REVISTA DE NUTRIÇÃO
Brazilian Journal of Nutrition

ORIGINAL

Nutrition and Geriatric

Editors
Rosângela Alves Pereira and Francisco de Assis Guedes de Vasconcelos

Support
Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes) (Financing Code 001).

Conflict of interest
The authors declare that there are no conflicts of interest.

Received
June 12, 2024

Final version
March 6, 2025

Approved
March 25, 2025

Frequency of protein-rich food consumption and incidence of sarcopenia in older adults: Health, Well-being, and Aging Study (SABE), São Paulo

Frequência de consumo de alimentos proteicos e incidência de sarcopenia em idosos: Estudo Saúde, Bem-estar e Envelhecimento (SABE), São Paulo

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Article based on the dissertation by F DAUN, entitled "*Comer, envelhecer e sentir: aspectos da sarcopenia em idosos na comunidade*". Universidade de São Paulo; 2024.

How to cite this article: Daun F, Pinto-e-Silva, MEM. Frequency of protein-rich food consumption and incidence of sarcopenia in older adults: Health, Well-being, and Aging Study (SABE), São Paulo. Rev Nutr. 2025;38:e240094. https://doi.org/10.1590/1678-9865202538e240094

ABSTRACT

Objective

To investigate the association between protein-rich food consumption and the risk of developing dynapenia and sarcopenia over five years.

Methods

This longitudinal study used data from older adults (≥60 years old) in São Paulo, collected in 2010 and 2015 as part of the Health, Well-being, and Aging Study. A total of 519 participants were analyzed, and the classification of dynapenia and sarcopenia was based on handgrip strength and the muscle mass index, respectively. The frequency of protein-rich food consumption was categorized and analyzed regarding the incidence of dynapenia and sarcopenia using binary logistic regression models, considering odds ratio and 95% confidence intervals.

Results

The incidence of dynapenia and sarcopenia was, respectively, 22% and 1.1% among participants. Analysis showed that individuals with daily consumption of meat and legumes had the lowest risk of developing these conditions. Daily meat consumption alone also reduced the risk.

Conclusion

Frequent consumption of meat and legumes is associated with a lower risk of developing dynapenia and sarcopenia in older adults. Combining these foods rich in animal and plant proteins offers significant benefits for muscle health.

Keywords: Eating. Meat proteins. Plant proteins. Sarcopenia.

RESUMO

Objetivo

Investigar a associação entre o consumo de alimentos fontes de proteína e o risco para o desenvolvimento de dinapenia e sarcopenia em um intervalo de 5 anos.

Métodos

Estudo longitudinal com dados de idosos (≥60 anos) de São Paulo, coletados em 2010 e 2015 como parte do estudo Saúde, Bem-estar e Envelhecimento. Foram analisados 519 participantes e a classificação de dinapenia e sarcopenia foi realizada com base na força de pressão palmar e no índice de massa muscular, respectivamente. A frequência do consumo de alimentos fonte de proteína foi categorizada e analisada em relação à incidência de dinapenia e sarcopenia por meio de modelo de regressão logística binária, considerando a razão de chances e intervalos de confiança de 95%.

Resultados

A incidência de dinapenia foi de 22% e de sarcopenia 1,1% entre os participantes. As análises mostraram que indivíduos com consumo diário de carne e leguminosas apresentaram o menor risco de desenvolver essas condições. O consumo diário de carne isoladamente também reduziu o risco.

Conclusão

O consumo frequente de carne e leguminosas está associado a um menor risco de desenvolvimento de dinapenia e sarcopenia em idosos. A combinação desses alimentos, rica em proteínas de origem animal e vegetal, oferece benefícios significativos para a saúde muscular.

Palavras-chave: *Consumo alimentar. Proteína de carne. Proteína vegetal. Sarcopenia.*

INTRODUCTION

In recent years, a significant leap forward has been observed in understanding muscle health and its profound influence on human well-being. Incorporating sarcopenia into the International Classification of Diseases (ICD-11) [1] has dramatically expanded knowledge about its precursors and health impacts. This progress offers valuable insights into the specific care of older adults and public health strategies to promote healthy aging throughout society.

However, the lack of a globally accepted definition of sarcopenia has challenged research and clinical practice, hindering comparing studies and the adoption of unified diagnostic criteria [2,3]. This gap directly impacts sarcopenia prevalence estimates, which vary widely depending on the criteria employed. Prevalence ranges from 10% to 27% among community-dwelling older adults, as reported in different studies [4-7]. This discrepancy reflects methodological differences in measuring muscle mass and strength and the lack of a definitive consensus on the ideal cutoff points and parameters for diagnosis.

Recently, the Global Leadership Initiative in Sarcopenia (GLIS) proposed a conceptual consensus defining sarcopenia as a generalized skeletal muscle disease characterized by a concomitant combination of reduced muscle mass and strength, potentially reversible [8]. However, this definition has not yet been operationalized for clinical and research use.

Currently, the most widely used operational definition continues to be that proposed by the European Working Group on Sarcopenia in Older People (EWGSOP2), which emphasizes the importance of muscle strength as a central criterion for screening and diagnosis. This consensus recognizes that dynapenia, defined as the loss of muscle strength without necessarily a reduced muscle mass, is a strong predictor of sarcopenia and is associated with adverse outcomes, such as loss of functionality, falls, and mortality [9].

Even in this turbulent context of definitions, the recommendation of resistance physical exercises is the principal, widely recognized strategy for managing sarcopenia [10-13] and the important role of nutrition in maintaining muscle functions – this, however, with a significant lack of studies to support nutritional intervention strategies [14-16].

Studies on the relationship between protein intake and sarcopenia in older adults are scarce because most investigations focus on the role of specific nutrients without adequately considering individuals' food matrix and dietary patterns [17-22]. Although there is extensive knowledge about the importance of protein in preserving muscle health, evidence on how consuming protein-rich food groups influences the risk and progression of sarcopenia in different populations is still limited.

Recent studies suggest that the intake of animal proteins may be associated with a lower prevalence of sarcopenia [23-27]. Dorhout et al. [27], for example, identified this relationship in different European and African ethnicities but also highlighted that protein metabolism varies between these groups, influencing the diagnosis of sarcopenia.

Other studies on diet and sarcopenia are less specific when exploring this relationship with broad classifications, such as "healthy pattern" or "Mediterranean diet", which results in generic recommendations not entirely applicable to the older adults' dietary reality [28-33]. These findings reinforce the need for investigations considering regional particularities, whose dietary habits and other factors can influence the response to protein intake and, consequently, the progression of sarcopenia.

In this sense, to understand the relationship between this disease and diet from a perspective closer to individuals' reality, this work aimed to investigate the association between consuming protein-rich foods and the risk of developing dynapenia and sarcopenia over five years.

METHODS

Study population and design

This longitudinal study was conducted with data obtained in 2010 and 2015 by the *Saúde, Bem-estar e Envelhecimento Estudo* (SABE, Health, Well-being, and Aging Study) of older adults aged 60 or over living in São Paulo. All healthy individuals in 2010 who participated in the study in 2015 (n=519) were included, and those who were not found or had insufficient data in 2015 were excluded. The Research Ethics Committee of the Faculdade de Saúde Pública da Universidade de São Paulo (FSP-USP, School of Public Health of the University of São Paulo) approved data use for this research (Opinion N° 4.349.697).

Data collection

The probabilistic sampling and collection processes have already been published [34] and involved drawing lots for residences in different census tracts of São Paulo, where home visits were conducted. The previously trained interviewers administered a structured questionnaire covering multiple sections related to key aspects of aging – including a Food Frequency Questionnaire (FFQ) – and conducted anthropometric assessments and functional tests. This instrument was developed by the Pan American Health Organization (PAHO) specifically for SABE and was validated by a committee of experts.

Sarcopenia

The individuals were classified for the outcome of interest based on the measured muscle strength and estimated muscle mass. Strength was verified through handgrip strength measured in kilograms (KG) by a handgrip dynamometer (Takei Kiki Kogyo TK 1201, Tokyo, Japan). Muscle mass was estimated using the predictive equation of Lee et al. [35]. For this dependent variable, individuals were classified as healthy, with dynapenia (reduced muscle strength), or with sarcopenia (reduced muscle strength combined with low muscle mass) per the cutoff points proposed by the EWGSOP2 [9].

Consumption of protein-rich foods

The FFQ is based on the assessment tool developed by PAHO for the SABE Study and was structured to capture participants' usual dietary intake in the last month. It contained 107 food items, organized into 18 groups. Responses were recorded on an ordinal scale, with the following options for consumption frequency: 1) does not eat or eats occasionally; 2) eats once a week; 3) eats two to three times a week; 4) eats four to six times a week; 5) eats once a day; 6) eats two to three times a day; 7) does not know; 8) did not respond. For this study, individuals who marked "don't know" or did not respond to the FFQ were excluded from the analysis.

This study selected the most relevant food groups for the research objective, specifically those representing the diet's principal protein sources. The question assessed the consumption frequency "Do you usually eat the following foods? How often?" was applied individually to each item listed. Meat (beef, chicken, fish, or pork) was assessed in the same question, where the participant was asked to indicate the consumption frequency considering all the options. The same procedure was adopted for legumes (beans, lentils, chickpeas, peas, and soybeans), which were listed together in a single question, and for milk and dairy products (yogurt and cheese), whose consumption frequency was also questioned together. Eggs were assessed separately, with a question exclusively for this item.

The categorization of consumption frequency, an exposure variable, was conducted in seven distinct groups (Chart 1), considering the responses "eats once a day" or "eats two to three times a day" as daily consumption.

The categorization of protein sources considered the food matrix and dietary patterns of the Brazilian population [36], recognizing that different protein sources have different digestibility and essential amino acid profiles [18]. Proteins of animal origin, such as meat, milk, and eggs, were classified separately due to their greater bioavailability and anabolic effect on muscle synthesis. Legumes, in turn, were analyzed in isolation due to their lower digestibility and deficiency in essential amino acids. Also, a group that combines meat and legumes was included, reflecting a culturally relevant dietary pattern that can streamline protein intake through amino acid complementarity.

Chart 1 – Groups by frequency of consumption of protein-rich foods.

Food group	Frequency of consumption of protein-rich foods
"Low consumption"	Lack of daily consumption of protein-rich foods
"Meat"	Daily consumption of meat, but not of legumes
"Legumes"	Daily consumption of legumes, but not of meat
"Eggs"	Daily consumption of eggs, but not of meat and legumes
"Milk"	Daily consumption of milk and dairy products, but not of other protein sources
"Meat and legumes"	Daily consumption of meat and legumes

Control variables

Control variables were those that could potentially influence the outcome of interest, including age, gender, Body Mass Index (BMI), physical activity level, schooling, income, and self-reported comorbidities.

Age was addressed as a continuous variable, expressed in complete years. Gender was categorized as male or female. Physical activity was considered habitual when the participant reported engaging in physical exercises three or more times per week. Schooling was measured by the total number of completed study years. Income was assessed from the answer to the question: "Do you consider that you have enough money to cover your daily expenses?" and was used as an indicator of the older adults' perceived financial sufficiency.

Nutritional status was assessed by the BMI calculated from the participants' weight and height and classified per the PAHO criteria adopted by SABE: underweight (<23 kg/m^2), normal weight (23-27.9 kg/m^2), overweight (28-29.9 kg/m^2), and obesity (≥30 kg/m^2) [37]. Comorbidities were identified from self-report based on the question: "Has a doctor ever told you that you have....", considering the answers for diabetes, hypertension, and cancer.

Statistical analysis

The prevalence of protein-rich food consumption in 2010 and the incidence of dynapenia and sarcopenia in 2015 were presented in absolute and relative frequencies considering the sample weight with a 95% Confidence Interval (CI). The incidence was calculated considering the number of new dynapenia or sarcopenia cases identified in 2015 among healthy people in 2010.

We employed a binary logistic regression to verify the association between 2010 consumption and the incidence of dynapenia or sarcopenia in 2015. Multicollinearity between the independent variables respected a cutoff value for tolerance (>0.8) to indicate the lack of problematic multicollinearity. The crude regression model results and those adjusted for the control variables were presented as Odds Ratios (OR) with the respective 95% CI. All tests with a *p*-value <0.05 were significant. All statistical procedures were performed using IBM®SPSS® Statistics 29.0 software.

RESULTS

A total of 519 older adults (healthy in 2010) were included in the analysis, of which 354 were women, and 165 were men, representing 60% and 40%, respectively, considering weighting. The incidence of dynapenia in 2015 was 22% (95% CI 19.84%-24.16%) (n=113), while that of sarcopenia was 1.1% (95% CI 0.99%-1.21%) (n=9).

A mean BMI of 21.94 kg/m^2 (95% CI: 20.65–23.23 kg/m^2) stood out among individuals with sarcopenia – a value that classifies them as underweight for the nutritional status classification of older adults. Regardless of the outcome related to muscle health in 2015, most individuals engaged in physical activity regularly five years earlier. The detailed characteristics of this incidence in 2015 by consumption of protein-rich foods in 2010 and the other control variables are described in Table 1.

Table 2 presents binary logistic regression results for the incidence of dynapenia or sarcopenia in 2015 by consumption of protein-rich foods in 2010. In the crude and adjusted models, meat and legumes, together or separately, represented a protective factor for the incidence of sarcopenia and dynapenia. In the adjusted model, meat had OR=0.393 (95% CI: 0.381-0.405; p<0.001) and legumes OR=0.519 (95% CI: 0.504-0.534; p<0.001). The combined consumption of meat and legumes conferred the most significant protection against sarcopenia and dynapenia, with OR=0.297 (95% CI: 0.289-0.305; p<0.001). The category of exclusive milk consumption, which in the crude model was a protective factor, lost this effect in the adjusted model (OR=1.185; 95% CI: 1.148-1.223; p<0.001). The final regression model had an accuracy rate of 78.8%.

Table 1 – Characteristics of the study population in 2010 by the incidence of dynapenia and sarcopenia in 2015.

Exposure in 2010				Incidence in 2015								
				Healthy			Dynapenia			Sarcopenia		
Age[a]	68.39	(67.84-68.94)		67.29	(66.74-67.84)		71.58	(70.22-72.94)		76.78	(71.05-82.51)	
Gender[b]												
Male	39.8%	(36%-44%)	(n=165)	36.8%	(33%-40%)	(n=118)	52.2%	(47%-57%)	(n=47)	0.0%		(n=0)
Female	60.2%	(54%-66%)	(n=354)	63.2%	(57%-69%)	(n=279)	47.8%	(43%-52%)	(n=66)	100.0%	(90%-110%)	(n=9)
BMI[a]	28.58	(28.13-29.03)		28.74	(28.23-29.25)		28.55	(27.61-29.49)		21.94	(20.65-23.23)	
Physical activity[b]												
Yes	76.5%	(69%-84%)	(n=403)	76.8%	(69%-84%)	(n=311)	74.5%	(67%-82%)	(n=84)	90.6%	(82%-99%)	(n=8)
No	23.5%	(21%-26%)	(n=116)	23.2%	(21%-25%)	(n=86)	25.5%	(23%-28%)	(n=29)	9.4%	(8%-10%)	(n=1)
Schooling (years[a]	6.17	(5.79-6.55)		6.21	(5.79-6.63)		6.13	(5.21-7.05)		4.78	(1.88-7.68)	
Income perception[b]												
Positive	54.9%	(50%-60%)	(n=284)	53.2%	(48%-58%)	(n=210)	62.0%	(56%-68%)	(n=71)	30.4%	(27%-33%)	(n=3)
Negative	45.1%	(41%-50%)	(n=232)	46.8%	(42%-51%)	(n=184)	38.0%	(34%-42%)	(n=42)	69.6%	(63%-76%)	(n=6)
Comorbidities[b]												
Diabetes	24.2%	(22%-27%)	(n=125)	23.8%	(21%-26%)	(n=95)	25.9%	(23%-28%)	(n=28)	22.1%	(20%-24%)	(n=2)
Hypertension	66.2%	(60%-73%)	(n=343)	65.8%	(59%-72%)	(n=260)	68.2%	(62%-75%)	(n=78)	52.1%	(47%-57%)	(n=5)
Cancer	6.6%	(6%-7%)	(n=34)	6.2%	(6%-7%)	(n=26)	8.2%	(7%-9%)	(n=8)	0.0%		(n=0)
Consumption of protein-rich foods[b]												
Low consumption	4.7%	(4%-5%)	(n=23)	3.3%	(3%-4%)	(n=15)	9.3%	(8%-10%)	(n=7)	13.0%	(12%-14%)	(n=1)
Meat	13.7%	(12%-15%)	(n=71)	13.9%	(13%-15%)	(n=54)	13.0%	(12%-14%)	(n=16)	13.6%	(12%-15%)	(n=1)
Legumes	21.4%	(19%-24%)	(n=114)	20.4%	(18%-22%)	(n=83)	24.0%	(22%-26%)	(n=27)	40.4%	(36%-44%)	(n=4)
Eggs	0.5%	(0%-1%)	(n=2)	0.6%	(1%-1%)	(n=2)	0.0%		(n=0)	0.0%		(n=0)
Milk	8.9%	(8%-10%)	(n=49)	6.7%	(6%-7%)	(n=27)	16.1%	(15%-18%)	(n=20)	23.6%	(21%-26%)	(n=2)
Meat and legumes	50.8%	(46%-56%)	(n=260)	55.1%	(50%-60%)	(n=216)	37.6%	(34%-41%)	(n=43)	9.4%	(8%-10%)	(n=1)

Note: [a]Mean values with 95% confidence interval are presented; [b]The relative frequency considering the sample weight (%) with a 95% confidence interval and the absolute frequency (n) are presented. BMI: Body Mass Index.

Table 2 – Crude and adjusted[a] binary logistic regression model for the incidence of dynapenia or sarcopenia in 2015 by consumption of protein-rich foods in 2010.

Food group	Crude		Adjusted	
	OR	95% CI	OR	95% CI
"Low consumption"	1		1	
"Meat"[b]	0.323	(0.309-0.336)	0.393	(0.381-0.405)
"Legumes"[b]	0.416	(0.402-0.442)	0.519	(0.504-0.534)
"Eggs"	0		0	
"Milk"[b]	0.847	(0.626-0.927)	1.185	(1.148-1.223)
"Meat and legumes"[b]	0.226	(0.218-0.235)	0.297	(0.289-0.305)

Note: [a]Final model adjusted for age, gender, body mass index, schooling, physical activity, income, and comorbidities. [b]p-value <0.001. CI: Confidence Interval; OR: Odds Ratio.

DISCUSSION

The different consensuses and ways of interpreting and diagnosing sarcopenia and dynapenia hinder a broad perspective of the evidence related to their incidence in older adults. However, while a global consensus on the diagnosis has not been achieved [8], it is already well established that the decrease in muscle strength and mass is age-related – due to changes in the activity of muscle cells and a natural reduction in physical activity [38] – with nutritional status [14], income, hypertension, diabetes, and cancer [39-42].

Thus, as expected, this study observed a higher mean age in individuals who acquired dynapenia and sarcopenia and a lower mean BMI. The distribution between men and women tends to be balanced among healthy individuals and those with dynapenia, albeit with a slight female predominance. However, during the study period, no man had an estimated loss of muscle mass to the point of being diagnosed with sarcopenia.

Most participants in all groups reported engaging in physical activity. Although the perceived income was balanced between healthy individuals and those with dynapenia, it was notably more pessimistic among the few individuals who acquired sarcopenia within five years. In the same vein, the schooling years among individuals with sarcopenia were, on average, lower. Diabetes and hypertension were common in all groups, while few people reported having cancer in 2010.

Daily consumption of meat and legumes was more frequent among study participants. However, the frequency of older adults reporting only consuming milk and dairy products or legumes daily in 2010 was higher among those who acquired sarcopenia or dynapenia in 2015. Regarding individuals who did not report daily consumption of any type of meat, eggs, milk, or legumes, those who consumed meat and legumes daily had the lowest risk (p<0.001), followed by those who consumed only meat daily (p<0.001) and then only legumes (p<0.001). Daily milk consumption alone was insufficient to reduce the risk, as it increased by 18%. Only two individuals reported consuming only eggs daily in 2010 – thus being the only group where no association with muscle health outcomes was found.

Daily consumption of meat and legumes is absolutely expected, especially among older adults, since these foods are part of the traditional Brazilian diet. In 2010, when the data for this study were collected, data from the Surveillance System for Risk and Protection Factors for Chronic Diseases by Telephone Survey (Vigitel) show an estimated consumption of beans on five or more days a week by 65.6% of Brazilians [43]. The same survey also indicates an estimated consumption of red meat and chicken on five or more days a week by 32% and 12% of the Brazilian population, respectively [44].

The greater protection against dynapenia and sarcopenia observed in daily meat consumption can be justified by its effects on protein metabolism – Berrazaga et al. [17] found a lower capacity of vegetable proteins to stimulate protein synthesis and preserve muscle mass. Also, vegetable proteins have lower anabolic potential due to their amino acid composition and lower digestibility and bioavailability. Ajomiwe et al. [18] discussed that the complex structure of many plant proteins, antinutritional factors, and greater resistance to enzymatic degradation reduce their body absorption and utilization. This lower utilization further compromises their ability to meet protein needs in populations vulnerable to muscle loss, such as older adults, reinforcing the role of animal proteins in preserving lean mass and preventing sarcopenia.

Several studies point to the superiority of animal proteins to preserve muscle health but highlight the important role of vegetable protein source foods (such as beans) in increasing the supply of energy, proteins, fibers, and micronutrients [17-21] – especially vitamin B6 has been associated with preserving muscle functions in older adults [45]. This micronutrient, found primarily in meat and legumes, was the only one whose inadequate intake was associated with sarcopenia in a study with Brazilian older adults [46]. Such information then supports the scale of protection for dynapenia and sarcopenia in the present study: daily consumption of meat and legumes>daily consumption of meat>daily consumption of legumes.

These data show the relevance of the quality and amount of ingested proteins, which may also explain the higher risk for sarcopenia and dynapenia associated with the daily consumption of exclusive milk and dairy products. Although dairy proteins are highly digestible and rich in leucine, their lower variety of essential amino acids, compared to meat and legumes, may limit their ability to stimulate protein synthesis optimally [17]. Furthermore, the lower energy density of milk and dairy products may compromise total caloric intake, which is relevant for populations vulnerable to muscle mass loss. Protein bioavailability and structure play a crucial role in the absorption and utilization of amino acids [18], reinforcing the importance of protein diversity in preventing sarcopenia.

The relationship between protein intake and preservation of muscle function in older adults has been widely investigated in different populations. This study's findings showed a protective association between daily consumption of meat and legumes and a lower risk of sarcopenia and dynapenia. They converge with the results of investigations in Asian, African, and European countries, highlighting the relevance of animal proteins in preserving muscle mass. Suthutvoravut et al. [23] and Yokoyama et al. [24] highlight a cross-sectional association between habitual fish consumption and lower prevalence of sarcopenia in Japanese populations. Similarly, Velho et al. [47] observed a protective effect of frequent fish consumption in Portuguese cancer patients, a population particularly susceptible to muscle loss. Although this study did not discriminate between the types of meat consumed, the results reveal that regular intake of protein-rich sources with high digestibility and essential amino acid content, such as meat and legumes, are crucial in preventing sarcopenia, corroborating the importance of protein adequacy in the older adult's diet.

Furthermore, investigating Chinese populations in cross-sectional studies, Chan et al. [25] and Wang et al. [26] found that high simultaneous consumption of animal and vegetable protein sources was a protective factor for sarcopenia. The present study strengthens this hypothesis by showing that older adults who consumed meat and legumes daily had the lowest risk of loss of muscle mass and strength, suggesting that the combination of protein sources can streamline protein metabolism and offer a superior protective effect to the isolated consumption of each of these food categories.

Following elderly Swedes over 16 years old, Karlsson et al. [29] found a lower risk of developing sarcopenia among those who followed a consumption pattern close to the Mediterranean diet (which advocates high fish consumption and moderate red meat consumption) after statistical adjustment to consider the amount of protein ingested. Hashemi et al. [28] found a similar result in a cross-sectional study with Iranians.

Evaluating the consumption of Brazilian people (from the same region as the population of the present study), Gonçalves et al. [48] found a low consumption of animal protein in men and women with dynapenia and sarcopenia. However, the present investigation expands this evidence by showing that insufficient protein intake and the diversity and combination of protein sources influence the risk of sarcopenia over time. This finding is corroborated by Silveira et al. [49], who, in a 12-week intervention with 111 older adults, found improved sarcopenia parameters after encouraging the consumption of a traditional Brazilian meal with beans and meat.

Despite this evidence, the future outlook is not promising for meat and legume consumption for the next generations, who will soon be classified as older adults. The popularity of adopting vegetarian and vegan diets has grown exponentially [50] and, contrary to recommendations, has not been accompanied by greater consumption of plant-based protein foods – Granado et al. [43] projected a significant reduction in bean consumption by Brazilians by 2030. In this setting, dynapenia and sarcopenia will very likely be an even more significant problem for aging in the future – even though they have among their prevention and coping possibilities something that for decades was so basic in the Brazilian reality: a plate of beans and a piece of meat.

The strengths of this research lie in its longitudinal approach, allowing the analysis of the temporal relationship between protein intake and the incidence of sarcopenia and dynapenia in older adults. Unlike cross-sectional studies, this work offers a more robust perspective on the impact of protein intake over time, reducing potential reverse causality biases. Furthermore, using a representative population sample based on a household survey conducted by trained interviewers reinforces the applicability of the findings to the Brazilian reality. The classification of protein-rich foods considered the food matrix and bioavailability of proteins, highlighting the importance of culturally relevant food combinations, such as meat and legumes, in protecting against muscle loss. Using internationally recognized criteria for the definition of sarcopenia and dynapenia strengthens comparability with other investigations, and the findings converge with evidence from studies conducted in different populations, reinforcing the consistency of the results. These aspects make the present study relevant to understanding the relationship between dietary patterns and muscle health in older adults, supporting public policies and nutritional recommendations to prevent sarcopenia.

However, some limitations should be considered. The assessment of food consumption was based on the frequency of intake of food groups without detailed information on the exact amount of protein consumed or its distribution throughout the day, factors that may influence protein synthesis, and the preservation of muscle mass. Furthermore, categorizing food consumption did not allow for the assessment of protein intake in isolation, nor for differentiating the types of meat consumed, which could provide a more refined analysis of the impact of different protein-rich sources. The estimation of sarcopenia was performed based on predictive equations and indirect measurements, which may introduce some imprecision in the classification of outcomes.

Another relevant limitation is the lack of data on rice consumption, a food traditionally consumed with beans in Brazil. This combination may have influenced the results since the complementarity of amino acids between cereals and legumes improves the dietary protein quality. These limitations should be considered when interpreting the findings and reinforce the need for future studies that evaluate dietary intake in greater detail, including the quantity and quality of the protein consumed.

CONCLUSION

The frequent dietary intake of protein-rich foods was relevant to the risk of developing dynapenia and sarcopenia. The importance of daily meat consumption was highlighted since this had greater protection than the consumption of legumes alone. However, the benefits of daily consumption of both food groups were superior, both due to higher energy intake and the intake of animal and vegetable proteins.

Aiming to improve quality of life and healthy aging, which includes combating dynapenia and sarcopenia, new research should explore the individual behaviors and contexts surrounding the absence of these food groups in the daily consumption of older adults – to collaborate in developing action plans. At the same time, this combination is typical of Brazilian meals that contain beans and some type of meat and should be encouraged from now on at an individual level and in public policies – and these should enable the broad production and access to these food groups for all social classes of the population and include ongoing communication strategies that promote their adequate consumption – not only for older adults but all age groups that will inevitably grow old.

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