REVISTA DE NUTRIÇÃO
Brazilian Journal of Nutrition

ORIGINAL

Nutrition and Geriatrics

Editor
Carla Cristina Enes

Conflict of interest
The authors declare that there is no conflict of interests.

Received
April 25, 2023

Final version
March 19, 2024

Approved
June 19, 2024

Relationship between fat and protein dietary intake and associated factors in older adults in the city of São Caetano do Sul

Relação entre o consumo alimentar de gorduras e proteínas e fatores associados em pessoas idosas no município de São Caetano do Sul

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Article based on the dissertation of MV SECAFIM, entitled "*Consumo habitual e distribuição energética de proteína, gordura total e saturada, e açúcar adicionado na dieta de idosos residentes no município de São Caetano do Sul*". Universidade São Judas Tadeus; 2019.

How to cite this article: Secafim MV, Aquino RC. Relationship between fat and protein dietary intake and associated factors in older adults in the city of São Caetano do Sul. Rev Nutr. 2024;37:e230077. https://doi.org/10.1590/1678-9865202437e230077

ABSTRACT

Objective
To assess the relationship between the usual dietary intake of fats and proteins and associated factors in older adults.

Methods
A descriptive cross-sectional study carried out with 295 older adults living in the city of São Caetano do Sul, Brazil. Dietary intake was assessed using two 24-hour dietary recalls and adjusted using the Multiple Source Method to characterize habitual intake. Fats (total and saturated) were assessed according to the percentage contribution of nutrients to total dietary energy (%) and were associated with the studied variables: sociodemographic, economic, lifestyle, nutritional status, and health variables.

Results
Percentage of fat consumption decreased with age and increased according to income level, and protein consumption was lower among those without spouses ($p \leq 0.05$). A negative linear correlation was observed between protein intake (%) and total energy intake, and a positive linear correlation was observed between protein intake and saturated fat intake in grams ($p \leq 0.05$).

Conclusion
The findings indicate that fat and protein intake was influenced by sociodemographic variables, and the relationship between the intake of protein-rich foods may impact the increase in the

availability of saturated fats. These findings demonstrate the importance of access to nutritional counseling that impacts diet quality, particularly in the choice of protein sources with lower amounts of total and saturated fats, in order to reduce the risk and/or prevent cardiovascular diseases.

Keywords: Aged. Elderly nutrition. Eating.

RESUMO

Objetivo

Avaliar a relação entre o consumo alimentar habitual de gorduras e proteínas e os fatores associados em pessoas idosas.

Métodos

Estudo transversal descritivo realizado com 295 pessoas idosas residentes do Município de São Caetano do Sul. O consumo alimentar foi levantado por dois Recordatórios de 24 horas e ajustado pelo Multiple Source Method para caracterizar o consumo habitual. Gorduras (totais e saturadas) foram avaliadas segundo a participação percentual dos nutrientes no valor energético total da dieta (%) e foram associadas com as variáveis estudadas: sociodemográficas, econômicas, de estilo de vida, estado nutricional e de saúde.

Resultados

O consumo percentual de gorduras diminuiu com a idade e aumentou com a renda, e o consumo de proteínas foi menor entre aqueles sem companheiros (p≤0,05). Ao correlacionar o consumo de proteínas (%) e o valor energético total, foi observada correlação linear negativa, e ao correlacionar o consumo de proteínas e de gorduras saturadas em gramas observou-se correlação linear positiva (p≤0,05).

Conclusão

Os achados indicam que o consumo de gorduras e proteínas foi influenciado por variáveis sociodemográficas, e a relação entre o consumo de alimentos fontes de proteínas pode impactar no aumento da disponibilidade de gorduras saturadas. Esses achados demonstram a importância do acesso a aconselhamento nutricional que impacta principalmente no que se refere à escolha de alimentos fontes de proteínas e com quantidades menores de gorduras totais e saturadas, na qualidade da dieta, a fim de reduzir o risco e/ou evitar doenças cardiovasculares.

Palavras-chave: *Idoso. Nutrição do idoso. Ingestão de macronutrientes.*

INTRODUCTION

Nutrition is an important factor in promoting and maintaining health throughout all life stages, and its role as a protector against Chronic Non-communicable Diseases (NCDs) is well established, as diet and food choices are modifiable risk factors [1]. There is strong evidence that a diet based on fruits, vegetables, legumes, whole grains, nuts, and seeds, along with reduced consumption of fatty and processed meats, sugary beverages, and other foods with high levels of sugars, salt, and saturated fat, has a protective effect and is crucial for active aging [2,3].

Several factors can impact dietary choices and food access, consequently affecting diet quality, such as social, economic, and environmental conditions. In the case of older adults, there are additional important determinants, such as physiological changes and aging-related diseases [4].

The health of older adults depends on access to a diet that provides an adequate quantity and proportion of all macronutrients (carbohydrates, lipids, and proteins) [5]. Inadequate intake of total and saturated fats leads to oxidative stress and inflammation, as well as increased blood lipid concentrations [6]. Additionally, high fat intake plays a crucial role in the etiology of obesity, creating a metabolic state that can favor dyslipidemia [6]. On the other hand, protein consumption is crucial for various processes such as growth, muscle function, and immunity. Adequate intake can help minimize muscle mass loss and prevent impairment in physical functionality [7].

Given this context, the present study aimed to assess the relationship between habitual dietary fat and protein intake in the diet of older adults residing in the city of São Caetano do Sul (Brazil) and to verify the association with sociodemographic, economic, lifestyle, nutritional status, and health variables.

METHODS

This is a cross-sectional study with non-probabilistic, convenience sampling in the municipality of São Caetano do Sul, state of São Paulo. Older adults were recruited from Integrated Health and Education Centers (IHEC) for Older Adults.

Recruitment was conducted through verbal announcements and posters displayed in the Centers. Interviewers stayed on-site and approached participants during activities conducted at the IHEC. Upon acceptance, an interview was scheduled, conducted in available consultation rooms at the units, along with a follow-up appointment to collect their responses to a food consumption assessment instrument. Inclusion criteria were being 60 years or older, being able to undergo the interview and body composition assessment, and agreeing to participate after reading and signing the informed consent form. A total of 350 individuals were approached, and 295 were included in the study.

The sample size was determined according to the method of Hair et al. [8], which establishes a minimum number of individuals as five times the number of food items studied in the food consumption assessment methods (the food frequency questionnaire used in the original research consisted of 57 items with 87 foods, and information on frequency was collected and described from 0 to 10 times, with units of time being day, week, month, and year). A sample size of at least 285 individuals was calculated for statistical analysis, ensuring a 95% confidence level and a 5% sampling error, with an additional 10% to account for potential dropouts.

Data collection was carried out by a team of trained nutritionists through an interview and a questionnaire developed based on the Pan American Health Organization's (PAHO) Health, Well-being, and Aging Survey [9]. Data collection took place from February 2014 to February 2015.

Economic and sociodemographic data (age, sex, educational level, marital status, and income level), lifestyle (self-reported physical activity and smoking), presence or absence of self-reported morbidities such as diabetes mellitus, hypertension, dyslipidemia, and others mentioned in the interview were collected. Per capita income was calculated according to the minimum wage at the time (BRL 724.00) and by the monthly income received from any source, such as retirement, family support, financial investments, government programs, and others.

Anthropometric data collected included body weight (kg) and height (m), measured using a digital scale and a portable stadiometer. Participants were measured wearing light clothing and barefoot. Body Mass Index (BMI) was calculated as weight (kg) divided by height squared (m^2), and classified as underweight (<23kg/m^2), normal weight (23-28kg/m^2), overweight (28-30kg/m^2), and obesity (≥30kg/m^2), according to the Pan American Health Organization [9].

Food consumption in the study was assessed using two methods: a Food Frequency Questionnaire (FFQ) and 24-hour recalls. This article focuses on the 24-hour recalls, which were conducted using the Multiple-Pass Method (MPM). The MPM involves five steps: quick listing, review of the quick listing, meal naming, detail cycle, and a general review. The 24-hour recall consists of defining and quantifying all foods and beverages consumed in the last 24 hours prior to the interview. The quantities of foods and beverages consumed are usually estimated in common measures, and it

is the interviewer's responsibility to establish understandable communication with the interviewee to collect the information as detailed as possible without leading. To estimate habitual consumption, a replication of the 24-hour recall was performed two weeks later in a sub-sample of 30% (n=89). Harttig et al. [10] recommend a 30% replication rate to estimate habitual food consumption and assess inter-individual variability in nutrient intake. To capture the variability of weekly and annual food consumption patterns, interviews were conducted to represent all days of the week and months of the year. To minimize memory bias, participants were instructed to record all foods and beverages consumed on the day before the 24-hour recall interviews.

Following this, the 24-hour recalls underwent analysis to convert reported food quantities and preparations into standard measures based on the Brazilian Food Composition Table [11]. Energy and macronutrient data were processed using the Nutrition Data System for Research (NDSR) software, licensed by the United States Department of Agriculture (USDA) license No. EA8B 39CC 5541 F0C9 2B.

The statistical modeling program MSM [10], developed by the European Prospective Investigation into Cancer and Nutrition (EPIC), was employed to estimate habitual energy and nutrient intake. This method was chosen for its capability to estimate habitual intake while accounting for intrapersonal variance through logistic regression and distribution of individual data adjusted for the population. It involves using two 24-hour recalls in a random sub-sample of the study population.

The relative percentage contribution of proteins and fats (total and saturated) to the Total Energy Value (TEV) of the diet was calculated. For analysis purposes, protein recommendations (10 to 35% of TEV) were adopted according to the Acceptable Macronutrient Distribution Ranges (AMDR) [12], and total and saturated fats were assessed according to the values recommended by the "Position Statement on Fat Consumption and Cardiovascular Health" [6]: 25 to 35% and <10% of TEV, respectively.

The data were analyzed using statistical software with a significance level of 5%. Student's *t*-test and one-way ANOVA were employed to compare means for variables with normal distribution, followed by Tukey's Post-Hoc test to assess differences. For variables not meeting normality assumptions, non-parametric Mann-Whitney or Kruskal-Wallis tests were utilized to compare means.

Pearson's linear method was used to assess the correlation between variables that met normality, and Spearman's correlation was used to assess the correlation between non-parametric variables. When the correlation between variables was significant, the multiple linear regression method of simultaneous modeling of dependent variables was applied. To represent the magnitude of the results, effect size measures were calculated as a complement to the statistical significance analysis.

In observance of ethical principles (Resolutions 466/2012 and 510/2016), the present study was approved by the Research Ethics Committees of the Municipal Health Foundation of the city of São Caetano do Sul and the Universidade São Judas Tadeu (USJT, São Judas Tadeu University) (protocol 72/2013 and CAAE No. 24607513.0.0000.0089).

RESULTS

The study population predominantly comprised older adult females (85.1%), with a mean age of 70.6±7.0 years. A significant portion had 0 to 4 years of formal education (41.7%) and reported not having spouses (55.3%), while 44.1% reported receiving between 1 to 3 minimum wages per month. Regarding lifestyle, 4.4% were smokers, and 84.7% reported engaging in physical activities. Nutritional status and self-reported morbidities indicated that 42.4% were eutrophic, 43.7% had

overweight and obesity, 55.3% reported hypertension, 21.7% had diabetes mellitus, and 42.0% had dyslipidemia.

In the assessment of the distribution of the percentage consumption of macronutrients, it was observed that most individuals had the percentage consumption of total fats (63.1%), saturated fats (100.0%), and proteins (98.3%) within the recommended guidelines. However, 20.0% of older adults had a percentage consumption of total fats above the recommendation. The mean percentage consumption of total fats was 29.7%, 4.4% for saturated fats, and 18.1% for proteins (Table 1).

Table 1 – Frequency, mean, and standard deviation of the percentage participation of the nutrient in the total energy value according to the recommendations for total fats, saturated fats, and proteins of the recommended percentage. São Caetano do Sul (Brazil), 2015.

Recommendation	Below recommendation				Within recommendation				Above recommendation			
	n	%	Mean	±SD	n	%	Mean	±SD	n	%	Mean	±SD
Total fat (25-35%)	50	16.9	21.3	±2.93	186	63.1	29.7	±2.73	59	20.0	38.0	±2.32
Saturated fats (<10%)	-	-	-	-	295	100.0	4.4	±1.11	-	-	-	-
Proteins (10-35%)	05	1.7	8.1	±1.47	290	98.3	18.1	±4.01	-	-	-	-

Note: SD: Standard Deviation.

When assessing the percentage of fats in the total energy value (below, between, and above the recommended percentage) and relating it to sociodemographic, economic, lifestyle, nutritional status, and health variables, significant differences were observed among age groups (p=0.013) and income (p=0.014) within the recommended range (25 to 35%). Specifically, lower percentage consumption was observed in individuals aged 80 years or older, whereas it was higher among those reporting an income above three minimum wages (Table 2).

Table 2 – Mean and standard deviation of the older adults' total fat intake in relation to the percentage participation of the nutrient in the total energy value and the recommendations according to sociodemographic, economic, lifestyle, nutritional status, and health variables. São Caetano do Sul (Brazil), 2015.

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Variables	<25% of TEV		p	25-35% of TEV		p	>35% of TEV		p
	n (%)	Mean±SD		n (%)	Mean±SD		n (%)	Mean±SD	
Sex									
Female	39 (78.0)	21.29±3.14	0.944‡	160 (86.0)	29.74±2.79	0.992‡	52 (88.1)	37.90±2.28	0.992‡
Male	11 (22.0)	21.65±2.09		26 (14.0)	29.72±2.44		07 (11.9)	39.17±2.50	
Age (years)									
60-69	22 (44.0)	21.33±2.49		86 (46.2)	29.82±2.65[a]		29 (49.2)	37.77±2.34	
70-79	22 (44.0)	21.11±3.53	0.605†	80 (43.0)	30.05±2.77[b]	0.013†	22 (37.3)	38.14±2.05	0.013†
80+	06 (12.0)	22.48±1.94		20 (10.8)	28.08±2.47[a]		08 (13.5)	38.81±3.03	
Marital status									
With spouse	17 (34.0)	20.58±3.43	0.231‡	91 (48.9)	29.70±2.74	0.867‡	24 (40.7)	38.42±2.38	0.867‡
Without spouse	33 (66.0)	21.77±2.59		95 (51.1)	29.76±2.74		35 (59.3)	37.80±2.28	
Educational level (years)									
0-4	20 (40.0)	21.93±2.72		82 (44.0)	20.90±2.67		21 (35.6)	38.11±2.37	
5-8	11 (22.0)	20.13±4.04	0.217†	39 (21.0)	29.73±2.88	0.810†	12 (20.3)	37.33±1.97	0.810†
9-12	11 (22.0)	20.74±2.46		29 (15.6)	29.74±2.71		13 (22.0)	38.53±2.60	
12+	08 (16.0)	22.55±1.55		36 (19.4)	29.36±2.81		13 (22.0)	38.13±2.38	
Income (MW)									
No income	05 (10.0)	22.24±2.34		24 (12.9)	30.35±3.04		06 (10.2)	38.18±3.21	
<1	08 (16.0)	19.12±3.83	0.072†	43 (23.1)	28.57±2.41[ab]	0.014†	11 (18.6)	38.44±1.78	0.014†
>1 ≤3	24 (48.0)	21.37±2.93		80 (43.0)	29.97±2.62[b]		26 (44.1)	38.48±2.35	
>3	13 (26.0)	22.43±1.79		39 (21.0)	30.16±2.83[a]		16 (27.1)	37.04±2.15	

Table 2 – Mean and standard deviation of the older adults' total fat intake in relation to the percentage participation of the nutrient in the total energy value and the recommendations according to sociodemographic, economic, lifestyle, nutritional status, and health variables. São Caetano do Sul (Brazil), 2015.

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Variables	<25% of TEV		*p*	25-35% of TEV		*p*	>35% of TEV		*p*
	n (%)	Mean±SD		n (%)	Mean±SD		n (%)	Mean±SD	
Physical activity									
Yes	38 (76.0)	21.48± 2.61	0.714*	162 (87.1)	29.72±2.80	0.849‡	50 (84.7)	38.06±2.38	0.916‡
No	12 (24.0)	21.03±3.89		24 (12.9)	29.82±2.33		09 (15.3)	37.98±2.10	
Smoking									
Yes	04 (8.0)	20.32±4.28	0.681‡	07 (3.8)	27.97±1.53	0.074‡	02 (3.4)	40.35±3.60	0.276‡
No	46 (92.0)	21.46±2.83		179 (96.2)	29.80±2.75		57 (96.6)	37.97±2.27	
Nutritional status									
Low weight	08 (16.0)	22.46±2.09	0.730†	31 (16.7)	29.48±2.60	0.451†	02 (3.4)	36.45±0.07	0.639†
Eutrophy	20 (40.0)	21.15±2.48		80 (43.0)	29.63±2.80		25 (42.3)	37.99±2.12	
Overweight	04 (8.0)	21.42±2.66		25 (13.4)	30.55±2.59		08 (13.6)	37.63±2.38	
Obesity	18 (36.0)	21.12±3.75		50 (26.9)	29.65±2.78		24 (40.7)	38.39±2.61	
Hypertension									
Yes	25 (50.0)	21.81±2.30	0.467‡	104 (55.9)	29.48±2.78	0.149‡	35 (59.3)	38.07±2.58	0.717‡
No	25 (50.0)	20.93±3.43		82 (44.1)	30.06±2.65		24 (40.7)	38.03±1.93	
Diabetes Mellitus									
Yes	06 (12.0)	22.56±1.55	0.293*	46 (24.7)	29.95±2.54	0.532*	12 (20.3)	38.07±2.48	0.992‡
No	44 (88.0)	21.21±3.04		140 (75.3)	29.66±2.80		47 (79.7)	38.05±2.31	
Dyslipidemia									
Yes	18 (36.0)	22.31±1.97	0.154‡	86 (46.2)	29.83±2.69	0.658*	20 (33.9)	37.63±2.29	0.324*
No	32 (64.0)	20.84±3.26		100 (53.8)	29.65±2.78		39 (66.1)	38.27±2.34	

Note: *Student's *t*-test; †: One-way ANOVA test; ‡: Mann-Whitney test; **a,b**: Means followed by the same letter do not differ significantly from each othe; MW: Minimum Wage; SD: Standard Deviation. Bold type indicates statistical significance.

Regarding the percentage distribution of proteins, significant differences (p=0.010) were observed between marital status and protein consumption below recommended (less than 10% of the total energy value). The percentage protein consumption was lower among older adults who reported not having spouses (Table 3).

Table 3 – Mean and standard deviation of the older adults' protein intake according to sociodemographic, economic, lifestyle, nutritional status, and health variables. São Caetano do Sul (Brazil), 2015.

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Variables	<10%		*p*	10-35%		*p*
	n (%)	Mean±SD		n (%)	Mean±SD	
Sex						
Female	04 (80.0)	7.75±1.44	0.157‡	247 (85.2)	18.06±4.04	0.431*
Male	01 (20.0)	9.50		43 (14.8)	18.58±3.85	
Age (years)						
60-69	05 (100)	8.10±1.47		132 (45.5)	18.43±4.04	
70-79	-	-	-	124 (42.8)	17.84±3.92	0.494†
80+	-	-		34 (11.7)	18.10±4.26	
Marital status						
With spouse	03 (60.0)	9.13±0.47	0.010*	129 (44.5)	18.44±3.91	0.249*
Without spouse	02 (40.0)	6.55±0.49		161 (55.5)	17.89±4.08	
Educational level (years)						
0-4	-	-		123 (42.4)	18.21±4.22	
5-8	02 (40.0)	8.95±0.49	0.362†	60 (20.7)	18.57±4.34	0.578†
9-12	03 (60.0)	7.53±1.73		50 (17.2)	17.50±3.38	
12+	-	-		57 (19.7)	18.09±3.70	

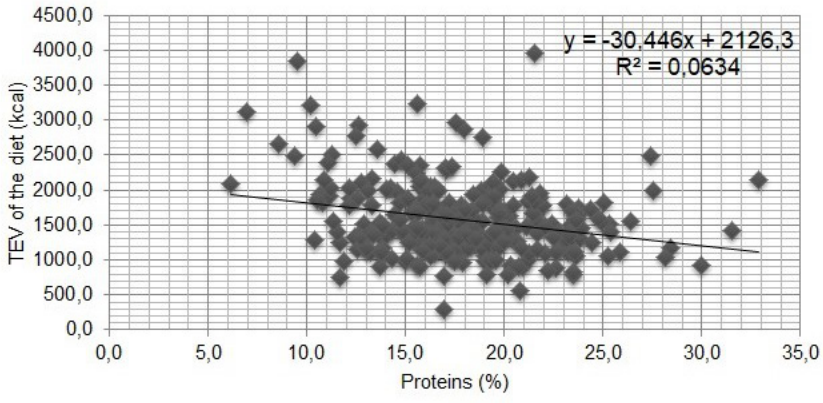
Table 3 – Mean and standard deviation of the older adults' protein intake according to sociodemographic, economic, lifestyle, nutritional status, and health variables. São Caetano do Sul (Brazil), 2015.

Variables	<10%		*p*	10-35%		*p*
	n (%)	Mean±SD		n (%)	Mean±SD	
Income (MW)						
No income	-	-	0.157§	35 (12.1)	19.22±4.81	0.311†
<1	-	-		62 (21.4)	18.36±3.81	
>1 ≤3	04 (80.0)	7.75±1.44		126 (43.4)	17.86±3.98	
>3	01 (20.0)	9.50		67 (23.1)	17.89±3.77	
Physical activity						
Yes	01 (20.0)	6.90	0.480‡	249 (85.9)	18.04±3.82	0.299*
No	04 (80.0)	8.40±1.51		41 (14.1)	18.74±5.00	
Smoking						
Yes	03 (60.0)	8.33±1.85	0.726*	10 (3.4)	18.86±3.18	0.566*
No	02 (40.0)	7.75±1.20		280 (96.6)	18.11±4.04	
Nutritional status						
Low weight	01 (20.0)	9.50	0.284§	40 (13.8)	17.56±3.16	0.707†
Eutrophy	01 (20.0)	9.30		124 (42.8)	18.36±4.12	
Overweight	01 (20.0)	8.60		36 (12.4)	18.36±3.96	
Obesity	02 (40.0)	6.55±0.49		90 (31.0)	18.01±4.24	
Hypertension						
Yes	03 (60.0)	8.26±1.23	0.804*	161 (55.5)	18.45±4.06	0.123‡
No	02 (40.0)	7.25±2.33		129 (44.4)	17.75±3.93	
Diabetes Mellitus						
Yes	-	-	-	64 (22.1)	18.60±3.70	0.199‡
No	05 (100)	8.10±1.47		226 (77.9)	18.01±4.09	
Dyslipidemia						
Yes	02 (40.0)	7.40±1.69	0.466*	122 (42.1)	17.92±3.84	0.425*
No	03 (60.0)	8.56±1.44		168 (57.9)	18.30±4.13	

Note: *Student's t-test; †: One-way ANOVA test; ‡: Mann-Whitney test; §: Kruskal-Wallis test. MW: Minimum Wage. Bold type indicates statistical significance.

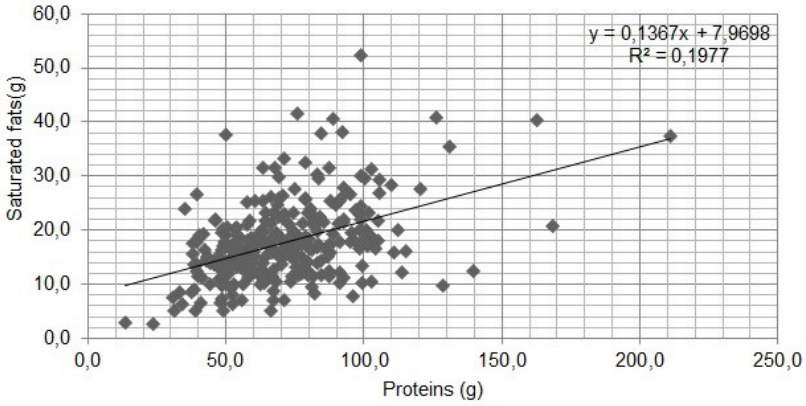
Correlating the protein percentage (%) and the total energy value (kcal) revealed a negative linear correlation (p=0.008; $R2$=0.0634), indicating that as the percentage protein consumption increased, the total energy value decreased by up to 6.3%. For each 1% increase in protein, there was an estimated decrease of 30.4 kcal (Figure 1). Additionally, a positive linear correlation (p≤0.001; $R2$=0.1977) was observed between the grams of protein (g) and the consumption of saturated fats (g), indicating that as protein consumption increased, the consumption of saturated fats increased by up to 19.7%, with each additional gram of protein corresponding to an estimated increase of 0.13g of saturated fats (Figure 2).

Figure 1 – Regression between protein intake and the Total Energy Value of the diet. São Caetano do Sul (Brazil), 2015.



Note: TEV: Total Energy Value.

Figure 2 – Regression between protein intake and saturated fats. São Caetano do Sul (Brazil), 2015.



DISCUSSION

Studying dietary intake, particularly among older adults, presents a methodological challenge but is crucial for identifying the importance of nutritional attention within interdisciplinary care. Dietary intake can be assessed from various perspectives: frequency of food groups, quantification of nutrients, and, as in the present study, the percentage contribution of macronutrients to the total energy value, compared to recommended guidelines. Furthermore, identifying sociodemographic and lifestyle factors that impact the quantity and quality of intake can guide strategies to improve diet quality [1].

This study demonstrated that although the dietary intake of fats (total and saturated) was adequate for most older adults in the sample, a significant percentage exceeded the recommendations and was associated with protein intake. Fat intake was lower among the oldest participants, those without spouses, and those with lower income levels, similar to the findings of Previdelli et al. [5], who analyzed a survey of Brazilian older adults through the 2008/2009 Household Budget Survey [13].

Regarding the sample characteristics, the results of this study were similar to those found in the population-based telephone survey on risk and protection factors for chronic diseases [14], conducted with Brazilians aged 65 years or older, and also in the Health Survey of the city of São Paulo [15], with individuals aged 60 years or older. However, the same surveys found lower values compared to this study concerning physical activity (21.8% and 15.9%) and higher values regarding smoking (7.4% and 23.0%). Access to reference centers promoting educational and sports activities enhances quality of life, particularly by fostering physical activity.

Studies with older adults have shown that the participation of nutrients in the total energy value varies widely: 18 to 35% for total fats, 6 to 12% for saturated fats, and 13 to 19% for proteins [16-20]. Neves-Souza et al. [21] associated high-fat diets, characterized by lipid percentages exceeding recommendations, with increased prevalence of obesity and dyslipidemia. Similar to the findings of this study, they also noted a positive association with protein intake.

Protein intake was found to be associated with saturated fat intake, which can be explained by the Brazilian dietary habit that is based on the consumption of plant-based protein sources like rice and beans, as well as animal-based foods such as meat, eggs, and dairy products, which are considered protein sources and also sources of saturated fats [6,22,23]. Gaspareto et al. [22], who assessed protein intake in the present population, found that, for both sexes, the largest contribution

was from animal-based protein sources (69%), and Freitas et al. [23], when assessing diet quality using the Revised Diet Quality Index (DQI-R), found high scores for "meat, eggs, and legumes" and "saturated fat" (consumption ≤7%).

The percentage of protein intake was lower among individuals who did not report having spouses, a similar result to the review by Procópio et al. [24], which found that single or separated older adults had lower intakes of food groups that are protein sources (meat, eggs, and beans) compared to those with spouses. A study by Beasley et al. [25] also found an association between higher protein consumption (% of total energy value) and having a spouse, suggesting that marital status may result in higher protein intake. The present study also found that as the percentage of protein increased, the total energy value decreased by up to 6.3%.

Recent evidence suggests that higher protein intake, within the recommended percentage range (AMDR) [12], can modulate systems involved in satiety, meaning that after consuming protein-rich meals, there is a reduction in hunger and an increase in perceived fullness due to a reduction in the hunger-stimulating hormone (ghrelin) and an increase in satiety-stimulating hormones (PYY and GLP-1) [26]. It is important to highlight that protein intake in older adults should be estimated individually, according to body weight and clinical conditions, and distributed evenly across the three main meals, as recommended by PROT-AGE [7]. However, in the same population of this study, Gaspareto et al. [27] found that the median intake was at the lower limit of the PROT-AGE recommended range, meaning that about 50% of individuals consumed less than 1.0g/kg/day, suggesting that the minimum percentage of 10% of the total energy value adopted by AMDR [12] may need to be re-assessed in studies of older adults' dietary intake.

Regarding the distribution of total fats, in this study, 63.1% of individuals had consumption within the recommended range, with a mean percentage of 29.7%, similar to some studies with older adults [28]. Total fat consumption was notably elevated among individuals with higher income levels. Income, alongside other unmeasured variables such as food valuation, appears to wield considerable influence over dietary choices. Notably, income emerges as a pivotal economic determinant in food consumption, particularly concerning the purchase of protein sources. For instance, lean meats, fish, and healthier animal protein options like chicken breast are often more expensive [20,22].

Regarding age, some studies have assessed the impact of age on diet quality. A study by Hiza et al. [29] found that American individuals aged 75 years or older had better quality diets compared to younger individuals. Gomes et al. [30] observed that individuals aged 60 to 69 years had 1.3 to 1.8 times, respectively, greater chances of having a low and intermediate quality diet compared to older individuals. Given the increasing availability of processed foods rich in total and saturated fats, which has impacted diet quality, especially among younger populations, it is believed that this will also impact the dietary patterns of adults as they age. Older adults seem to maintain dietary habits acquired throughout life, prior to the intense industrialization of food, but there has been an observed increase in the consumption of foods like instant noodles and processed meats [4].

It is important to consider that the acquisition and consumption of foods considered fat sources, such as processed foods, may be related to the formation of recent eating habits [31,32]. Factors such as fear of going out, anxiety and stress, financial insecurity, and the unavailability of healthy foods during the COVID-19 pandemic may have exacerbated the consumption of these foods [4]. However, the presence of Non-Communicable Diseases (NCDs) and the desire for a better quality of life may motivate the adoption of a healthier diet. This could explain the association observed in the study, noting that participants reported having NCDs such as hypertension, diabetes mellitus, and dyslipidemia.

It is worth noting that the results of the present study are derived from older adults attending reference centers for seniors and residents of a city with a high Human Development Index (HDI) (0.862–2010 Census) [33]. These individuals have access to healthcare professionals, as well as educational, sports, and social activities. Access to these services is considered a means of transforming individual and collective lifestyle habits, consequently promoting health and quality of life.

The main limitation of this study was the collection of data from a non-probabilistic sample, but to reduce this bias, individuals were selected geographically across 15 districts within the municipality with different social, demographic, and economic characteristics. Another bias to consider is the data collection location, as older adults who frequent reference centers may have better health conditions promoted by access to these institutions. Another possible limitation is related to age, as aging-related changes such as concentration difficulties and memory decline may increase the interview time and required greater attention from interviewers for dietary intake assessment. Therefore, the training of nutritionists, the request for dietary records the day before the interview, and the appropriate space available for data collection were essential for impacting the quality and reliability of the gathered information.

CONCLUSION

When assessing habitual dietary intake, it was observed that although most older adults had the percentage distribution of total fats within the recommended guidelines, 20% of the sample had a mean consumption above the recommended level. Fat intake percentage was lower among the oldest individuals and higher among those with higher incomes. Protein intake was lower among those without spouses, impacting the total energy value of the diet. Additionally, saturated fat intake increased with protein consumption. These findings indicate that fat and protein intake were influenced by sociodemographic variables, and the relationship between the consumption of protein-rich foods may lead to an increased intake of saturated fats. This highlights the importance of access to nutritional counseling to improve diet quality, particularly in choosing protein sources with lower amounts of total and saturated fats, aiming to reduce the risk of non-communicable chronic diseases.

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ACKNOWLEDGMENT

We would like to thank the city of São Caetano do Sul and its administrators, as well as the older adults who participated in this research.

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