between 5 % and 33 % among populations of different nationalities (7-12).

With data extracted from the 28 countries of the European Union, retrieved from the Eurostat online database, interpolating age- and gender-specific prevalences of sarcopenia according to the different diagnostic cutoffs posited by the EWGSOP, when using the definition providing the lowest prevalence estimates the number of individuals with sarcopenia in Europe rised from 11.1 % in 2016 to 12.9 % in 2045 (a 72.4 % increase). The reported prevalence estimates were interpolated between 65 and 100 years. This increase in prevalence corresponds to an increase in the number of individuals with sarcopenia, rising from about 18 million in 2016 to 32 million by 2045 within the European Union, according to the chosen diagnostic thresholds for muscle mass, muscle strength, and gait speed (13).

By using these parameters with Brazilian elderly subjects, Alexandre et al. found a prevalence of 15.4 % in the city of Sao Paulo (14), and Barbosa-Silva et al., through the study performed in Pelotas, Rio Grande do Sul, found a prevalence of 13.9 % (15). Both teams evaluated community-dwelling elderly individuals at least 60 years of age; however, to assess muscle mass, the former used the predictive equation by Lee et al. (16), whereas the latter used X-ray absorptiometry and calf circumference (14,15).

Thus, this study aimed to evaluate the prevalence of sarcopenia in elderly users of the primary health care network of the city of Marau, applying the criteria proposed by the EWGSOP.

METHODS

This was a cross-sectional study in elderly users of the primary health care system of the city of Marau, Rio Grande do Sul, Brazil. This research was approved by the Ethics Committee at "Universidade de Passo Fundo" (approval no. 1.041.028), and all participants provided their informed consent.

For sample calculation the total number of elderly residents in Marau (3,964) was taken into consideration, together with an error margin of 5 %, a sarcopenia prevalence of 10 %, and a level of significance corresponding to a 95 % confidence interval, which resulted in a sample of 148 seniors. The sampling process was expedited and data collection was performed through individual interviews in the eleven family care clinics of the city.

The following sociodemographic data were collected using a questionnaire: gender, age, race, marital status, education, occupation, family member formation, and lifestyle.

To establish a diagnosis of sarcopenia muscle mass, hand grip strength, and gait speed were estimated according to the descriptions below.

MUSCLE MASS

Skeletal muscle mass (SMM) was measured using the predictive equation of Lee et al. (16), which has been validated for Brazilian elderly (3):

$$SMM\ (kg) = 0.244 \times body\ weight\ (kg) + 7.8 \times height\ (m) - 0.098 \times age\ (years) + 6.6 \times gender + ethnics - 3.3$$

For the above equation the following values were used: gender = 1 for men and 0 for women; ethnics = 1.2 for Asian, 0 for white, and 1.4 for black.

After estimating SMM, values were adjusted by squared height to create the Skeletal Muscle Mass Index (SMMI). A percentage cut-off point of 20 was used for the study population, following recommendations by Delmonico et al. (17) and Newman et al. (18); these were used in Brazil for the SABE study, which was performed in elderly people from São Paulo, and also used the equation by Lee et al. for the calculation of skeletal muscle mass (14). In the present study the 20th percentile was represented by 6.72 kg/m^2 for women and 6.85 kg/m^2 for men.

MUSCLE STRENGTH

Hand grip strength was evaluated through the use of a digital dynamometer (Saehan). The procedure followed the recommendations of the American Society of Hand Therapists (ASHT): the patient was placed in a seated position with the shoulder adducted, elbow flexed by 90º, forearm in neutral, and wrist between 0 and 30º of dorsiflexion. Speaking loudly, a verbal "go" was given by the evaluator. The senior pulled the strap and kept it for 6 seconds. Three measures were obtained and expressed as kilograms-force (kgf) for the dominant hand, and the average value of all three measures was considered (19). Values under 30 kgf and 20 kgf, respectively for men and women, were considered reduced muscle strength (4,20).

MUSCLE PERFORMANCE

To analyze muscle performance speed gait was measured as the time spent to walk a distance of 4.6 m. The senior walked a total distance of 8.6 m, with the two initial and two final meters being ignored. Three measures were taken in seconds, and the average value of all three was considered. Results equal or inferior to 0.8 m/s were considered a loss in physical performance (4).

OTHER ANTHROPOMETRIC AND NUTRITIONAL DATA

To evaluate nutritional risk the Mini Nutritional Assessment (MNA) instrument was administered; it includes 18 questions split into two parts: the first part, called screening, has 6 questions to assess food intake, weight loss over the last three months, mobility, psychological stress, recent acute disease, neuropsychological conditions, and BMI (21). The second part includes an overall assessment using questions related to lifestyle, medications, health status, anthropometric measures, arm circumference, calf circumference, and food (number of meals, foods and drinks taken, etc.).

According to Guigoz et al. (21), the sum of MNA scores allows to differentiate elderñy individuals with a proper nutritional condition (> 24) from those at risk of malnutrition (17-23.5), and those who are malnourished (< 17).

Current weight was measured using an electronic digital portable scale of the platform type (Caumaq) capable of 180 kg and with a sensitivity of 100 g. Weight was measured with the person wearing the least possible amount of clothes and without shoes.

Height was measured with a portable height-measuring appliance with a maximum of 2.20 meters, divided in centimeters and subdivided in millimeters (Wood Portatil Compact).

Body mass index (BMI) was obtained by dividing weight (kg) by the square of height in meters (m^2), with results being expressed kg/m^2. It was then classified according to specific cutoffs for seniors established by Pan-American Health Organization – OPAS (22): low weight (BMI < 23 kg/m^2); eutrophy (23 < BMI < 28 kg/m^2); overweight (28 < BMI < 30 kg/m^2); and obesity (> 30 kg/m^2). This calculation was applied in the SABE study, which was carried out in seven Latin American and Caribbean countries.

STATISTICAL ANALYSIS

Data were fed to and analyzed by a statistical software program. Measures of central tendency and dispersion were calculated for quantitative variables, which were expressed as absolute frequencies and simple ratios. Fisher's exact test was used for associations, and statistical significance was considered for a p-value < 0.05.

RESULTS

An investigation of 148 elderly subjects with a mean age of 73.6 years (SD = 5.5) was performed, of which 107 (72.3 %) were women. The marital status "with a partner," that encompassed married or in common-law married individuals was predominant in the study (60.1 %). White skin color (82.4 %) and education also predominated — 51.1 % of subjects had studied beyond elementary school. Of the elderly subjects evaluated, 23.6 % lived alone and 85.8 % had their own houses. Table I shows the sociodemographic variables of interest.

Table II shows the prevalence of sarcopenia (14.2 %) found by the present study, considering that 47.3 % of the sample had

Table I. Demographic and socioeconomical characteristics of elderly users of the health care system of Marau, 2015 (n = 148)

Variables	Categories	*n*	(%)
Gender	Male	41	27.7
	Female	107	72.3
Age	65 to 74 years	85	57.4
	75 years or more	63	42.6
Skin color	White	122	82.4
	Non-white	26	17.6
Marital status	With a partner	89	60.1
	Without a partner	59	39.9
Education	None	33	22.3
	Elementary/High school	115	77.7
Living alone	Yes	35	23.6
	No	113	76.4
Own house	Yes	127	85.8
	No	21	14.2

Table II. BMI, prevalence of sarcopenia, and diagnostic criteria for elderly users of the health care system of Marau, 2015 (n = 148)

Variables	Categories	N	(%)
BMI	Eutrophy	55	37.2
	Low weight	16	10.8
	Excess weight*	77	52
Hand grip strengh	Appropriate	78	52.7
	Low FPM	70	47.3
Muscle mass	Appropriate	119	80.4
	Low MM	29	19.6
Speed gait†	> 0,8	68	46.3
	≤ 0,8	79	53.7
Sarcopenia†	Without sarcopenia	119	80.4
	Pre-sarcopenia	8	5.4
	With sarcopenia	21	14.2

**Excess weight: overweight and obesity. †n = 147 (valid answers).*

Table III. Association between sarcopenia and both demographic and socioeconomical characteristics of elderly users of the health care system of Marau, 2015 (n = 148)

Variables	Categories	Sarcopenia				*p*-value*
		No		Yes		
		n	(%)	n	(%)	
Gender	Male	33	80.5	8	19.5	0.186
	Female	94	87.9	13	12.1	
Marital status	With a partner	77	86.5	12	13.5	0.471
	Without a partner	50	84.7	9	15.3	
Skin color	White	103	84.4	19	15.6	0.239
	Non-white	24	92.3	2	7.7	
Age group	65 to 74 years	77	90.6	8	9.4	0.046
	75 years or more	50	79.4	13	20.6	
Education	None	21	75.8	8	24.2	0.060
	Elementary/High school	102	88.7	13	11.3	
Living alone	Yes	30	85.7	5	14.3	0.588
	No	97	85.8	16	14.2	
Own house	Yes	107	84.3	20	15.7	0.159
	No	20	95.2	1	4.8	
MNA	At risk/Malnourished	10	71.4	4	28.6	0.115
	Well nourished	117	87.3	17	12.7	
BMI	Low weight	4	25	12	75	< 0.001
	Eutrophy and/or excess weight	123	93.2	9	6.8	

** Fisher's exact test.*

low hand-grip strength and 53.7 % inadequate gait speed. As for BMI, 10.8 % of the elderly participants were considered to be low-weight.

Table III shows the association between sarcopenia and sociodemographic characteristics. The highest prevalence of sarcopenia was obtained in the male gender (19.5 %), with marital status "without partner" (15.3 %), white skin color (15.6 %), and no education (24.2 %), having their own house (15.7 %), and being 75-year-old or beyond (20.6 %). Regarding nutritional evaluations, according to the MNA, the subjects that were at risk of malnutrition or malnourished had a higher prevalence of sarcopenia (28.6 %), as had those with a BMI of low weight. However, only older age ($p = 0.046$) and BMI ($p < 0.05$) were statistically significant. The results listed in table III show that 75 % of the low-weight senior participants were sarcopenic.

DISCUSSION

The prevalence of sarcopenia in this study (14.2 %) was similar to that observed in other researches performed in Brazil using the EWGSOP criteria. In the COMO VAI study, performed in Pelotas, Rio Grande do Sul, Brazil, a 13.9 % rate of sarcopenia was found among the elder population (15), and the SABE study, which was performed using the equation posited by Lee et al. to calculate muscle mass, found a prevalence of 15.4 % for sarcopenia among the seniors living in the city of Sao Paulo (14). The study by Almeida dos Santos et al., which was performed in elderly subjects with no physical or cognitive restriction who were seen in the geriatric walk-in clinic of a college hospital in north-eastern Brazil, with a mean age of 73.9 years, found a prevalence of 18 % for sarcopenia (23). The Toledo Study of Healthy Aging (TSHA), a study of community-dwelling elderly individuals with a mean age of 75.42 years, 21.8 % of participants were considered sarcopenic according to the EWGSOP criteria (24).

This research did not find an association between sarcopenia and sex, although sarcopenia was more common in men. Identical results were reported by Lee et al. (10), Lin et al. (11), Davies et al. (24), and Espinel-Bermúdez et al., who studied 1,177 subjects (median age, 68.4 years) living in Mexico City, and reported a 9.9 % rate of sarcopenia in older people (9.0 % females and 11.1 % males) using the EWGSOP criteria (25).

However, in the studies by Alexandre et al. (14) and Barbosa-Silva et al. (15) prevalence was higher in elderly women, although no significant statistical differences between genders were found. Massanes et al. (26), in a study performed on Spanish elderly subjects in Barcelona, found a 10 % sarcopenia rate in men, and a 33 % sarcopenia rate in women; they used BIA to evalu-

ate muscle mass and a young population as reference for their cutoffs, and also assessed muscle function through the use of Barthel's index rather than gait speed as in our study. Patel et al. showed a prevalence of sarcopenia of 4.6 % in men and 7.9 % in women in the United Kingdom, with a mean age of 67 years (12). We believe that this lower prevalence as compared to the one found in our study is due to the younger mean age of their subjects, and to socioeconomical and anthropometric differences between the two populations; also, they measured muscle mass by using skinfold thickness.

The "Salud Bienestar y Envejecimiento (SABE)" study, a cross-sectional study conducted in Bogotá, Colombia, that collected sociodemographic, health, cognitive, and anthropometric parameters from 2,000 community-dwelling adults aged 60 years and older, and that assessed sarcopenia following the European Working Group on Sarcopenia in Older People algorithm, identified 166 (11.5 %) elderly subjects with sarcopenia, and reported that older age and female gender are significantly associated with this condition (27). Espinel-Bermúdez et al., using 2012 National Health and Nutrition Survey data, analyzed a sample of 5,046 older adults. The prevalence of sarcopenia in their study was 13.30 %; the condition was more prevalent in women (9.57 %), and increased with advanced age (75.87 ± 8.81 age, $p < 0.001$) (28).

Regarding the association of sarcopenia with elderly or advanced age individuals, the studies by Arango-Lopera et al. (7), Alexandre et al. (14), Volpato et al. (29), Barbosa-Silva et al. (15), and Almeida dos Santos et al. also demonstrated that sarcopenia increases with advanced age (23). The same was shown by the pivotal studies that informed the diagnostic criteria issued by EWGSOP (10,30-32).

It has been estimated that from 40 years of age on a loss of muscle mass of about 5 % occurs in each decade, resulting in a reduction of about 30 % after age 70 (33). In Brazilian women, for example, a decrease in muscle mass of approximately 17 % was measured after two decades from age 40 (34). Human muscle tissue is made up of different types of fiber — type-I fibers, aerobic, slow contraction; type-II fibers, anaerobic,fast contraction. Type-I fibers seem to be more resistant to ageing-related atrophy, at least until 70 years of age, wheras type-II fibers decrease by 20 %-50 % as years go by. These physiological changes may explain the increased prevalence of sarcopenia in older subjects.

The statement that subjects with sarcopenia have a high prevalence of malnourishment (35) was confirmed in our study, where 28.6 % of sarcopenic subjects were malnourished or at risk of malnutrition according to the MNA, and 75 % of subjects with low-weight BMI were sarcopenic. This was also shown by Almeida dos Santos et al. (23), who found an average BMI of 24.6 % kg/m^2, that 26 % of their elderly subjects were low-weight, and that 61.5 % of the latter had a diagnosis of sarcopenia. In the study by Alexandre et al. (14) seniors with sarcopenia were significantly more prone to be at risk for malnourishment, their rate being 26 % according to MNA scores.

The present study found a greater occurrence of sarcopenia in elderly subjects without a partner and with low or no education, as was also reported by Alexandre et al. (14), Barbosa-Silva et al. (15), and Almeida dos Santos et al. (23). Volpato and contributors confirmed in their study the role of higher education as a protective factor for good health, showing that the years of education were inversely associated with the possibility of suffering from sarcopenia (15).

The criteria predominantly used for the diagnosis of sarcopenia were gait speed and hand-grip strength. Of the 197 subjects evaluated by Landi et al., 143 had reduced gait speed (9), as was also the case in the study by Alexandre et al., where sarcopenic subjects were significantly more prone to have their gait speed reduced (14).

The low hand-grip strength (HGS) found in this research is consistent with the study by Arango-Lopera et al., which was performed in Mexico City in elderly subjects with a mean age of 78.5 years, reported that 47.8 % of the sample had low HGS (7). The same was reported by the study "COMO VAI", where the rate found was 34.1 % (15).

Bianchi and colleagues showed that assessing muscle weakness and lower muscle mass provided a predictive value similar to that of the EWGSOP algorithm, suggesting that gait speed evaluation may not be essential to the definition of sarcopenia. Furthermore, particularly in hospitalized or institutionalized elderly individuals, the evaluation of gait speed may be impracticable due to functional limitations and patient disability. Therefore, to reach a diagnosis of sarcopenia in patients who are unable to walk and with low muscle mass measuring HGS may be a useful alternative. All in all, the authors conclude that the EWGSOP algorithm is a good predictor of physical disability, hospitalization, and death (36).

CONCLUSIONS

The prevalence of sarcopenia found in this study (14.2 %) is consistent with that reported by national and international studies. Our results show the importance of assessing sarcopenia in the primary health care setting, aiming at its prevention and early treatment. This will result in containment of the high costs associated with geriatric care, which is an issue in the current context of population aging.

The variables that exhibited an association with sarcopenia were older age and a muscle mass index characterized by low weight. Even though no significant association was found between MNA score and sarcopenia, a higher proportion of sarcopenic subjects was classified as at risk of malnutrition or malnourished.

These results show the importance of assessing nutritional status together with potential sarcopenia, as this syndrome is known to be highly associated with inadequate food intake, which is often impaired among the elderly because of economical and/or physiological factors related to changes in taste, dentition, and digestion.

Health services need to adapt to new demands, aiming to maintain quality of life for ageing people, prolonging their lives, and favoring thereby a true "active aging"process.

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