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Original

Sarcopenia and associated factors in older adults in Primary Health Care: a cross-sectional study in the Brazilian Northeast

Sarcopenia y factores asociados en adultos mayores en Atención Primaria a la Salud: Un estudio transversal en el nordeste brasileño

Sarcopenia e fatores associados em pessoas idosas da Atenção Primária à Saúde: um estudo transversal no Nordeste brasileiro

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Abstract

Objective: To determine the prevalence of sarcopenia and verify the association of this outcome with sociodemographic and health factors in community-dwelling older adults in Primary Health Care (PHC). **Methods**: Cross-sectional study with a representative sample of older adults attended at the PHC and living in private households in a municipality in Northeastern Brazil. Anthropometric variables (adductor pollicis muscle, calf circunference and body mass index) were collected and a coded questionnaire was used as a global assessment tool, where sociodemographic information and health data were obtained. The outcome was sarcopenia identified according to the criteria of the European Working Group on Sarcopenia in Older People II. A descriptive analysis was performed with Pearson's chi-square test and binomial logistic regression. **Results**: A total of 316 older adults were evaluated and a prevalence of 13.6% of sarcopenia was observed. In the logistic regression, a significant association was observed between sarcopenia and female gender (OR = 0.41; 95% CI: 0.18 - 0.95); age group >80 years (OR = 3.25; 95% CI: 1.19-8.90); worse or uncertain self-perception of health (OR = 0.24; 95% CI: 0.08-0.70); underweight (OR = 6.39; 95% CI: 2.69-15.18); and nutritional risk (OR = 3.83; 95% CI: 1.62-9.06). **Conclusions**: A significant prevalence of sarcopenia was observed among older adults followed in PHC, highlighting the importance of evaluating specific groups that were at higher risk. These findings highlight the importance of interventions for the prevention and management of sarcopenia, particularly in the older population.

Keywords: Sarcopenia, Elderly, Aging, Primary Health Care.

Resumen

Objetivo: Determinar la prevalencia de sarcopenia y verificar la asociación de este desenlace con factores sociodemográficos y de salud en adultos mayores que viven en la comunidad en Atención Primaria de Salud (APS). **Métodos**: Estudio transversal con muestra representativa de adultos mayores atendidas en APS y residentes en domicilios particulares en un municipio del nordeste brasileño. Se recolectaron variables antropométricas (músculo aductor del pulgar, circunferencia de la pantorrilla, índice de masa corporal) y, como herramienta de evaluación global, se utilizó un cuestionario codificado, del cual se obtuvieron informaciones sociodemográficas y datos de salud. El resultado fue la sarcopenia identificada según los criterios del European Working Group on Sarcopenia in

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Older People II. Se realizó un análisis descriptivo, con test X2 de Pearson y la regresión logística binomial. **Resultados**: Se evaluaron 316 ancianos y se observó una prevalencia de 13,6% de sarcopenia. En la regresión logística, se atisbó una asociación significativa entre la sarcopenia y el sexo femenino (OR = 0,41; IC 95%: 0,18 - 0,95); franja de edad >80 años (OR = 3,25; IC 95%: 1,19-8,90); autopercepción de salud empeorada o incierta (OR = 0,24; IC 95%: 0,08-0,70); bajo peso (OR = 6,39; IC 95%: 2,69-15,18); y riesgo nutricional (OR = 3,83; IC 95%: 1,62-9,06). **Conclusiones**: Se observó prevalencia significativa de sarcopenia entre los adultos mayores acompañados en la APS, destacando la importancia de evaluar grupos específicos que presentaron un mayor riesgo. Estos hallazgos resaltan la importancia de intervenciones para prevención y manejo de la sarcopenia, particularmente en la población anciana.

Palabras clave: Sarcopenia, Adulto Mayor, Envejecimiento, Atención Primaria en Salud.

Resumo

Objetivo: Determinar a prevalência de sarcopenia e verificar a associação desse desfecho com fatores sociodemográficas e de saúde, em idosos comunitários da Atenção Primária à Saúde (APS). **Métodos**: Estudo transversal com amostra representativa de pessoas idosas assistidas pela APS e residentes em domicílios particulares em um município do Nordeste brasileiro. Foram coletadas variáveis antropométricas (músculo adutor do polegar, circunferência da panturrilha e índice de massa corporal) e como ferramenta de avaliação global foi utilizado um questionário codificado, onde foram obtidas informações sociodemográficas e dados de saúde. O desfecho foi a sarcopenia identificada segundo os critérios do European Working Group on Sarcopenia in Older People II. Foi realizada análise descritiva, com teste Qui-quadrado de Pearson e a regressão logística binomial. **Resultados**: Foram avaliados 316 idosos e observada uma prevalência de 13,6% de sarcopenia. Na regressão logística, observou-se associação significativa entre a sarcopenia e o sexo feminino (OR = 0,41; IC 95%: 0,18 - 0,95); faixa etária >80 anos (OR = 3,25; IC 95%: 1,19-8,90); auto percepção de saúde pior ou incerta (OR = 0,24; IC 95%: 0,08-0,70); baixo peso (OR = 6,39; IC 95%: 2,69-15,18); e risco nutricional (OR = 3,83; IC 95%: 1,62-9,06). **Conclusões**: Observou-se prevalência significativa de sarcopenia entre as pessoas idosas acompanhadas na APS, destacando a importância de avaliar grupos específicos que apresentaram maior risco. Estes achados ressaltam a importância de intervenções para prevenção e manejo da sarcopenia, particularmente na população idosa.

Palavras-chave: Sarcopenia, Idoso, Envelhecimento, Atenção Primária à Saúde.

Introduction

The human aging process brings with it a series of physiological, anatomical, structural and metabolic changes. Among these changes, there is a change in body composition, with emphasis on the decrease in muscle mass (1,2). This reduction, however, is not necessarily related to a pathological process, except in more serious conditions, in which it can be defined as sarcopenia. The origin of the expression has its etymology in Greek, whose term “sark” means flesh and “penia” means loss (3,4).

Currently, this disorder is characterized by a progressive and widespread decline in muscle strength and mass, associated with an increased risk of adverse outcomes (5,6). Sarcopenia can be primary, characterized by aging-related muscle loss, leading to decreased strength and muscle mass, contributing to negative health consequences, affecting mobility, balance, physical performance and quality of life in elderly people, or secondary sarcopenia, which may arise from pathological conditions unrelated to aging (7). However, primary

sarcopenia is not an inevitable consequence of aging, therefore, it can be both prevented and treated (4).

The identification of sarcopenia associated with the aging process depends on the instrument used for its identification, which varies according to the equipment, techniques and cutoff points used. In view of these variations, a systematic review including 263 studies conducted worldwide, with more than 600 thousand participants, presented the global prevalence of sarcopenia in older adults ranging from 0.2% to 86.5% (8). Aspects such as the local scenario also contribute to the discrepancies between the values, since lower-income countries tend to have less favorable health conditions (9). Considering the factors that may be associated with sarcopenia, the literature has shown that age, marital status, functional dependence, low weight, malnutrition and risk of malnutrition, in addition to the presence of diseases, are aspects that are related to the outcome in community-dwelling older adults (10).

In this sense, in addition to knowing the prevalence of sarcopenia, it is necessary to identify aspects that may establish a relationship with the outcome, in order to enable early detection and intervention of the problem. Understanding this scenario is relevant in the population studied, especially due to the role played by reduced strength and muscle mass as predictors of functional disability and death in older adults (11).

Thus, considering the scenario involving the increase in global population aging, as well as the impacts that sarcopenia can have on the health and functionality of older adults, it is imperative to understand how this condition manifests itself in this population group, especially among those older adults monitored by multidisciplinary Primary Health Care (PHC) teams. Identifying factors that may be related to sarcopenia, favoring the anticipation of interventions, can contribute to aging with a better quality of life.

Objectives

To determine the prevalence of sarcopenia and verify the association of this outcome with sociodemographic and health factors in community-dwelling older adults in Primary Health Care (PHC).

Materials and Methods

This study was conducted following the guidelines of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines, which provide recommendations for enhancing the quality of observational study reporting, in order to ensure transparency and quality of the study (12). Therefore, this is a cross-sectional, quantitative study conducted with older adults from the city of Barreiras, Bahia, Brazil. This city is located in the Northeast region of the country and has an estimated population of 159,000 inhabitants (13).

The study was carried out within the scope of the PHC, with older adults (60 years or older), registered in 23 Family Health Strategy (ESF) teams of the studied municipality, during the data collection period (2017/2018). The total older population at the time was 7,449 older adults, of which 3,541 were male and 3,908 were female; however, 4,828 older people were identified as being served by the existing ESF (eSF) teams (14). Thus, the sample calculation used a power of 95%, a sampling error of 5%, and a probability of the event of 50%, since the initial project from which this study originated did not present a single outcome, resulting in 356 individuals and ensuring the representativeness of the sample.

Stratified sampling was performed with proportional allocation by eSF, followed by simple random sampling. The steps for calculating and selecting the sample, including the drawing of participants by stratum, were carried out with the help of the OpenEpi software, version 3, an open source calculator, and Microsoft Office Excel.

Older adults, without gender restrictions, living in private homes in the urban perimeter of the city of Barreiras, selected by lottery and who agreed to participate in the research by signing or fingerprinting the ICF were included in the study.

Older adults who had functional and/or cognitive disabilities that could compromise or make it impossible to apply the questionnaires and other assessments were excluded from the study, as well as those who lived in Long-Term Care Facilities for Older Adults (LTCF), were hospitalized during the data collection period, had some restriction on performing the bioelectrical impedance test or other collection procedure, as well as those who refused to participate in the research.

The data for this study were collected by a trained team and standardized collection techniques were previously applied. The collection procedures were carried out at the Family Health Units (FHU) of the municipality, after an alignment meeting with the Community Health Agents (CHAs). To recruit the participants, the selected older adults received an initial visit from the CHAs to deliver the invitations, schedule the interviews and explain the research procedures.

As a global assessment tool, a previously coded questionnaire was used, through which information related to sociodemographic characteristics and health data was obtained. The global assessment questionnaire was used to obtain information related to sociodemographic characteristics, namely: sex (male or female), age group (60 to 79 years or 80 or older), race/color (white and other or black and brown), education (less than 4 years or 4 years or more), marital status (with or without a partner). Health and lifestyle assessment variables were also obtained: medication use (less than 3 per day or 3 or more per day), alcohol consumption (yes or no), and smoking (yes or no).

To identify sarcopenia (outcome variable), parameters from the European Consensus on Sarcopenia - European Working Group on Sarcopenia in Older People (EWGSOP) II were used, whose classification is divided into: probable sarcopenia, sarcopenia and severe sarcopenia (15). However, for this investigation, older adults diagnosed with sarcopenia were considered, regardless of severity.

In this study, according to the Nutritional Therapy Guidelines for Aging of the Brazilian Society of Parenteral and Enteral Nutrition (SBNPE/BRASPEN), the Handgrip Strength (HGS) method was used to identify probable sarcopenia, which assesses muscle strength, and to confirm sarcopenia, the assessment of muscle mass was incorporated by measuring the calf circumference (CC) (6).

The HGS measurement was performed using a Saehan Model SH5001 hydraulic hand dynamometer (Saehan Corporation, 973, Yangdeok-Dong, Masan 630-728, Korea), set to the second position of the handle, according to the guidelines of the American Society of Hand Therapists (ASHT) (16). Two measurements were performed on each hand and the one with the highest value was identified. The cutoff points considered for determining low HGS were those proposed by SBNPE/BRASPEN for the Brazilian population (6).

Calf circumference (CC) was measured with the individual seated, in the position closest to the end of the chair, with the feet slightly apart and fixed on the floor and the leg forming a 90º angle (17). Using an inelastic measuring tape, graduated in millimeters, positioned at the maximum circumference of the calf, recording the measurement in centimeters. The cutoff points used were 34 cm for men and 33 cm for women (18).

Regarding the independent variables, anthropometric data, and food security, nutritional, and health status indicators were collected. For anthropometric variables, the Body Mass Index (BMI) was calculated from weight measurement and height estimated by knee height (19). Weight was measured using a portable digital scale, Líder (Líder Balanças, Araçatuba, São Paulo, Brazil), model P200M, without a column, with a capacity of 200 kg and accuracy of 0.1 kg. Height was estimated based on knee height (KH) (19), using a wooden pediatric anthropometric ruler (infantometer) with an accuracy of 0.5 cm, Taylor (São Paulo, Brazil). To standardize height measurement, the value was estimated, considering that some older adults had limitations for direct measurement. The cutoff points proposed by PAHO (20) were considered for BMI classification. The phase angle (PA) was obtained using segmental, octopolar Bioelectrical Impedance Analysis (BIA) (InBody Co., Ltd. InBody Bldg, Gangnam-gu, Seoul, Korea), model S10. The PA was obtained by the formula Reactance (Xc)/Resistance (R) x 180º/π, and transformed into the standardized PA (SPA): (measured PA – mean PA (for age and sex) / Standard Deviation). The cutoff point used was –1.65, corresponding to the fifth percentile for the healthy Brazilian population (21, 22).

For the food and nutritional variables, the Food Security (FS) situation and nutritional status were used. FS was analyzed using the Brazilian Food Insecurity Scale (EBIA) (23). A score was then generated from the responses, which classifies the households as FS, mild Food Insecurity (FI), moderate FI and severe FI. Nutritional status was assessed by the Mini Nutritional Assessment (MNA), which classified the older adults as normal or at nutritional risk (24). Arm circumference (AC), a measurement present in the MNA, was measured using an inelastic tape measure, graduated in millimeters, following the guidelines of Lohman, Roche,

Martorell (25).

Finally, information regarding health variables was obtained by measuring the thickness of the adductor pollicis muscle (APM) and self-perceived health status. The APM was measured using a Sanny AD1009C caliper with a precision of 0.1 mm and a mandibular pressure of 10 g/mm² (American Medical do Brasil, São Bernardo do Campo, São Paulo, Brazil), as recommended by Lameu et al. (26) and Bragagnolo et al. (27). The cutoff points used were 13.4 mm for men and women (27). Self-perceived health was investigated using the question in the MNA: "Compared to other people of the same age, how does the patient rate his or her own health?" The response ranged from 0.0 for worse, 0.5 for "does not know", 1.0 for "equal" and 2.0 for "better" (24).

Data analysis involved descriptive statistics, with a measure of central tendency (simple arithmetic mean) and a measure of absolute dispersion (standard deviation), in addition to simple frequency analysis (absolute and relative). To verify the association between categorical variables, Pearson's chi-square test or Fisher's exact test were performed, when necessary.

Binary logistic regression was performed with block entry, presenting the crude and adjusted odds ratios (OR) and their respective 95% confidence intervals, with variables that showed association with $p<0.20$ being included in the model. The quality of the model fit was assessed based on the Hosmer-Lemeshow test.

The assumptions regarding the nature of the variables, such as multicollinearity, absence of outliers and expected counts greater than five observations for logistic regression, were fully met. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 20.0 software, and a 5% level of statistical significance was used for all tests.

The study was analyzed and approved by the Research Ethics Committee (opinion no. 1,447,361/2016), in accordance with the standards set forth by the National Health Council of the Ministry of Health (Resolution no. 466/12). All study participants participated voluntarily and signed or fingerprinted the Informed Consent Form (ICF).

Results

A total of 316 older adults participated in this study, with 11.2% of losses in relation to the a priori sample calculation, related to refusals, non-location or non-attendance of the participant on the collection days. The a post hoc power calculation was performed, considering nutritional risk as the main exposure and the prevalence of the outcome among those exposed of 24.1%, maintaining the sample power greater than 95%.

There was a predominance of females (61.7%) and the overall mean age was 70.4 years (+7.3). Demographic data and general characteristics of the sample are presented in Table 1. Among the participants, 51.9% declared themselves black or brown, 72.8% had less than four years of schooling and 51.6% reported having a partner. The majority of the older adults (87.3%) were between 60 and 79 years old. According to the EBIA, 25.6% had moderate and severe FI. The prevalence of the outcome (sarcopenia) in the sample was 13.6%.

Table 1. Characterization of older adults assessed according to sex. Barreiras, Bahia, Brazil, 2017/2018.

Variable	n(%)	Male n (%)	Female n (%)
Race/Color			
White and others	152 (48.1)	61 (40.1)	91 (59.9)
Black/brown	164 (51.9)	60 (36.6)	104 (63.4)
Schooling			
≥ 4 years	86 (27.2)	31 (36.0)	55 (64.0)
< 4 years	230 (72.8)	90 (39.1)	140 (60.9)

Marital Status			
With a partner	163 (51.6)	84 (51.5)	79 (48.5)
Without a partner	153 (48.4)	37 (24.2)	116 (75.8)
Age group (years)			
60 – 79	276 (87.3)	102 (37.0)	174 (63.0)
80 or older	40 (12.7)	19 (47.5)	21 (52.5)
Food Security			
FS and mild FI	235 (74.4)	99 (42.1)	136 (57.9)
Moderate FI and severe FI	81 (25.6)	22(27.2)	59 (72.8)
APM			
Without low APM	91 (28.8)	57 (62.6)	34 (37.4)
With low APM	225 (71.2)	64 (28.4)	161 (71.6)
BMI			
Without underweight	208 (65.8)	73 (35.1)	135 (64.9)
With underweight	108 (34.2)	48 (44.4)	60 (55.6)
Nutritional Status			
Normal	204 (64.6)	89 (43.6)	115 (56.4)
Nutritional risk	112 (35.4)	32 (28.6)	80 (71.4)
Self-perceived health			
Same or better	230 (72.8)	95 (41.3)	135 (58.7)
Worse or unsure	86 (27.2)	26 (30.2)	60 (69.8)
Quantity of medications			
< 3	165 (52.2)	75 (45.5)	90 (54.5)
≥ 3	151 (47.8)	46 (30.5)	105 (69.5)
Alcohol consumption			
No	272 (86.1)	94 (34.6)	178 (65.4)
Yes	44 (13.9)	27 (61.4)	17 (38.6)
Smoking			
No	282 (89.2)	104 (36.9)	178 (63.1)
Yes	34 (10.8)	17 (50.0)	17 (50.0)
Standardized phase angle			
SPA > -1.65º	269 (85.1)	101(37.5)	168 (62.5)
SPA < -1.65°	47 (14.9)	20 (42.6)	27 (57.4)
Sarcopenia			
Without sarcopenia	273 (86.4)	98 (35.9)	175 (64.1)
With sarcopenia	43 (13.6)	23 (53.5)	20 (46.5)

FS: Food Security; FI: Food Insecurity; APM: Adductor Pollicis Muscle; BMI: Body Mass Index; SPA: Standardized Phase Angle

Source: Prepared by the authors.

Table 2 presents the assessment of the association between sarcopenia and the study variables. An association between sarcopenia and sex, age group, BMI, MNA and self-perceived health was observed ($p < 0.05$). However, for inclusion in the logistic regression model, the variables race/color, education and APM were also considered ($p < 0.2$).

Table 2: Bivariate analysis of older adults assessed according to the presence or absence of sarcopenia. Barreiras, Bahia, Brazil, 2017/2018.

Variable	n(%)	Male n (%)	Female n (%)
Race/Color			
White and others	152 (48.1)	61 (40.1)	91 (59.9)
Black/brown	164 (51.9)	60 (36.6)	104 (63.4)
Schooling			
≥ 4 years	86 (27.2)	31 (36.0)	55 (64.0)
< 4 years	230 (72.8)	90 (39.1)	140 (60.9)
Marital Status			
With a partner	163 (51.6)	84 (51.5)	79 (48.5)
Without a partner	153 (48.4)	37 (24.2)	116 (75.8)
Age group (years)			
60 – 79	276 (87.3)	102 (37.0)	174 (63.0)
80 or older	40 (12.7)	19 (47.5)	21 (52.5)
Food Security			
FS and mild FI	235 (74.4)	99 (42.1)	136 (57.9)
Moderate FI and severe FI	81 (25.6)	22(27.2)	59 (72.8)
APM			
Without low APM	91 (28.8)	57 (62.6)	34 (37.4)
With low APM	225 (71.2)	64 (28.4)	161 (71.6)
BMI			
Without underweight	208 (65.8)	73 (35.1)	135 (64.9)
With underweight	108 (34.2)	48 (44.4)	60 (55.6)
Nutritional Status			
Normal	204 (64.6)	89 (43.6)	115 (56.4)
Nutritional risk	112 (35.4)	32 (28.6)	80 (71.4)
Self-perceived health			
Same or better	230 (72.8)	95 (41.3)	135 (58.7)
Worse or unsure	86 (27.2)	26 (30.2)	60 (69.8)
Quantity of medications			
< 3	165 (52.2)	75 (45.5)	90 (54.5)

≥ 3	151 (47.8)	46 (30.5)	105 (69.5)
Alcohol consumption			
No	272 (86.1)	94 (34.6)	178 (65.4)
Yes	44 (13.9)	27 (61.4)	17 (38.6)
Smoking			
No	282 (89.2)	104 (36.9)	178 (63.1)
Yes	34 (10.8)	17 (50.0)	17 (50.0)
Standardized phase angle			
SPA > -1.65º	269 (85.1)	101(37.5)	168 (62.5)
SPA < -1.65°	47 (14.9)	20 (42.6)	27 (57.4)
Sarcopenia			
Without sarcopenia	273 (86.4)	98 (35.9)	175 (64.1)
With sarcopenia	43 (13.6)	23 (53.5)	20 (46.5)

FS: Food Security; FI: Food Insecurity; APM: Adductor Pollicis Muscle; BMI: Body Mass Index; SPA: Standardized Phase Angle
* Pearson's Chi-square test: $p < 0.05$.
** Pearson's Chi-square test: $p < 0.20$
*** Fisher's Exact Test.
Source: Prepared by the authors.

Regarding the binary logistic regression performed, three models were proposed to evaluate the association between sarcopenia and the factors studied that presented a p-value <0.20 in the bivariate analysis. The variables were grouped in each model according to their characteristics, with model I consisting of sex, age group, schooling level and race/color. Model II included, in addition to the previous variables, self-perception of health and model III also included BMI, MNA and APM.

In the final model, a significant association was observed between sarcopenia and female gender (OR = 0.41; 95% CI: 0.18 - 0.95); age group over 80 years (OR = 3.25; 95% CI: 1.19-8.90); worse or uncertain self-perception of health (OR = 0.24; 95% CI: 0.08-0.70); low weight according to BMI (OR = 6.39; 95% CI: 2.69-15.18); and nutritional risk (OR = 3.83; 95% CI: 1.62-9.06). Table 3 presents the results of the three binary logistic regression models.

Table 3: Binary logistic regression models predicting the association between sarcopenia and associated factors in the older adults evaluated. Barreiras, Bahia, Brazil, 2017/2018.

Variables	Model I OR (95% CI)	Model II OR (95% CI)	Model III (%) OR (95% CI)
Sex (Female)	0.51(0.26-0.99)*	0.54 (0.27-1.05)	0.41(0.18-0.95)
Age group (80 or older)	3.81 (1.75-8.29)*	3.26 (1.47-7.23)*	3.25 (1.19-8.90)*
Schooling (< 4 years)	1.61 (0.69-3.72)	1.80 (0.75-4.06)	1.44 (0.56-3.71)
Race/color (Black/brown)	0.58 (0.29-1.15)	0.57 (0.29-1.13)	0.48 (0.22-1.05)
Self-perception of health (Worse or unsure)		0.47 (0.18-1.21)	0.24 (0.08-0.70)*
BMI (With underweight)			6.39 (2.69-15.18)*
Nutritional status (Nutritional risk			3.83 (1.62-9.06)*
APM (With low APM)			1.33 (0.48-3.63)

BMI: Body Mass Index; APM: Adductor Pollicis Muscle; OR: Odds Ratio; CI: Confidence Interval.
*p< 0.05.
Hosmer-Lemeshow test: p = 0.852 (model I); p = 0.567 (model II); p = 0.840 (model III).
Source: Prepared by the authors

Discussion

In the present study, the prevalence of sarcopenia was 13%, which is significant given the relevance of this outcome for the older population. This result should be interpreted as a warning sign, since the presence of sarcopenia can lead to significant impairments in the functionality of people at this stage of life. HGS as a measure of muscle strength and CC as a measure of the amount of muscle mass were the indicators used to identify this outcome, which showed a slight predominance in males. Among the variables studied in this investigation with community-dwelling older adults from PHC, the following were associated with sarcopenia: sex, age group, nutritional status according to BMI and MNA, and self-perceived health.

Studies on the prevalence of sarcopenia have shown different results in the literature, both in Brazil and in other countries, and this fact may be associated with the heterogeneous characteristics of the samples studied. In older Brazilians, the prevalence of sarcopenia ranged from 4.8% to 62% (28). In the United States, in people over 50 years of age, this prevalence was 15.7% (29). Results of a review on the global prevalence of sarcopenia indicated a range of 10 to 27% (8). Different protocols were used to identify the outcome, with different techniques and interpretations of reference values, producing this variation in prevalence (30).

Considering the results obtained, it was possible to compare them with other findings in the literature, especially studies with samples whose context presented similar characteristics in relation to the studied population. In a cross-sectional study, carried out with 280 community-dwelling older adults from a municipality in the Northeast, sarcopenia was classified according to EWGSOP I and II, and the prevalence identified was 12.2% and 7.9%, respectively (31). The small differences found between the investigations can be attributed to the different strategies used to identify sarcopenia. In another study, conducted with 258 older individuals from a city in the southern region of Brazil, a prevalence of 55.8% of sarcopenia was observed (32). Even

though some methods similar to those used in the present study for assessment and diagnosis were used, it is noteworthy that the prevalence is higher than that found in this study. Such discrepancies can be explained by the fact that the aforementioned study used a sample with a specific cut, which may have contributed to an overestimation of the findings. Furthermore, it is a region of Brazil with a higher life expectancy and where the average age of the sample was higher, both among men and women.

The variability observed among studies already conducted was also highlighted in a review study on the prevalence of sarcopenic older adults, including data from 26 countries (33). The data from the aforementioned study showed a prevalence of sarcopenia ranging from 4.6% to 22.1%. In addition to the points already raised, aspects such as differences between local contexts, investments in health and disease prevention among older adults, as well as the difficulties in establishing a standardized and specific definition for sarcopenia, may influence the fluctuation of results, which is not capable of minimizing the relevance of the problem, even in situations of lesser occurrence.

Another important result obtained in the present study concerns the factors associated with sarcopenia, including gender. As mentioned, there was a higher occurrence of sarcopenia among older males in the sample evaluated. A study conducted in the United States with 274 men and 493 women also observed a higher frequency among men (19.0%) compared to women (13.0%) (34). It is important to mention that the presence or absence of sarcopenia was determined by means of dual-energy absorptiometry (DXA), a highly accurate and detailed tool for assessing body composition. However, despite the difference in the methodology used, the present study obtained similar results regarding the occurrence of the outcome. In the same direction, in a study carried out in Ceará, northeastern Brazil, a higher frequency of sarcopenia was also observed among men (35). The predominance of sarcopenia observed in males in both studies may be attributed to the more pronounced decline in strength and muscle mass among men compared to women in older people, despite a greater average reserve during adulthood (36).

This study also demonstrated that sarcopenia is associated with older age, specifically in the age group of 80 years or older. In a study conducted with older adults in the United States, it was observed that the prevalence of sarcopenia was higher than 50% in people over 80 years of age (1). Age is an aspect that appears as a modifying factor in muscle strength, since, especially among older adults, a more significant reduction is observed (37). A review study, focusing on updating the subject of sarcopenia, reinforces that the prevalence of this condition, in fact, increases with age; however, there may be variation, depending on the reference values and other diagnostic criteria used (38).

BMI was another aspect associated with sarcopenia. Underweight individuals were approximately six times more likely to have sarcopenia than those who were not considered underweight. Study conducted with community-dwelling older adults in southeastern region of Brazil also found that underweight older individuals were more likely to be sarcopenic (39).

The overall nutritional status of older adults and its relationship with greater susceptibility to sarcopenia may be a result of physiological, metabolic and functional changes, such as a possible reduction in taste and smell sensitivity, decreased digestive capacity, cognitive impairment, among other aspects that may compromise food intake (31). Often, the FI condition may be the scenario for this impaired nutritional status, both due to difficulties in accessing and consuming important foods (40). Thus, nutritional deficiencies may also be present, since there may be a reduction in the consumption and use of macro and micronutrients, which directly reflects on the individual's general health, making them more vulnerable to sarcopenia (41).

In this sense, nutritional risk, identified by the MNA, and sarcopenia were also shown to be related in the present study, a situation that can have a significant impact on the health of older adults. In a study in Brazil, it was observed that older people with malnutrition have a greater chance of having sarcopenia, compared to eutrophic older people (11). Another study that analyzed the relationship between sarcopenia and nutritional status in Portuguese community-dwelling older adults observed that sarcopenic older people were more likely to develop malnutrition or be at risk for malnutrition (42). It is noted that there is a concentration of studies on the general nutritional status and the presence of sarcopenia among institutionalized older people, and this fact may be associated with the greater health vulnerability of these individuals when compared to older adults in

the community (43).

Regarding the aspects associated with the presence of sarcopenia in this study, people who perceived their health as worse or did not know how to respond were less likely to have sarcopenia. Although self-perception of health represents an important indicator of well-being and can assess the needs of an older adults, this fact was not noted in this study (44). In a study carried out in a municipality in the South of Brazil, attended at the PHC, it was observed that sarcopenia, combined with a sedentary lifestyle and pathologies, corroborate a negative self-perception of health, directly affecting the quality of life of the older person (45). The same study observed that among sarcopenic older adults, the majority considered their health to be average or poor. This self-assessment can be justified by the fact that the outcome variable can be associated with reduced mobility and cognitive impairment. However, negative self-perception of health can become a motivating factor for preventive behaviors and seeking care.

In general, this study identified the prevalence of sarcopenia among older adults in PHC and had as a positive aspect the sampling process carried out. It was a sample calculated a priori to ensure its representativeness and whose selection of individuals was carried out based on stratification by eSF and subsequent drawing. Although the sample had some missing data, a post hoc power calculation showed no compromise in the statistical tests. The interest of the research in working with community-dwelling older individuals served in PHC allows greater heterogeneity of individuals, in different clinical conditions and socioeconomic levels, which can contribute to improving the quality of life and health of this population. In addition, important aspects were determined for the elaboration of the regression models, such as the grouping of variables according to their characteristics, the use of the resource of imputation of missing or inconsistent data, as well as all the assumptions for performing the appropriate statistical tests were met.

However, some limitations need to be mentioned, such as the exclusion of older adults with severe physical and/or cognitive disabilities that could compromise data collection. This fact can lead to bias in the results, as well as the exclusion of individuals living in LTCFs and hospitalized individuals. In addition, a methodological choice that can be understood as a limitation is the cross-sectional design, related to reverse causality and possible confusion that are not justified due to the design used. The application of anthropometry for muscle mass quantification can also be considered a limitation, emphasizing the need for future studies that incorporate assessment through Dual-energy X-ray Absorptiometry (DXA). Another limitation of this study is the time interval between data collection and publication. Nevertheless, the findings remain valid in addressing the research question, as they reflect trends and patterns that retain relevance.

Conclusion

This study identified a high prevalence of sarcopenia among older adults in primary care, given the magnitude of the repercussions that such a condition can have on this population group. This research suggests a significant association between sarcopenia and sex, age group, nutritional status (assessed by BMI and MNA), and self-rated health. Sarcopenia represents a major public health challenge in older populations, especially in vulnerable socioeconomic contexts, such as those present in low- and middle-income Latin American countries. Early recognition of this condition becomes essential to prevent associated complications, such as falls, frailty and functional dependence. In this way, multidisciplinary monitoring in PHC plays a strategic role, integrating different knowledge and practices to promote healthy aging. In this sense, it is essential to consider actions to promote health and prevent diseases, knowing the prevalence of the outcome and acting on the possible determinants, seeking to ensure a better quality of life for the studied population, through the expansion of social and health policies.

It is important to highlight the importance of carrying out new studies, based on the results found, which can understand the contribution of each variable studied in the sarcopenia process, in order to better understand the relationships evidenced and allow for the design of effective strategies for community health intervention.

Conflict of interest

The authors declare that there is no conflict of interest related to the article.

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