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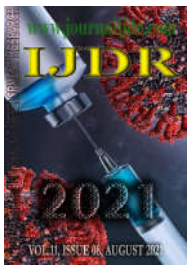

RESEARCH ARTICLE OPEN ACCESS

RISK OF SARCOPENIA AND ASSOCIATED FACTORS IN INSTITUTIONALIZED ELDERLY

Matheus Santos Gomes Jorge*, Marlene Doring, Marilene Rodrigues Portella, Ana Carolina Bertoletti De Marchi and Lia Mara Wibelinger

Faculty of Physical Education and Physiotherapy, University of Passo Fundo, Passo Fundo, Rio Grande do Sul, Brazil

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***Corresponding author:**
Veridiana Camilotti

ABSTRACT

Introduction: The elderly is the group with the highest risk of sarcopenia, a condition defined by loss of muscle mass accompanied by muscular strength and/or function, especially those who live in long-term care facilities. Objective: To verify the risk of sarcopenia in institutionalized elderly. ***Objective:*** To verify the risk of sarcopenia in institutionalized elderly. ***Materials and methods:*** A cross-sectional population-based study that evaluated 479 institutionalized elderly people regarding risk of sarcopenia (SARC-CalF Questionnaire), socioeconomic variables, comorbidities, anthropometric variables, cognitive status (Mini Mental State Examination), nutritional status (Mini Nutritional Assessment), fragility (Fried Phenotype) and functional capacity (Katz Scale). In the statistical analysis were used descriptive statistics, association tests and the crude and adjusted analysis by the Poisson Regression with robust variance. The level of significance was 5%. ***Results:*** The sample consisted of 369 elderly, 79.75 ± 9.52 years, 69.1% women. Two hundred and eighty-two elderly presented risk of sarcopenia (76.4%). Factors associated with the risk of sarcopenia were stroke, Parkinson's disease, dysphagia and frailty ($p \leq 0.05$). ***Conclusion:*** The risk of sarcopenia is high in institutionalized elderly, and stroke, Parkinson's Disease, dysphagia and frailty are predisposing factors.

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INTRODUCTION

Sarcopenia is a muscle disease (muscle insufficiency) characterized by low muscle quantity and/or quality associated with muscle weakness, resulting from complications accumulated throughout life and more commonly affecting the elderly (Cruz-Jentoft *et al*., 2019). Recognized in 2016 as an independent condition by the Tenth Revision of the International Classification of Disease (ICD-10-CM), with code M62.84 (Cao & Morley, 2016), sarcopenia is present in all contexts, as in the community, in hospitals or long-term care facilities for the elderly (Bahat *et al*., 2018). Its prevalence is higher in the institutionalized population, and may exceed 70% in the Brazilian population (Mesquita *et al*., 2017). Several negative health outcomes are associated with sarcopenia in the elderly, such as worsening quality of life, hospital admissions, falls and fractures, functional disability, mortality and even institutionalization itself (Bahat *et al*., 2018). In addition, sarcopenia has a significant economic impact on health services (Mijnarends *et al*., 2016).

Various procedures diagnose sarcopenia. The most used method was proposed by the EWGSOP, which assesses muscle strength (usually through manual dynamometry), muscle quality (usually through dual-emission X-ray densitometry or bioimpedance) and physical function (usually by gait speed test) (Cruz-Jentoft *et al*., 2019). However, only elderly people with good physical and cognitive condition are able to perform it, limiting its applicability to a large portion of institutionalized elderly people who are restricted to wheelchairs or beds (Oliveira Neto, Agrícola, Andrade, Oliveira, & Lima, 2017). Sarcopenia is poorly recognized by the public and underdiagnosed in clinical practice. In view of this, in 2013, a simple, easy and useful screening tool was created to track it in clinical practice: the SARC-F, validated in different populations. Despite this, its main deficiency is low sensitivity, giving it a high risk of misdiagnosis in individuals who may actually have a certain condition (Yang, Hu, *et al*., 2018). Recently, a Brazilian research group improved the SARC-F questionnaire, adding the measurement of the circumference of the calf, renamed SARC-CalF. This significantly improved diagnostic accuracy, especially sensitivity (increasing from 33.3% to 66.7%) (Barbosa-Silva, Menezes, Bielemann, Malmstrom, & Gonzalez,

2016). To date, studies have validated the SARC-CalF questionnaire in different populations and contexts, however, possible predictors for the risk of sarcopenia have not been evaluated, especially in the context of long-term care facilities for the elderly. In this sense, the aim of this study was to verify the risk of sarcopenia in institutionalized elderly and associated factors.

MATERIALS AND METHODS

Design and Ethical Aspects: A multicenter and cross-sectional study was conducted with 479 elderly living at 18 long-term care facilities in three cities located in Rio Grande do Sul State, South Brazil (Passo Fundo, Carazinho and Bento Gonçalves). This study was approved by Ethics and Research Committee of the University of Passo Fundo, unbder protocol 2.097.278, and it is in accordance with Declarations of Helsinki and Brazilian National Health Council. Participants signed the Free and Informed Consent Term with previous explanation and clarification of doubts.

Sample Calculation: According to the international literature, the risk of sarcopenia in institutionalized elderly can range between 36.2% (Urzi, Šimunič, & Buzan, 2017) and 47.3% (Yang, Lu, Jiang, Zeng, & Tang, 2018). To stipulate the minimum reliable sample value, we considered the sample calculation using the mathematical formula "$n=[Z^2.p.(1-p)]/e^2$", which was used in a previous study (Jorge *et al*., 2020). In the formula, the letter "n" corresponds to the desired sample size, the letter "Z" to the deviation from the average acceptable value to reach the desired level of confidence (the most commonly used value for this type of calculation adopted: 1.96), the letter "p" to the expected proportion (adopting the minimum stipulated value of the prevalence of sarcopenia in this population according to the literature: 36.2%) and the letter "e" corresponds to the accepted margin of error (adopting the most commonly used value for this type of calculation: 0.05). Thus, the sample size needed to meet the objective of this study would be approximately 355 institutionalized elderly.

Selection Criteria: We included individuals aged 60 years or over, with physical capacity to perform the proposed tests and who resided full-time at the long-term institutions. We excluded individuals who were unable to answer the SARC-CalF Questionnaire (elderly people with dysarthria, mental confusion, comatose state), hospitalized on the day of the interview or who were in acute periods of chronic-degenerative or infectious diseases. Therefore, we excluded 110 initially recruited elderly (loss of 23.79%).

Data Collect: Data were collected in a single assessment at each long-term care facilities by undergraduate and graduate students from the research group "Padrões de envelhecimento e longevidade: aspectos biológicos educacionais e psicossociais", linked to the Postgraduate Program in Human Aging at the University of Passo Fundo , under the supervision of professors specialized in human aging. The primary outcome of this study was the risk of sarcopenia, assessed using the SARC-CalF Questionnaire, in its Brazilian version. This instrument, developed by a Brazilian research group, is an improvement on the SARC-F Questionnaire and includes six components: strength (lifting a 2.5 kg weight with your arms), walking (walking around a room or in your bedroom) , getting up from a chair (performing the action), climbing stairs (climbing a flight of 10 steps), accident by falls (occurrence of the event in the last year) and muscle mass (calf circumference). The first four components are assigned scores of 0 (no difficulty), 1 (some difficulty) and 2 (very difficult or unable to perform the task) points. The fifth component is assigned a score of 0 (no fall), 1 (1-3 falls in the last year) and 2 (4 or more falls in the last year) points. Finally, the sixth and last component is assigned a score of 0 (calf circumference > 33 cm for women and > 34 cm for men) and 10 (calf circumference ≤ 33 cm for women and ≤ 34 cm for men) points. The final scores on the questionnaire ranged from 0 (lower risk of sarcopenia) to 20 (higher risk of sarcopenia), with the individual scoring for risk of sarcopenia when reaching 10 or more points.

SARC-CalF has a sensitivity of 66.7% (38.4% - 88.2%) and specificity of 82.9% (76.3% - 88.4%), values improved compared to SARC-F which has a sensitivity of 33.3% (11.8% - 61.6%) and specificity of 84.2% (77.6% - 89.4%) (Barbosa-Silva *et al*., 2016). The secondary outcomes analyzed were sociodemographic variables (age and sex), anthropometric variables (body weight, height, body mass index and calf circumference), comorbidities (chronic diseases and health problems), cognitive status, nutritional status, frailty and capacity functional. Sociodemographic variables and comorbidities were collected through the medical records of the elderly. In the case of comorbidities, we consider the presence of some conditions identified in the literature as prevalent in Brazilian elderly (Costa Filho, Mambrini, Malta, Lima-Costa, & Peixoto, 2018; Malta *et al*., 2016). The anthropometric variables we measured were body weight (using a digital scale and recorded in kilograms – kg) and height (using a measuring tape and recorded in meters – m – and centimeters – cm). After obtaining these variables, we calculated the body mass index (BMI) by dividing the body weight value by the height value raised to the second power. For elderly people unable to measure weight and height, these measures were estimated using the Chumlea Equation (Chumlea, Roche, & Steinbaugh, 1985). All anthropometric measurements followed the protocols established by the *International Society for the Advancement of Kinanthropometry* (Stewart, Marfell-Jones, Olds, & Ridder, 2011). The circumference of the calf was measured by means of perimetry in the place of greater muscular volume with a measuring tape (Chumlea *et al*., 1985). However, their values were used in the analysis of the primary outcome (risk of sarcopenia) and not as a secondary outcome.

We evaluated measures of muscle condition considering the three variables used to diagnose sarcopenia according to the European Working Group on Sarcopenia in Older People (EWGSOP): muscle mass, strength and function. We assessed muscle mass using the Lee Equation (Lee *et al*., 2000), which is in strong agreement with the Dual Energy X-Ray Absorciometry (DEXA), considered the gold standard, and validated in the Brazilian population (Rech, Dellagrana, Marucci, & Petroski, 2012), with cutoff points of <8.76kg/m2 for men and <6.47kg/m2 for women (Viana *et al*., 2018). We assessed muscle strength through manual dynamometry, with a Kratos® brand dynamometer (Jorge *et al*., 2019), following the recommendations of the *American Society of Hand Therapists* (MacDermid, Solomon, & Valdes, 2015) and adopted as cutoff points the EWGSOP reference values (27 kg for men and 16 kg for women) (Cruz-Jentoft *et al*., 2019). We evaluated muscle function through the 4-meter walk test (Perry, 2005), considering the result of dividing the distance by the elapsed time, recording it in meters per second (m/s) and adopting the reference values as cutoff points of the EWGSOP (<0.8m/s for both sexes) (Cruz-Jentoft *et al*., 2019). We analyzed the cognitive state through the Mini Mental State Examination (MMSE). This instrument consists of 30 questions grouped into seven categories (Folstein, Folstein, & McHugh, 1975) and with cutoff points adjusted according to education (Bertolucci, Brucki, Campacci, & Juliano, 1994). We assessed the nutritional status through the Mini Nutritional Assessment (MAN), in the short version. This scale consists of six questions that address decreased food intake, weight loss (last three months), mobility, psychological stress or acute illness (last three months), neuropsychological problems and body mass index, with scores ranging from 0 to 14 points and classifying the elderly as malnourished (0 to 7 points), at risk of malnutrition (8 to 11 points) or with normal nutritional status (12 to 14 points) (Rubenstein, Harker, Salvà, Guigoz, & Vellas, 2001). We verified frailty through Fried's Phenotype, where we used four of the five proposed criteria, which are: unintentional weight loss (self-report), fatigue (questions 07 and 20 of the Center for Epidemiological Studies Depression Scale, translated and adapted to Brazilian culture), the reduction in handgrip strength (hand dynamometry, adjusted for gender and BMI) and the reduction in gait speed (4 m gait speed test execution time, adjusted for gender and height). The elderly were classified as frail (three or four positive criteria), pre-frail (one or two positive criteria) or non-frail (no positive criteria) (Fried *et al*., 2001). Due to the context in which the elderly lived, we did not assess physical activity, as this is measured using the International Physical Activity Questionnaire and

involves various activities such as work, transport, domestic activities, leisure, among others (Craig *et al*., 2003) that do not apply to a significant portion of this population. We assessed functional capacity using the Katz scale. This scale is composed of six items (bath, clothing, going to the bathroom, transfer, sphincter control and feeding), where the individual is classified as "independent" (one point), "dependent receiving assistance" (no point) or " dependent" (no point) (Duarte, Andrade, & Lebrão, 2007; Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963), with final scores defined by the Hartford Institute for Geriatric Nursing, which classifies the elderly with total independence (six points), moderate dependence (three, four or five points) and severe dependence (less than three points) (Wallace & Shelkey, 2007).

Statistical Analysis: After data collection, we performed the statistical analysis using a software. Participants' characteristics were analyzed using descriptive statistics and presented as mean and standard deviation for continuous variables, and counts and percentages for categorical variables. The characteristics of participants at risk of sarcopenia and without risk of sarcopenia were compared according to the t test of independent samples (normal numerical variables), the Mann-Whitney test (abnormal numerical variables) and the chi-square test (categorical variables) , considering as statistical differences values with $p \leq 0.05$. Associated factors were determined by using Poisson Regression with robust variance, with the status risk of sarcopenia as the outcome. Initially, we identified the sarcopenia risk predictors through a crude analysis, considering as significant factors with $p \leq 0.200$, which were later included in an adjusted model to determine the best combination of sarcopenia risk predictors. The significance level adopted in the final set was $p \leq 0.05$.

RESULTS

Sample and Risk of Sarcopenia

The sample consisted of 369 institutionalized elderly, with a mean age of 79.75 ± 9.52 years, and 69.1% were female. According to the SARC-CalF Questionnaire, 282 elderly people (76.4%) were classified as at risk for sarcopenia. Compared to their peers, the elderly at risk for sarcopenia had lower values of anthropometric variables and a higher prevalence of stroke, dysphagia, risk of malnutrition or malnutrition, frailty and moderate or severe functional dependence (Table 1). We analyzed the independent variables in the Poisson Regression model with robust variation in relation to the risk of sarcopenia. Initially, we identified eight variables (BMI, muscle mass, stroke, rheumatism, Parkinson's disease, dysphagia, frailty and functional capacity) as possible associations. After adjustments, stroke (PR: 1.254; 95%CI: 1.018 - 1.544; p=0.033), Parkinson's disease (PR: 1.423; 95%CI: 1.145 - 1.767; p= 0.001), dysphagia (PR: 1.252; 95%CI: 1.039 - 1.508; p=0.018) and frailty (PR: 1.415; 95%CI: 1.157 - 1.730; p=0.001) (Table 2).

DISCUSSION

We identified that institutionalized elderly people have a high risk of sarcopenia, which reached almost 80% of the sample, according to the SARC-CalF. This result is much higher than that found in the literature, where in the context of the community it reached 12.9% (Bahat *et al*., 2018) and in the context of long-term care facilities, it permeated between 36.2%(Urzi *et al*., 2017) and 47.3% (Yang, Lu, *et al*., 2018). In addition, the elderly at risk for sarcopenia had lower anthropometric values in all analyzed variables, and a higher prevalence of stroke, dysphagia, malnutrition, frailty and functional dependence. However, in the final statistical model, only stroke, Parkinson's disease, dysphagia and frailty were factors associated with the outcome. The SARC-F is a brief and inexpensive test, consisting of five criteria, for screening sarcopenia that can be used in clinical practice (Malmstrom & Morley, 2013). Although it has been used in previous studies for this purpose, most in the elderly in the community (Kim, Kim, & Won, 2018; Malmstrom, Miller, Simonsick, Ferrucci, & Morley, 2016; Rolland *et al*., 2017; Yang *et al*., 2019), there is one consensus on its limitations, especially regarding its sensitivity (Woo, Leung, & Morley, 2014). As an alternative, the SARC-CalF was developed, adding a sixth criterion to the SARC-F (calf circumference), which increased the sensitivity compared to the original. In addition to its validation in Brazil (Barbosa-Silva *et al*., 2016) and in different populations and contexts (Bahat *et al*., 2018; Yang, Hu, *et al*., 2018; Yang, Lu, *et al*., 2018), the SARC-CalF was also validated in the long-term term care facilities (Urzi *et al*., 2017; Yang, Lu, *et al*., 2018), which is why we chose this tool to assess the risk of sarcopenia in institutionalized elderly. Conceptually, stroke is a clinical condition with an abrupt onset of neurological symptoms lasting more than 24 hours (or fatal), resulting from an acute vascular lesion in part of the brain, of ischemic (inadequate blood supply) or hemorrhagic (rupture) origin of a blood vessel). The signs and symptoms are multiple and include sudden unilateral weakness, numbness, visual loss, diplopia, ataxia, vertigo, headache, dysarthria, dysphagia, among others (Hankey & Blacker, 2015). Due to the motor changes caused by stroke, these individuals can have consequences on the musculoskeletal system, as is the case of sarcopenia, present between 14% and 18% of this population, a prevalence that is higher in relation to individuals without the disease (Ryan, Ivey, Serra, Hartstein, & Hafer-Macko, 2017). This information justifies the association between stroke and the risk of sarcopenia in this study.

Parkinson's disease is the second most common neurodegenerative disease, being more prevalent in elderly males over 65 years old (Pringsheim, Jette, Frolkis, & Steeves, 2014). Approximately 30% of these individuals are admitted to long-term care facilities, mainly due to advanced age, functional impairment and neuropsychiatric symptoms (Aarsland, Larsen, Tandberg, & Laake, 2000). The clinical picture includes parkinsonism (bradykinesia accompanied by tremor at rest and/or rigidity), postural instability, balance deficit, activity limitation (Postuma *et al*., 2015), among others. Motor and non-motor symptoms may be involved in the loss of muscle mass in this population, as up to 55.8% of elderly people with Parkinson's disease develop sarcopenia (Peball *et al*., 2018). Such evidence supports our finding on the association between the risk of sarcopenia and Parkinson's disease in institutionalized elderly. Another factor associated with the risk of sarcopenia in our sample was dysphagia. Elderly people with dysphagia have lower mass and strength of the muscles responsible for swallowing (Feng *et al*., 2013), suggesting that there may be a relationship between the decrease in skeletal muscle mass and dysphagia, a condition called sarcopenic dysphagia (Maeda, Takaki, & Akagi, 2017). Thus, our findings regarding the association between the risk of sarcopenia and dysphagia are supported by studies carried out in different geriatric populations where they found similar results (Maeda & Akagi, 2016; Maeda *et al*., 2017; Wakabayashi, Takahashi, Watanabe, Oritsu, & Shimizu, 2017). However, this association is not fully clarified, encouraging in-depth research (Maeda & Akagi, 2016). Sarcopenia is considered the main factor in the development of frailty, but determining the causal relationship between the two is controversial and is currently the focus of several studies (Buckinx *et al*., 2017). In the community, frail elderly people have a higher prevalence of sarcopenia (Beaudart *et al*., 2015). A study carried out with institutionalized elderly people showed that the prevalence of sarcopenia was 38.1%, and the group of elderly people with frailty had a prevalence of almost 50%, demonstrating a significant association (Buckinx *et al*., 2017). In our study, frailty was one of the factors associated with the risk of sarcopenia in institutionalized elderly. Our study is not free from limitations. We had a sample loss of 23.79%, but we kept the absolute sample number that was expected to meet the main objective of our research. In addition, our sample is representative compared to other studies that investigated the risk of sarcopenia in institutionalized elderly (Urzi *et al*., 2017; Yang, Lu, *et al*., 2018). Another possible limitation would be the original questionnaire that is used to assess the risk of sarcopenia, the SARC-F, which has excellent specificity but poor sensitivity. Thus, we used the SARC-CalF questionnaire, which includes measuring the circumference of the calf, which significantly improved its sensitivity. Despite being recently validated in the Brazilian population and in other nationalities, this instrument is simple, easy to apply and has been explored in different contexts.

Table 1. Characteristics of institutionalized elderly in relation to risk of sarcopenia

	Total (n=369)	No Risk of Sarcopenia (n=87)	Risk of Sarcopenia (n=282)	p-valor
Sociodemographic variables				
Age (years) †	79,65 ± 9,53	78,80 ± 9,39	79,91 ± 9,57	0,346
Gender				0,353
Female	255 (69,1%)	64 (25,1%)	191 (74,9%)	
Male	114 (30,9%)	23 (20,2%)	91 (79,8%)	
Anthropometric variables				
Body Weight (kg) †	60,54 ± 15,39	67,45 ± 12,67	58,29 ± 15,54	0,000
Height (m) †	1,54 ± 0,12	1,57 ± 0,10	1,53 ± 0,12	0,009
Body mass index (kg/m^2) †	25,09 ± 5,37	27,09 ± 4,52	24,44 ± 5,47	0,000
Calf circumference (cm) †	32,53 ± 4,58	36,91 ± 3,21	31,50 ± 4,24	0,000
AMM (kg/m²) †	7,27 ± 1,88	7,73 ± 1,51	7,12 ± 1,96	0,008
Handgrip strength (kg) ‡	10,20 ± 8,29	13,19 ± 7,30	9,22 ± 8,37	0,000
Gait speed (m/s) ‡	0,27 ± 0,20	0,35 ± 0,20	0,24 ± 0,19	0,000
Comorbidities				
Cardiovascular disease	63 (17,2%)	13 (20,6%)	50 (79,4%)	0,626
Systemic arterial hypertension	209 (57,1%)	49 (23,4%)	160 (76,6%)	0,902
Stroke	70 (19,0%)	08 (11,4%)	62 (88,6%)	0,007
Diabetes mellitus	80 (21,7%)	16 (20,0%)	64 (80,0%)	0,458
Cancer	21 (5,7%)	03 (14,3%)	18 (85,7%)	0,429
Rheumatism	52 (14,1%)	08 (15,4%)	44 (84,6%)	0,159
Pulmonary disease	31 (8,4%)	07 (22,6%)	24 (77,4%)	1,000
Depression	132 (36,1%)	36 (27,3%)	96 (72,7%)	0,251
Osteoporosis	41 (11,1%)	10 (24,4%)	31 (75,6%)	0,846
Dementia	164 (44,4%)	35 (21,3%)	129 (78,7%)	0,390
Parkinson's disease	34 (9,2%)	04 (11,8%)	30 (88,2%)	0,094
Chronic pain	135 (37,8%)	30 (22,2%)	105 (77,8%)	0,610
Dysphagia	98 (26,9%)	08 (8,2%)	90 (91,8%)	0,000
Polypharmacy	279 (76,9%)	65 (23,3%)	214 (76,7%)	1,000
Comprehensive Geriatric Assessment				
Cognitive state (MMSE)				0,088
Without cognitive decline	119 (32,2%)	35 (29,4%)	84 (70,6%)	
With cognitive decline	250 (67,8%)	52 (20,8%)	198 (79,2%)	
Nutritional status (MNA)[a]				0,000
Normal nutritional status	104 (29,6%)	35 (33,7%)	69 (66,3%)	
Risk of malnutrition	173 (49,3%)	43 (24,9%)	130 (75,1%)	
Malnutrition	74 (21,1%)	06 (8,1%)	68 (91,9%)	
Fragility (Fried Phenotype)[a]				0,001
Non-frail or pre-frail	108 (57,1%)	46 (42,6%)	62 (57,4%)	
Frail	81 (42,9%)	15 (18,5%)	66 (81,5%)	
Functional capacity (Katz Index)[a]				0,000
Independence	63 (17,5%)	28 (44,4%)	35 (55,6%)	
Moderate dependence	122 (33,8%)	34 (27,9%)	88 (72,1%)	
Severe dependence	176 (48,8%)	23 (13,1%)	153 (86,9%)	

In bold (p≤0.05); † (independent samples t test); ‡ (Mann-Whitney test); CP (calf circumference); BMI (body mass index); MMA (appendicular musculoskeletal mass); kg (kilogram); m (meter); kg/m² (kilogram per square meter); m/s (meter per second); MMSE (Mini Mental State Examination); MAN (Mini Nutritional Assessment); [a] (only valid values accounted for)

Table 2. Poisson regression model gross and adjusted associated factors with risk of sarcopenia in the institutionalized elderly

	Gross analysis		Adjusted analysis	
Variables	PR ($CI_{95\%}$)	p-value	PR ($CI_{95\%}$)	p-value
60-79 years	1 (ref.)			
80 years or over	1,052 (0,872 – 1,269)	0,968		
Male	1 (ref.)			
Female	0,879 (0,716 – 1,078)	0,216		
Body mass index >22 kg/m^2	1 (ref.)			
Body mass index ≤22 kg/m^2	1,269 (1,033 – 1,559)	0,023		
IMM normal (kg/m²)	1 (ref.)			
IMM diminuída (kg/m²)[a]	1,234 (1,009 – 1,509)	0,041		
FPM normal (kg)	1 (ref.)			
FPM diminuída (kg)[b]	0,974 (0,640 – 1,481)	0,901		
VM ≥ 0,8 m/s	1 (ref.)			
VM < 0,8 m/s	1,728 (0,588 – 5,082)	0,320		
Cardiovascular disease	1,085 (0,836 – 1,407)	0,540		
Systemic arterial hypertension	1,041 (0,842 – 1,287)	0,712		
Stroke	1,283 (1,041 – 1,580)	0,019	1,254 (1,018 – 1,544)	0,033
Diabetes mellitus	1,154 (0,917 – 1,453)	0,223		
Cancer	1,107 (0,785 – 1,562)	0,562		
Rheumatism	1,174 (0,919 – 1,499)	0,198		
Pulmonary disease	1,110 (0,819 – 1,504)	0,500		
Depression	0,871 (0,698 – 1,087)	0,220		
Osteoporosis	0,923 (0,661 – 1,289)	0,637		
Dementia	1,018 (0,819 – 1,266)	0,871		
Parkinson's disease	1,351 (1,106 – 1,651)	0,003	1,423 (1,145 – 1,767)	0,001
Chronic pain	1,071 (0,867 – 1,324)	0,523		
Dysphagia	1,374 (1,144 – 1,649)	0,001	1,252 (1,039 – 1,508)	0,018
Polypharmacy	1,002 (0,792 – 1,267)	0,989		
Without cognitive decline	1 (ref.)			
With cognitive decline	1,121 (0,906 – 1,387)	0,293		
Normal nutritional status	1 (ref.)			
Deficient nutritional status[b]	1,068 (0,864 – 1,319)	0,543		
No frail or pre-frail elderly	1 (ref.)			
Frail elderly	1,441 (1,183 – 1,756)	0,000	1,415 (1,157 – 1,730)	0,001
Functional independence	1 (ref.)			
Functional dependence[c]	1,338 (1,017 – 1,761)	0,038		

In bold (variables included in the gross and adjusted models); PR (prevalence ratio); 95%CI (95% confidence interval); BMI (Body Mass Index); CP (Circumference of the Calf); MMI (muscle mass index); FPM (hand grip force); VM (speed of the march); kg/m2 (kilograms per square meter); m/s (meters per second); > (larger); ≤ (less than or equal); a (<6.47kg/m2 for women and <8.76kg/m2 for men); b (<20 kg for women and <30 kg for men); c (risk of malnutrition or malnutrition); d (moderate or severe dependence)

In this way, we seek to contribute to the education of health professionals and managers in long-term care facilities on monitoring the risk of sarcopenia, in order to implement comprehensive and multidisciplinary actions in search of improving their health conditions and quality of life individuals.

Conclusion

These findings highlight the high risk of sarcopenia in the institutionalized elderly population, especially individuals with chronic neurological diseases, swallowing disorders and frailty conditions. Furthermore, this study brings the possibility of using an improved and easily applicable instrument for the screening of sarcopenia in institutionalized elderly, the SARC-CalF. Knowing that this population is the most susceptible to developing sarcopenia, especially individuals diagnosed with any of the aforementioned health problems, it is necessary to implement screening for the disease in the routine assessment protocols of long-term care facilities. This will allow health agents to more accurately delineate the profile of residents in these environments, in order to develop multi- and interdisciplinary actions to prevent sarcopenia, as well as to promote health and quality of life for institutionalized elderly people.

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