Sarcopenia and associated factors in older people living in rural riverside areas of the Amazon

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Abstract

Objective: To estimate the prevalence of signs suggestive of sarcopenia and its associated factors in an older rural riverside population of the Amazon. *Method:* A cross-sectional household-based study was carried out from April to June 2021 involving the universe of older people (age ≥60 years) living in nine rural communities on the banks of the Rio Negro, Manaus city, Amazonas state, Brazil. Signs suggestive of sarcopenia were identified using the Sarcopenia Formulary combined with calf circumference. Sociodemographic aspects, physical performance (static standing balance, gait speed at usual pace, and chair sit and stand), handgrip strength and self-reported health conditions (hypertension, diabetes, stroke, chronic low-back pain and multimorbidity) represented the explanatory variables. Poisson regression with robust variance was used to assess factors associated with signs suggestive of sarcopenia. *Results*: Data from 98 older individuals (55.1% male) with a mean age of 69.6±7.4 years were analyzed. Results revealed that 50.5% had low handgrip strength, 52.6% disability/low physical performance and 43.0% multimorbidity. Sarcopenia was identified in 28.9% of participants and associated with higher age (PR=1.1; 95%CI=1.1-1.1) and greater number of residents in the household (PR=1.2; 95%CI=1.0-1.3). *Conclusion:* The findings of the study showed a high prevalence of signs suggestive of sarcopenia (28.9%) among the population of older people in rural riverside areas of the Amazon, where higher mean age and greater number of residents in the household increased the probability of occurrence of this clinical condition.

Keywords: Sarcopenia. Aging. Rural Population.

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INTRODUCTION

In Brazil, the population aging process has occurred at a rapid pace and, while the guarantees provided for in law 10.741/2003 ruling on the Statute of the Older Person[1] have met with barriers precluding full implementation, the National Health Policy for Older People contains in its recommendations the conditions necessary to improve this scenario[2]. On a global scale, the demographic transitions have imposed a new epidemiological demand profile for society. The physiological changes accompanying advancing age can impact physical performance, nutritional status and risk of chronic diseases[3,4].

Sarcopenia, the term used to define progressive age-related loss of peripheral muscle mass and strength, is common in older people owing to the physiological process of ageing and conditions in this population group[5]. The etiology of this skeletal muscle disorder is multifactorial, involving a complex interaction between age, health conditions, and genetic, social and behavioral factors[6]. The condition is also associated with adverse health outcomes, including musculoskeletal, endocrine, psychiatric and cardiovascular problems[7]. Globally, the prevalence of sarcopenia in the older population ranges from 10% to 27%[8]. In Brazil, a systematic review and meta-analysis reported an overall sarcopenia prevalence of 17% in older people, with higher rates seen in women (20%) than men (12%)[9]. Therefore, monitoring and controlling this condition is critical to public health.

Sarcopenia can also affect the functioning of older individuals. Physical performance, besides constituting a predictor of independence and quality of life, is necessary for carrying out self-care[3]. Thus, assessments of physical performance are also fundamental in primary care to help devise strategies for maintaining health, autonomy and independence, and also to promote the health of these populations,

It is important to recognize the heterogeneity of characteristics of groups of older people in different regions of the country. Amid this diversity, evidence shows that health care of rural populations from the Amazon still replicates the urban logic, overlooking local specificities and providing only limited actions by health professional at riverside settlements[10]. In general, despite the dearth of epidemiological information pertaining to this group, they are considered a vulnerable population, with poorer health status that faces numerous barriers to accessing goods and services, and possesses inadequate basic health infrastructure[11].

Despite the growing body of knowledge about sarcopenia, related epidemiological studies involving traditional Brazilian populations, such as rural amazon riverside dwellers, remain scarce. The literature suggests that older individuals living in rural areas may experience a decline in physical activity level during the aging process and cumulative exposures throughout the life course[12]. Against this backdrop, the objective of the present study was to estimate the prevalence of signs suggestive of sarcopenia, and assess associated factors, in older people from rural Amazon riverside communities.

METHOD

A cross-sectional household-based study was conducted at 9 riverside settlements situated on the left bank of the river Negro, a rural area of the city of Manaus, Amazonas state, Brazil. The communities selected are part of 4 different subareas defined by the Municipal Health Secretariat covered by a single Fluvial Family Health Team (Floating Mobile Units) which serves the communities on an itinerant basis[10]. The only health professionals that reside in the area are Community Health Workers (CHW). The 9 locations with the highest population density were chosen for this study: Nova Jerusalém, Nova Canaã and São Francisco (subarea Mipindiaú); São Sebastião do Cuieras and Nova Canaã (subarea Cueiras); Santa Maria, Pagodão and Chita (subarea Santa Maria); and Bela Vista do Jaraqui (subarea Costa do Arara). The geographic locations of the communities selected, all covered by the fluvial primary health unit, are depicted in Figure 1.

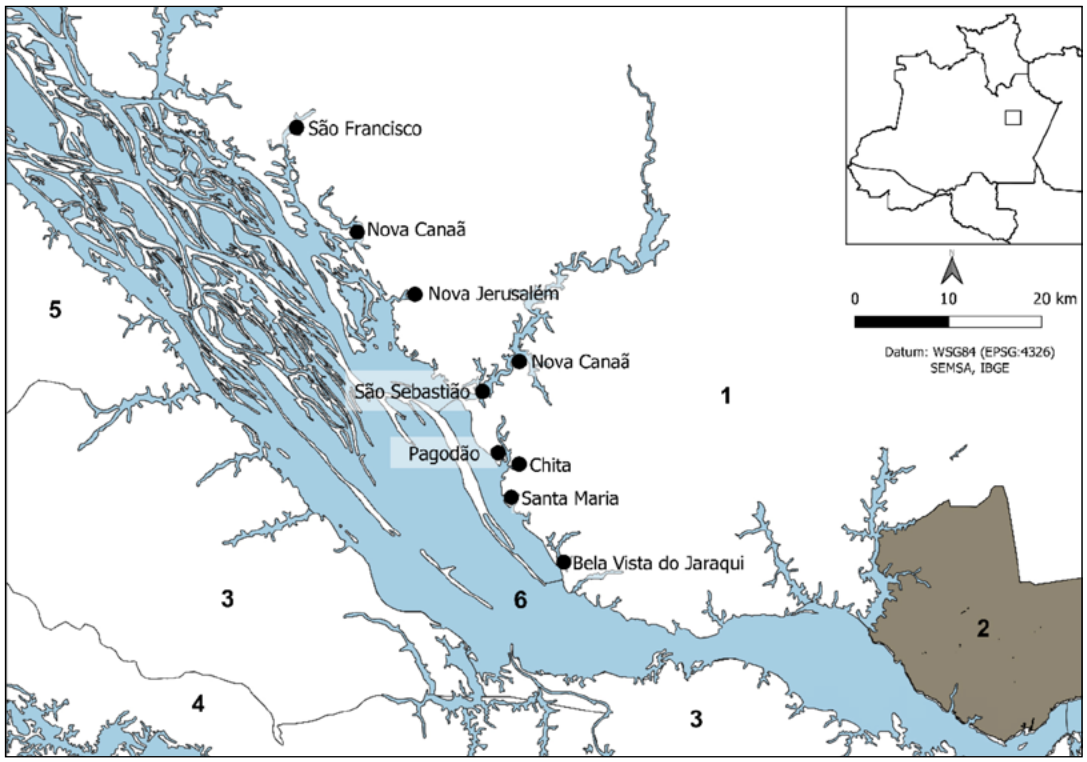

Figure 1. Rural riverside communities included in the study, Manaus, Amazonas, Brazil.

Source: SEMSA, IBGE. Datum: WGS84 (EPSG: 4326).

Notes: (1) Manaus, rural area; (2) Manaus, urban area; (3) Iranduba; (4) Manacapuru; (5) Novo Airão; and (6) Waterway/Hydrography.

All older individuals (≥60 years) of both genders and living at the selected study sites were included. For cognitive screening, the Verbal Fluency Test by semantic category (animals) was applied[13]. Individuals scoring less than 6 points were not included. The estimated sample of participants, based on the registration data for the year of collection provided by the CHWs, was 100 older individuals, representing 80% power in estimating regression coefficients of 0.3 in a model with 5 covariables at a significance level of 0.05, allowing for up to 10% losses. Older individuals who were bedridden or had a temporary or permanent disability precluding proper performance of the physical tests in the study were excluded (n=2).

Data were gathered from April to June 2021 by applying a questionnaire collecting data on sociodemographics and self-reported health status, as well as performing physical tests. The data collected were registered on smartphones using the Research Electronic Data Capture (REDCap) app designed to create and manage studies and databases, enabling field collection without the internet, while also recording the geolocation of each household. Prior to the main study, theoretical and practical training was carried out, besides a pilot study to train the interviewers in a controlled environment (within the institution), including 19 older respondents. The assessment of reproducibility of scores for the scales applied using intraclass correlation coefficient showed good reliability of the measurements on calibration (>0.75). Subsequently, a pilot study was conducted in a rural riverside community close to the urban area of Manaus to replicate the collection conditions in the field.

The interview entailed collection of sociodemographic data (age, sex, self-declared race/color, employment status, education, family income, receipt of welfare benefit, number of dwellers in household), household characteristics (main material for floors, wall enclosures and roof;

water/electricity supply; waste disposal) and variables related to health status (self-rated general health; self-reported clinical diagnosis of chronic diseases [arterial hypertension, diabetes, stroke, chronic lower-back pain], multimorbidity [≥2 self-reported chronic diseases in the same individual]; medical consultation in past 12 months; and limitations in activities of daily living due to health issues).

Physical performance was assessed using the Short Physical Performance Battery (SPPB) translated and adapted for use in the Brazilian population[14]. The SPPB comprises 3 timed physical tests which measure, in sequence, static standing balance, gait speed walking at usual pace, measured twice for a set course and, indirectly, lower limb muscle strength by repeated chair stand and sit 5 times without the assistance of upper limbs. Score on each test ranges from 0 (worst) to 4 (best).

Balance testing was performed in 3 stages with increasing degree of difficulty. The participant must hold each of the following 3 positions for 10 seconds: standing with feet together, side by side; standing with feet one foot placed slightly forwards of the other (semi-tandem position), and standing with one foot in front of the other, toe to heel (tandem position). For each position, the interviewer first demonstrated the task, offering arm support while the participant positioned their feet, and asks whether they are ready, withdrawing support and then beginning timing. The stop watch was stopped when the participant moved their feet, grasped the interviewer for support, or when 10 seconds had elapsed. A score of 1 was awarded when the participant performed the first position for 10 seconds and failed on the second position; 2 points when the participant held the second position for 10 seconds but failed to hold the 3rd position for more than 3 seconds; 3 points when the 3rd position was held for 3-9 seconds; and 4 points when holding the 3rd position for 10 seconds. If the participant scores 0 on either of the 2 first positions then the balance test should be stopped[14].

For the gait speed test, the participant walked a distance of 4 meters, marked out using tapes affixed to the floor. The participant was asked to walk from the start line until crossing the finish line at their usual walking pace. A score of 0 was given if the participant was unable to do the walk. A score of 1-4 was attributed according to the time taken to perform the test (1 point for time >8.70 seconds; 2 points for 6.21-8.70 seconds; 3 points for 4.82-6.20 seconds; and 4 points when time <4.82 seconds)[14].

The chair stand and sit test was then carried out, during which the participant was asked to repeat the movement 5 times, unassisted by upper limbs. A score of 0 was given if the participant was unable to do the test. A score of 1-4 points was given according to the time taken to complete the test (1 point: ≥16.70 seconds; 2 points: 13.70-16.69 seconds; 3 points: 11.20-13.69 seconds; and 4 points: ≤11.19 seconds)[14].

Total score on the SPPB was calculated by summing the points on each of the 3 tests, and ranged from 0 (worst performance) to 12 (best performance) points. Total score was subsequently categorized as follows: 0-6 points = disability/low physical performance; and 7-12 points = moderate/good physical performance[15].

For the assessment of isometric hand-grip strength, a Saehan® (Saehan Corporation, Masan, Korea) dynamometer was used. The device has two handles, one fixed and the other sliding, adjustable to 5 grip positions, accommodating the patient´s hand size. The individual sat in a chair with the arm in adduction, neutral rotation and elbow flexed to 90º. The needle was first set to zero. The participant was asked to apply grip pressure to the device using maximum possible force. In response to prompts from the interviewer, the subject must exert maximum force to bring the handles of the device together. The verbal commands were standardized to prevent influence of encouragement given. Three measurements were collected for each hand with 1-minute rest intervals between sets, where the highest value obtained was used for analysis. The reference values adopted for low hand-grip strength were <33.4 kg for men and <18.6 kg for women[16].

The Sarcopenia Formulary (SARC-F) scale was applied, using the version adapted for Portuguese[17], which consists of a questionnaire with objective questions probing the individual´s perceived level of difficulty for 5 components: strength, ambulation (walking independence), rising from chair, climbing stairs and falls. Each of the 5 components was scored

on a scale of 0-2 points (0 = no difficulty or no falls in past year; 1 = some difficulty or 1-3 falls in past year; and 2 = major difficulty/disability or ≥4 falls in past year). Calf circumference was measured using an inelastic metric measuring tape (accurate to nearest 1mm) at the largest volume of the two legs with the individual sitting in a chair with leg flexed to 90°[18]. In the absence of information on the dominant leg, the largest measurement was used. Low muscle mass was defined as ≤34 cm for men and ≤33 cm for women[19]. Calf circumference was given a score of 0 for adequate muscle mass and 10 for low muscle mass. Sarcopenia was assessed using the SARC-CalF (SARC-F + calf circumference) which includes the 5 items of the SARC-F plus calf circumference. A total score (SARC-CalF) ≥11 points (maximum 20 points) was considered suggestive of sarcoepenia[20].

The data collected by REDCap, following critical analysis and correction of inconsistencies, were exported to the software package Stata SE, version 15 (StataCorp, College Station, TX). A descriptive analysis of the data was first performed. Bivariate analyses were then carried out to assess the differences between independent variables (sociodemographic and health characteristics) according to the presence or otherwise of signs suggestive of sarcopenia. To check for differences between proportions and means, the chi-square/Fisher exact tests and Student´s *t*-test for independent samples were applied, respectively. Variables with a p-value ≤0.20 on bivariate analyses were included in the multiple analysis, using Poisson regression with robust variance to estimate prevalence ratios (PR) and respective 95% confidence intervals (95%CI). Variables with p-value ≤ 0.10 were retained in the final model. The goodness-of-fit of the model was assessed by the Hosmer-Lemeshow model. A 5% level of significance was adopted for the analyses.

The study complied with the recommendations of Resolution nos. 466/12 and 510/2016 of the National Board of Health of the Ministry of Health. The study was approved by the Ethics Committee for Research involving Humans of the University of Amazonas State (CAAE permit no. 34514220.1.0000.5016). All study participants received and signed a Free and Informed Consent Form after receiving explanations about the study objectives, risks and benefits when approached to take part.

RESULTS

Of the 100 older adults visited, 98 dwellers aged ≥60 years were included in the study. Of this total, 28 presented signs suggestive of sarcopenia (prevalence 28.9%). Participant age ranged from 60-96 years and mean age was 69.6 (±7.4) years. The study participants were predominantly male (55.1%), self-declared as black or brown (93.8%), retired (71.6%), and received social welfare benefit (54.6%). Mean monthly income was R$ 1,661.8 (R$ ±1,088.8) and mean number of dwellers in the household was 3.2 (±1.9).

Regarding physical characteristics of the houses, most were built with wood or mud floors, wood enclosing walls, and zinc metal or cement fiber sheet roofing. Almost 12% of the household had no electric lighting, 60% of families drew drinking water from artesian wells, and 87% reported burning or burying domestic waste in the community (data not shown in tables). Sociodemographic characteristics of the older participants according to presence of sarcopenia are presented in Table 1. The individuals exhibiting signs suggestive of sarcopenia tended to be older (p<0.001).

The prevalence of multimorbidity was 43%. Regarding physical performance assessed using the physical tests (balance, gait speed and sit-and-stand) on the SPPB, 52.6% (n=51) had low functional performance or disability/very poor performance. Results shows that 50.5% (n=49) of participants had low hand-grip strength. The association between health characteristics and sarcopenia is presented in Table 2. A higher occurrence of stroke (p=0.023) and worse physical performance (p=0.018) was evident among individuals with signs suggestive of sarcopenia.

The multiple logistic regression analysis (Table 3) revealed that, on the adjusted model, older age (PR=1.1; 95%CI=1.1-1.1) and higher number of dwellers in household (PR=1.2; 95%CI=1.0-1.3) were associated with a greater occurrence of signs suggestive of sarcopenia.

Table 1. Sociodemographic characteristics according to presence of signs suggestive of sarcopenia in older individuals from rural riverside areas (n=98). Manaus, Amazonas, 2021.

Variable	Total n (%)	Sarcopenia*		*p*-value
		Without suggestive signs (n=69)	With suggestive signs (n=28)	
Sex				0.474
Female	44 (44.9)	29 (42)	14 (50)	
Male	54 (55.1)	40 (58)	14 (50)	
Skin color/race				0.611
White	2 (2.1)	2 (2.9)	0 (0)	
Brown and Black	91 (93.8)	65 (94.2)	26 (92.9)	
Indigenous	4 (4.1)	2 (2.9)	2 (7.1)	
Age (years) (Mean ± SD)	69.6 ± 7.4	67.3 ± 5.7	74.9 ± 8.2	<0.001
Monthly income per capita (Reais) (Mean ± SD)	1,661.8 ± 1,088.8	1,677.1 ± 1,238.6	1,644.3 ± 618.8	0.894
No, of dwellers in household (Mean ± SD)	3.2 ± 1.9	3.0 ± 1.8	3.6 ± 2.0	0.155
Education[#]				0.543
Never attended school	21 (21.9)	13 (19.2)	8 (28.6)	
Primary	64 (66.7)	46 (67.6)	18 (64.3)	
Secondary/Higher/Postgraduate	11 (11.5)	9 (13.2)	2 (7.1)	
Employment status[&]				0.072
Employed**/self-employed**/civil servant	16 (16.7)	15 (22.4)	1 (3.6)	
Homemaker/student/unemployed	11 (11.5)	7 (10.4)	4 (14.3)	
Retired	68 (71.6)	45 (67.2)	23 (82.1)	
Social welfare benefits received by a member of household				0.224
No	44 (45.4)	34 (49.3)	10 (35.7)	
Yes	53 (54.6)	35 (50.7)	18 (64.3)	

Chi-square or Fisher Exact test (expected counts < 5) for comparison of proportions. Student´s *t*-test for comparison of means. **Activities related to agriculture, fish farming, extractivism, tourism, business and general services. *n=97; [#]n=96; [&]n=95.

Table 2. Health characteristics according to presence of signs suggestive of sarcopenia in older individuals from rural riverside areas (n=98). Manaus, Amazonas, 2021.

Variable	Total n (%)	Sarcopenia*		*p*-value
		Without suggestive signs (n=69)	With suggestive signs (n=28)	
Arterial hypertension				0.524
No	43 (44.3)	32 (46.4)	11 (39.3)	
Yes	54 (55.7)	37 (53.6)	17 (60.7)	
Diabetes mellitus				0.563
No	76 (78.4)	53 (76.8)	23 (82.1)	
Yes	21 (21.6)	16 (23.2)	5 (17.9)	
Stroke				0.023
No	85 (87.6)	64 (92.8)	21 (75.0)	
Yes	12 (12.4)	5 (7.2)	7 (25.0)	
Chronic lower-back pain*				0.487
No	43 (46.2)	29 (43.9)	14 (51.9)	
Yes	50 (53.8)	37 (56.1)	13 (48.1)	
Multimorbidity				0.522
No	53 (57.0)	39 (59.1)	14 (51.9)	
Yes	40 (43.0)	27 (40.9)	13 (48.1)	
Medical consultation in past 12 months				0.317
No	24 (24.7)	19 (27.5)	5 (17.9)	
Yes	73 (75.3)	50 (72.5)	23 (82.1)	
Limitation in daily activities due to health problem				0.470
No	75 (77.3)	52 (75.4)	23 (82.1)	
Yes	22 (22.7)	17 (24.6)	5 (17.9)	
Self-rated health status				0.955
Very good/good	42 (43.3)	30 (43.5)	12 (42.9)	
Fair/poor/very poor	55 (56.7)	39 (56.5)	16 (57.1)	
Hand-grip strength				0.200
Low	49 (50.5)	32 (46.4)	17 (60.7)	
Adequate	48 (49.5)	37 (53.6)	11 (39.3)	
Physical performance				0.018
Disability/low	51 (52.6)	31 (44.9)	20 (71.4)	
Moderate/good	46 (47.4)	38 (55.1)	8 (28.6)	

Chi-square or Fisher Exact test (expected counts < 5) for comparison of proportions *n=93.

Table 3. Association of sociodemographic and health characteristics with signs suggestive of sarcopenia in older individuals from rural riverside areas (n=98). Manaus, Amazonas, 2021.

Variables	PR (95%CI)	*p*-value	Adjusted PR (95%CI)	*p*-value
Age (years)	1.1 (1.0-1.1)	<0.001	1.1 (1.1-1.1)	<0.001
No. of dwellers in household	1.1 (1.0-1.3)	0.152	1.2 (1.0-1.3)	0.033
Employment status				
Employed/self-employed/civil servant	ref.			
Homemaker/student/unemployed	5.8 (0.7-45.8)	0.094		
Retired	5.4 (0.8-37.5)	0.088		
Stroke				
No	ref.			
Yes	2.4 (1.3-4.3)	0.006		
Hand-grip strength				
Low	1.5 (0.8-2.8)	0.210		
Adequate	ref.			
Physical performance				
Disability/low	2.3 (1.1-4.6)	0.027		
Moderate/good	ref.			

PR= prevalence ratio. 95%CI= 95% confidence interval. Ref.= reference category. Final model = Nagelkerke R^2: 0.1190; Hosmer-Lemeshow: 0.9947.

DISCUSSION

The occurrence of signs suggestive of sarcopenia was found in 28.9% of the older population living in rural riverside settlements of the Amazon. Older age and greater number of dwellers in the household were associated with the occurrence of signs suggestive of sarcopenia.

The study results revealed that 52.6% of the participants were classified into the 2 poorest physical performance categories (disability and low performance). A population-based study of older users of the Family Health Strategy in a city lo located in the south of Minas Gerais state (n=406) found that over half of the sample (57,6%) had low functional performance, scoring less than 6 points on the SPPB scale[21], results corroborated by the findings of the current study. Examination of the biomechanical and motor control aspects on an analysis of the ability to perform the sit-to-stand and stand-to-walk actions showed that, amid the age-related compensatory mechanisms with regard to the quality and execution of movement, there is an influence of a physical energy saving strategy, manifested by slow speed during the execution of the movement, together with emphasis on the aspect of body stability, characterized by the lack of fluidity between standing and walking positions in these individuals[22]. This theory explains the poorer results for physical performance in older people.

The present study showed that 50.5% of older participants had low hand-grip strength. This rate proved higher than that reported (30.6%) in the SABE (Health, Well-being and Aging) study, a cross-sectional population-based investigation involving 1,168 older individuals in the city of São Paulo[23]. The application of the hand-grip strength test represents a simple, objective alternative that is low cost and non-invasive. However, few Brazilian studies assess this outcome, possibly due to lack of consensus on the reference values for older people. This indicator is considered a good predictor of functional capacity and physical performance in these populaitons[24]. Thus, the literature shows that age-related loss of muscle mass, strength and resistance are determinants of functioning in older people[6,25]. In this respect, pursuing a physically active life style through healthy aging can favor the preservation of muscle strength in

this population and, consequently, the maintenance of good gait and balance[25]. It should be emphasized that physical strength is at the core of the normal riverside routine due to the long journeys via waterways and on foot, together with work to support the family involving fishing, hunting and extractivism in the forest. In general, factors such as work overload, low education, limited access to healthcare services, as well as older age, have negative repercussions during aging which can promote the occurrence of chronic diseases and reduce both functioning and autonomy. Notably, all these issues outlined regarding life style and aging are perceived empirically by older dwellers of riverside areas in the Amazon region[26].

In the present study, the prevalence of chronic diseases was high, particularly for arterial hypertension (55.7%), chronic lower-back pain (53.8%), and multimorbidity (43%). A cross-sectional study of older people from the rural area of the Uberaba city, Minas Gerais state, also reported high rates of chronic diseases, with highest prevalences seen for arterial hypertension (55.7%) and back problems (57.7%)[27]. Amaral et al. (2018)[28], in study assessing older people treated under the Family Health Strategy of the urban area of Acre city detected multimorbidity in 66.3% of the sample assessed.

In a study by Nunes et al.[29] analyzing baseline data from the *ELSI-Brasil* (Longitudinal Study of the Health of Older Brazilians) study involving a nationally representative sample of the non-institutionalized population aged ≥ 60, found a rising prevalence of multimorbidity with increasing age (50-59 years: 58.8%; 60-69 years: 73.4%; 70-79 years: 79.0%; and ≥80 years: 82.4%). It is important to mention that the prevalences found in the present study for chronic diseases and multimorbidity may be underestimated, given that information bias cannot be ruled out, since rural riverside populations have greater difficulties obtaining a clinical diagnosis, a factor which may have a delayed impact on functional performance. Moreover, these statistics are subject to a selective survival bias, where the population in the North region has a lower average life expectancy than the average for Brazil as a whole (72 versus 76 years)[30] and there is a tendency for survivors to have a less unfavorable health status[31].

The prevalence of signs suggestive of sarcopenia, as measured by the SARC-CalF, was 28.9% in the population assessed. A similar rate (24.9%) was observed in a cross-sectional study of 234 older adults (mean age: 69.3 years) registered with family (primary) health units of a city situated in the interior of São Paulo state[32] and also in a population-based study of 598 older individuals (22.9%: mean age: 72.5 years) from Florianópolis city, Santa Catarina state[33], according to DEXA – dual-energy X-ray absorptiometry.

An association of sarcopenia with age was identified. Sarcopenia is a progressive disorder characterized by gradual loss of skeletal muscle mass and function with advancing age, since aging changes the homeostasis of skeletal muscle[6]. This loss of muscle mass is caused by a reduction in both number and size of muscle fibers. Thus, there is reduction in metabolism, protein synthesis and muscle repair[6]. With aging, the oxidative stress associated with decline in sexual hormones, which exert anabolic effects on skeletal muscle tissue, can accelerate loss and atrophy of this tissue[34]. Therefore, sarcopenia is becoming an emerging public health problem in Brazil, amid the shift in population aging driven by the process of demographic transition in recent decades.

Besides age, higher number of dwellers in the household was also associated with the occurrence of sarcopenia. The population studied comprises older individuals living in rural riverside communities in the Amazon that have socioeconomic vulnerability, poor access to goods and services, and inadequate basic healhcare[10]. Analysis of these specific characteristics of the population showed a context of low income and an average of 3 dwellers per household. Data from a Brazilian National Survey (Pesquisa Nacional por Amostra de Domicílios – PNAD) revealed that individuals over 65 years of age in the lowest income stratum had worse health status, lower physical functioning and made less use of health services[35]. Thus, individuals who experience unfavorable socioeconomic and housing conditions have worse general health indicators. In this scenario, the challenge for health policies integrated with other social policies lies in achieving both human longevity and quality of life, particularly among populations for which accessing services is harder.

This study has some limitations inherent to its cross-sectional design, calling for caution in interpreting the direction of causality of the associations identified. Another limitation outlined previously is the risk of selective survival bias underestimating the outcomes of interest, because less healthy individuals tend to be under-represented due to lower longevity, hampering the detection of some associations. In view of the role of obesity in predicting muscle mass and strength, the non-assessment of this clinical condition by the present study can be regarded as a limitation. The present study used validated tests for assessing physical performance, considered better predictors of the outcome compared with self-report scales. Lastly, assessment of the whole population of older people at the riverside settlements was envisaged, evaluating a little studied population using a census-like approach to further the understanding of outcomes in the context of this group´s specificities, also contributing toward improving the practices of fluvial family health teams tasked with delivering primary care in the region.

CONCLUSION

The findings of this study revealed a high prevalence of signs suggestive of sarcopenia among older individuals from the rural riverside settlements assessed. Older age and greater number of dwellers in the household were associated with an increased probability of occurrence of signs suggestive of sarcopenia. The high rate of low physical performance, low hand-grip strength and high prevalence of chronic diseases in older people from rural riverside settlements highlights the need for implementing public health policies which take account of local specificities and promote healthy aging with quality of life in this population.

AUTHORSHIP

- Kaellen A. Scantbelruy - Conceptualization; Data acquisition; Interpretation of data; Writing – original draft; Approval of the final version.
- Aline M. Queiroz - Conceptualization; Methodology; Data acquisition; Formal analysis; Interpretation of data; Writing – original draft; Approval of the final version.
- Jansen Atier Estrázulas - Conceptualization; Methodology; Supervision; Validation; Writing – review & editing; Approval of the final version.
- Jordana Herzog Siqueira - Formal analysis; Interpretation of data; Writing – review & editing; Approval of the final version.
- Gleica Soyan Barbosa Alves - Methodology; Software; Writing – review & editing; Approval of the final version.
- Fernando José Herkrath - Conceptualization; Data curation; Formal analysis; Methodology; Resources; Software; Supervision; Validation; Writing – review & editing.

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