NUTRITIONAL STATUS AND ASSOCIATED FACTORS IN THE ELDERLY: EVIDENCE BASED ON TELEPHONE SURVEY

Estado nutricional e fatores associados em idosos: evidências com base em inquérito telefônico

Estado nutricional y factores asociados en ancianos: evidencias basadas en encuesta telefónica

Célia Cristina Diogo Ferreira
Federal University of Rio de Janeiro - (*Universidade Federal do Rio de Janeiro - UFRJ*) - Macaé (RJ) - Brazil

Gina Torres Rego Monteiro
Sérgio Arouca National School of Public Health - (*Escola Nacional de Saúde Pública Sérgio Arouca - ENSP/Fiocruz*) - Rio de Janeiro (RJ) - Brazil

Taynãna César Simões
René Rachou Research Center - (*Centro de Pesquisa René Rachou - CPqRR /Fiocruz*) - Belo Horizonte (MG) - Brazil

ABSTRACT

Objective: To evaluate the nutritional status and associated factors in the elderly. **Methods:** This is a cross-sectional study, carried out between June and October 2016, with 720 elderly individuals. It used demographic, socioeconomic, behavioral and health status information on individuals aged 60 years or older, originating from the system Surveillance of Risk and Protective Factors for Chronic Diseases through Telephone Survey (VIGITEL), in the year 2013. The measures of association for overweight and obesity were adjusted according to some variables studied, on the binomial logistic model. **Results:** Most of the participants were women (59.7%, n=430), with education until middle school (70.5%, n=508), and did not work (75.2%, n=541). The prevalence of excess weight and obesity in the elderly was 57.5% (n=414) and 19.9% (n=143), respectively. Main meals were replaced with snacks (five or more times per week) by 33.8% (n=243) of the elderly. High blood pressure was reported by 62.8% (n=452) of the elderly; 21.2% (n=153) were diabetic, 35.4% (n=255) had high cholesterol, and 35.4% (n=255) had dyslipidemia. Being hypertensive and having dyslipidemia increased the likelihood of being overweight. Increasing age reduced the likelihood of being overweight. Obesity was positively associated with hypertension, dyslipidemia and female gender. **Conclusion:** A high percentage of excess weight and obesity was observed, and elderly individuals with high blood pressure, dyslipidemia and the habit of replacing main meals with snacks were more likely to be overweight and obese.

Descriptors: Overweight; Obesity; Aged; Health Surveys.

RESUMO

Objetivo: Avaliar o estado nutricional e fatores associados em idosos. Métodos: Trata-se de um estudo transversal, realizado entre junho e outubro de 2016, com 720 idosos. Utilizaram-se informações demográficas, socioeconômicas, comportamentais e de estado de saúde, de indivíduos com idade maior ou igual a 60 anos, provenientes do Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por inquérito telefônico (VIGITEL), no ano de 2013. Foram ajustadas as medidas de associação para sobrepeso e obesidade, de acordo com variáveis estudadas, segundo modelo logístico binomial. Resultados: A maioria dos participantes era do sexo feminino (59,7%, n=430), com escolaridade até o ensino fundamental (70,5%, n=508) e não trabalhavam (75,2%, n=541). A prevalência de excesso de peso e de obesidade nos idosos foi de 57,5% (n=414) e 19,9% (n=143), respectivamente. Substituíam refeições principais por lanche (cinco ou mais vezes na semana) 33,8% (n=243) dos idosos. Referiram pressão alta 62,8% (n=452) dos idosos, 21,2% (n=153) eram diabéticos, 35,4% (n=255) apresentavam colesterol alto e 35,4% (n=255) tinham dislipidemia. Ser hipertenso e ter dislipidemia aumentavam a chance de ter excesso de peso. O aumento da idade diminuiu a chance de ter excesso de peso. A obesidade foi positivamente associada à hipertensão arterial, à dislipidemia e ao sexo feminino. Conclusão: Observou-se alto percentual de excesso de peso e obesidade, sendo os idosos com pressão alta, dislipidemia e hábito de substituir as refeições principais por lanche os com maiores chances de apresentar excesso de peso e obesidade.

Descritores: Sobrepeso; Obesidade; Idosos; Inquéritos Epidemiológicos.

Ferreira CCD, Monteiro GTR, Simões TC

RESUMEN

Objetivo: *Evaluar el estado nutricional y los factores asociados en ancianos.* ***M****étodos:* *Se trata de un estudio transversal realizado entre junio y octubre de 2016 con 720 ancianos. Se utilizaron las informaciones demográficas, socioeconómicas, de conductas y del estado de salud de individuos con 60 años de edad o más provenientes del Sistema de Vigilancia de Factores de Riesgo y Protección para las Enfermedades Crónicas a través de encuesta telefónica (VIGITEL) en al año de 2013. Se ajustaron las medidas de asociación para el sobrepeso y la obesidad según las variables estudiadas del modelo logístico binomial.* ***Resultados:*** *La mayoría de los participantes eran del sexo femenino (59,7%, n=430) con máxima escolaridad de la educación primaria (70,5%, n=508) y sin trabajo (75,2%, n=541). La prevalencia del exceso de peso y de obesidad en los ancianos ha sido del 57,5% (n=414) y 19,9% (n=143), respectivamente. El 33,8% (n=243) de los ancianos sustituían las comidas principales por meriendas (cinco o más veces a la semana). El 62,8% (n=452) de los ancianos refirieron presión arterial alta, el 21,2% (n=153) eran diabéticos, el 35,4% (n=255) presentaban el colesterol alto y el 35,4% (n=255) tenían dislipidemia. El hecho de ser hipertenso y tener dislipidemia aumentaba la oportunidad de tener exceso de peso. El aumento de la edad ha disminuido la oportunidad de tener exceso de peso. La obesidad estuvo asociada de manera positiva a la hipertensión arterial, la dislipidemia y al sexo femenino.* ***Conclusión:*** *Se observó un elevado porcentual de exceso de peso y obesidad y los ancianos con presión alta, dislipidemia y con la costumbre de substituir las principales comidas por meriendas son aquellos con más oportunidades de presentar exceso de peso y obesidad.*

Descriptores: *Sobrepeso; Obesidad; Anciano; Encuestas Epidemiológicas.*

INTRODUCTION

Reduced fertility rates, decreased mortality and, therefore, increased life expectancy characterize the demographic restructuring process in which the world population finds itself. This is reflected in a decreased proportion of children and young people and an increased population of adult and elderly individuals. This latter group is currently an expressive and growing contingent in Brazilian society, accompanied by the need for a series of requirements and demands in terms of public health policies[1,2].

Nutritional status is an important marker of health in these individuals, given that, during aging, the body of the elderly presents physiological changes that may influence their nutrition and, consequently, their general health status. Factors such as financial limitations, presence of illnesses, use of medications, physical inability to prepare food and social isolation may interfere in the access to and selection of food, thus contributing to the development of nutritional disorders[3].

Even though the prevalence of excess weight and obesity in Brazilian elderly people is considered high (41.9% in females and 31.6% in males)[4], these individuals present a high inadequacy in the ingestion of protective nutrients against chronic diseases, such as vitamins and antioxidant minerals, as well as unsaturated fats[5]. Telephone-administered dietary surveys provide approximate estimates of food consumption, with relatively small financial investment and less time, making it possible to better understand the trends in the food and nutritional consumption profile of the Brazilian elderly population[6].

The Risk and Protective Factors Surveillance System for Chronic Diseases through Telephone Inquiry (VIGITEL) was implemented in 2006 in 27 Brazilian capitals. Its results have led to an improvement in the quality of epidemiological data, as well as an increase in the knowledge of Chronic Noncommunicable Diseases (CNCD) in the country, along with other national surveys[7,8].

With the increasing Brazilian elderly population, the need for investigation of determinants related to health and nutritional status is increased, so that health intervention proposals can be implemented and impact the quality of life of this group. In this context, the present article was aimed at evaluating the nutritional status and associated factors in the elderly.

METHODS

This is a cross-sectional and analytical study, carried out between June and October 2016, whose data was obtained from the telephone survey VIGITEL, carried out in the year 2013[9]. The evaluated population was composed of the individuals randomly selected in that survey, aged 60 or older, living in the city of Rio de Janeiro, Brazil, and with complete information regarding the variables of interest.

The analyzed sample comprised 720 elderly people (representative of a total 1,679,837 elderly individuals in the population of the city of Rio de Janeiro). In the year under consideration, the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística - IBGE*) estimated that 13% of the population in the city of Rio de Janeiro was elderly, therefore, the VIGITEL sample can be considered representative of the elderly population[9]. Only four individuals were excluded because they did not respond to the variables of interest for the present study.

All measures of frequency and statistical analysis took into consideration the sample weights assigned to each interviewee, contemplating the complex sampling procedure of the survey. Such weights, in addition to correcting the inceased chance of

having individuals from households with more than one telephone line selected for the sample, also corrected the lower chance of having individuals selected from households inhabited by more people, thus providing reliable estimates.

The outcome variables were obtained from the body mass index (BMI) and classified as excess weight (Yes = BMI ≥ 25 Kg/m²) and obesity (Yes = BMI ≥ 30 Kg/m²), according to the criteria adopted by VIGITEL[9]. The potential determinants were separately evaluated, for each outcome of interest, from associations with the variables categorized according to VIGITEL. In regard to demographic and socioeconomic variables, this study used age, sex, marital relationship (Yes: legally married or in a stable union for more than six months; No: single, widowed, separated or divorced), race/color (white, non-white), schooling (illiterate, unknown, did not want to respond, up to middle school, up to high school, higher education or more), having health insurance plan and being currently working.

For health status evaluation, this study collected self-assessment variables of health status: high blood pressure, diabetes, high cholesterol or dyslipidemia. As for the behavioral variables, the study considered: consumption of five or more portions of vegetables and/or fruits per week, regular consumption of candy (5 or more times per week), habit of replacing main meals with snacks (5 or more times per week), consumption of whole milk, high or very high salt intake, performing sufficient physical activity[10], high alcohol consumption, daily smoker (Yes; No).

The descriptive analysis of the variables of interest was conducted, having the summary measures adjusted by the sample weights. The bivariate analyses between categorical variables were evaluated with use of the chi-square test with Rao Scott correction whereas, between categories, the test between proportions was applied, considering the sample weights[11]. Although the data originates from a cross-sectional study, from which one obtains prevalence measures, it was decided to detect only associations and their directions, with use of logistic regression models, by means of the odds ratio, regardless of the magnitudes of such measures, possibly overestimated[12], thus adjusting separate models for the two outcomes of interest.

In the modeling process, significant variables in the univariate models were added to the multiple models in descending order of significance (p-value < 0.20). The associations between explanatory variables were also evaluated in order to avoid multicollinearity. Inclusion of variables was tested at each step by the likelihood ratio test[13]. The subsequent inclusion of non-significant variables in the univariate analysis was also evaluated. Additionally, potential interaction terms between the variables that remained in the multiple model were tested. The individual contribution of the effects in the multiple model was evaluated at the 10% level of significance, by the Wald test, in addition to the practical significance.

All analyses were carried out in the R statistical software, with use of the survey package, providing reliable weighted estimates[14]. Because this is a complex sample, the results will be presented as proportions.

RESULTS

Of the 720 elderly persons evaluated, 57.5% (n=414) were overweight and 19.9% (n=143), obese. The majority of the sample consisted of females (59.7%, n=430), with level of education up to middle school (70.5%, n=508), who were out of employment (75.2% , n=541) (Table I).

Regarding the behavioral variables: most of the elderly in the sample consumed five or more portions of vegetables (57.1%, n=411) or fruits (73.1%, n=526) per week; 15.4% (n=111) consumed sweeties (five or more times in the week); 33.8% (n=243) regularly replaced main meals with snacks (five or more times per week); 43.1% (n=310) consumed whole milk, and 5.1% (n=37) had high or very high salt consumption; 8.3% (n=60) had high alcohol consumption and 7.2% (n=52) were smokers (Table I).

As to health status, only 8.6% (n=62) regarded their health status as poor or very poor. Moreover, 62.8% (n=452) reported high blood pressure; 21.2% (n=153) were diabetic; 35.4% (n=255) had high cholesterol level, and 35.4% (n=255) had dyslipidemia. The mean age was 69.8 years in the elderly individuals with excess weight and 68.5 years in those with obesity (Table I).

Table I - Percentage distribution and bivariate analysis of excess weight, obesity and demographic, socioeconomic, behavioral, and health status variables in the elderly of the city of Rio de Janeiro, VIGITEL 2013, Brazil.

Variables	Categories	Percentages	Excess weight			Obesity		
		(%)	Yes (%)	No (%)	p-value	Yes (%)	No (%)	p-value
Demographic								
Sex								
	Male	40.3	54.1	45.9	0.2324	14.9	85.1	0.0527
	Female	59.7	59.8	40.2		23.3	76.7	
Marital relationship								
	Yes	53.9	60.5	39.5	0.1535	21.2	78.8	0.4488
	No	46.1	54.0	46.0		18.3	81.7	
Color								
	White	48.8	54.1	45.9	0.1415	17.3	82.7	0.1839
	Non-white	51.2	60.8	39.2		22.4	77.6	
Socioeconomic								
Schooling								
	Illit./NK/NDA	4.9	58.9	41.1	0.3408	15.2	84.8	0.0924
	Middle shcool	65.6	57.9	42.1		22.8	77.2	
	High shcool	16.1	62.2	37.8		14.3	85.7	
	Higher education or more	13.4	49.5	50.5		14.0	86.0	
Health insurance plan								
	Yes	51.4	57.0	43.0	0.8086	21.8	78.2	0.3273
	No	48.6	58.1	41.9		17.9	82.1	
Currently working								
	Yes	24.8	57.5	42.5	0.9938	23.6	76.4	0.3288
	No	75.2	57.5	42.5		18.7	81.3	
Behavioral								
Vegetable								
	Yes	57.1	58.0	42.0	0.8094	17.5	82.5	0.1707
	No	42.9	56.9	43.1		23.1	76.9	
Fruits								
	Yes	73.1	58.5	41.5	0.4988	19.9	80.1	0.9798
	No	26.9	54.8	45.2		19.8	80.2	
Vegetables/Fruits								
	Yes	46.2	58.6	41.4	0.6727	17.7	82.3	0.2948
	No	53.8	56.6	43.4		21.8	78.2	
Consumption of candies								
	Yes	15.4	48.5	51.5	0.0819	20.8	79.2	0.8394
	No	84.6	59.1	40.9		19.7	80.3	
Snack								
	Yes	33.8	66.1	33.9	0.0048	27.3	72.7	0.0084
	No	66.2	53.1	46.9		16.2	83.8	
Milk								

	Yes	43.1	55.9	44.1	0.5424	15.4	84.6	0.0562
	No	56.9	58.7	41.3		23.3	76.7	
Excess salt								
	Yes	5.1	69.6	30.4	0.1579	28.2	71.8	0.2952
	No	94.9	56.9	43.1		19.5	80.5	
Enough physical activity								
	Yes	49.5	58.7	41.3	0.6051	20.6	79.4	0.7240
	No	50.5	56.3	43.7		19.2	80.8	
Excess alcohol								
	Yes	8.3	64.0	36.0	0.4097	14.3	85.7	0.3920
	No	91.7	56.9	43.1		20.4	79.6	
Daily smoking								
	Yes	7.2	39.8	60.2	0.0308	15.6	84.4	0.5096
	No	92.8	58.9	41.1		20.2	79.8	
Health status Self-evaluation								
	Good/Very good	48.7	54.4	45.6	0.2929	15.1	84.9	0.1171
	Regular	38.8	58.4	41.6		24.0	76.0	
	Bad/Very bad	8.6	64.0	36.0		23.5	76.5	
	NK/WNR	3.9	73.4	26.6		31.8	68.2	
High blood pressure								
	Yes	62.8	62.4	37.6	0.0049	26.3	73.7	<0.0001
	No	37.2	49.2	50.8		9.2	90.8	
Diabetes								
	Yes	21.2	59.8	40.2	0.7674	14.4	85.6	0.0492
	No	77.8	56.8	43.2		21.7	78.3	
	NK	1.0	65.2	34.8		1.7	98.3	
High cholesterol								
	Yes	35.4	64.9	35.1	0.0361	26.5	73.5	0.0369
	No	62.9	53.5	46.5		16.3	83.7	
	NK	1.7	52.9	47.1		15.9	84.1	
Dyslipidemia								
	Yes	35.4	64.9	35.1	0.0164	26.5	73.5	0.0150
	No	64.6	53.5	46.5		16.3	83.7	

* Illit = Illiterate; NK = Do not know; WNR = Would not respond. Chi-square test. The table does not display absolute values (n), because this is a complex sample and does not univocally represent the number of people observed, differently from the estimated percentages, which are representative at the population level.

Among the significant variables at the level of 20% in the bivariate analysis (Table I), the potential existence of multicollinearity was evaluated. Since the variables dyslipidemia and cholesterol are highly associated, the study opted to place the first in the multiple model, as it presented greater significance regarding the outcomes. Table II presents the adjusted models with the best predictors for excess weight and obesity.

It is observed that those who have high blood pressure, dyslipidemia, and a habit of replacing main meals with snacks (five or more times a week) are more likely to be overweight and obese. The likelihood of being overweight decreases with advancing age, as well as being a daily smoker (Table II).

Table II - Logistic regression models for factors associated with excess weight and obesity in the elderly, Rio de Janeiro, VIGITEL 2013, Brazil.

Variable	Excess weight		Obesity	
	OR	CI (90%)	OR	CI (90%)
High pressure				
Yes	1.665	1.132 – 2.447	3.855	2.379 – 6.249
Snack				
Yes	1.828	1.253 – 2.666	2.181	1.432 – 3.323
Dyslipidemia				
Yes	1.486	1.002 – 2.204	1.816	1.202 – 2.743
Daily smoking				
Yes	0.446	0.211 – 0.943	-	-
Age	0.968	0.944 – 0.991	0.938	0.913 – 0.964
Diabetes			0.001	$8.1e^{-6}$ – 0.116
Yes				
Interaction Term				
Age X Diabetes (Yes)	-	-	1.093	1.022 – 1.167

* Two models were adopted and not all explanatory variables remained in both. A dash was added to the table in the missing results.
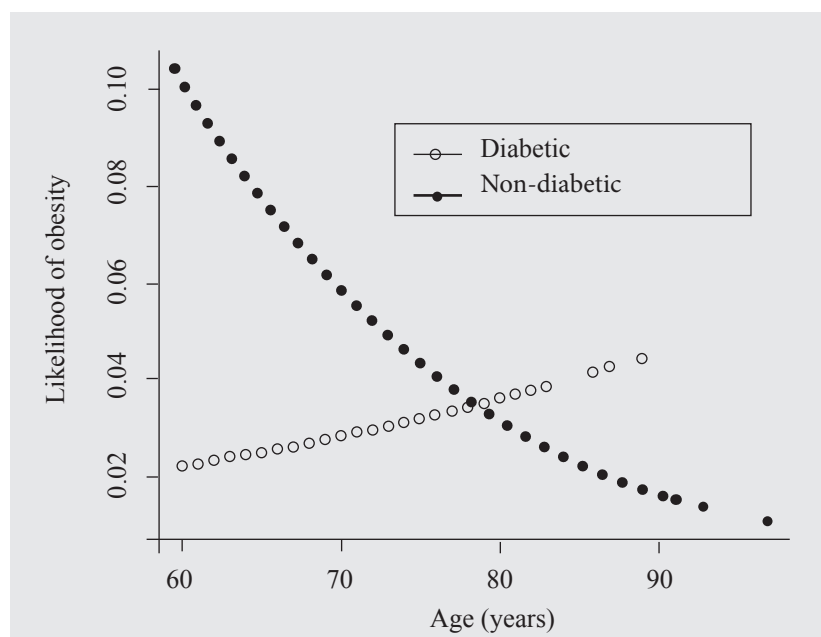

Figure 1 - Effect of age on the likelihood of being obese, according to the information of having or not diabetes in the elderly, Rio de Janeiro, VIGITEL, 2013, Brazil.

Furthermore, there is an association between diabetes and age, indicating that the likelihood of being obese increases with age among diabetics and decreases among non-diabetics. Moreover, this likelihood is higher among non-diabetics up to 79.5 years of age. From that age, the likelihood of being obese is higher among diabetics (Figure 1).

DISCUSSION

Among the factors with recognized association with the development of CNCDs, four were observed in the population evaluated in the present study: smoking, excess weight/obesity, hypertension and dyslipidemia. The results indicate that the elderly population of the city of Rio de Janeiro presents unsatisfactory nutritional status, with a high percentage of excess weight (57.5%) and obesity (19.9%). These results, however, are inferior to other Brazilian studies[15,16].

A population-based cross-sectional study with 596 elderly residents in Pelotas, Rio Grande do Sul, found a prevalence of obesity of 48.7% (95% CI: 44.6-52.7)[15]. Another population-based cross-sectional study with 304 elderly people from the city of Porto Alegre, Rio Grande do Sul, presented a prevalence of obesity of 30.6%[16]. According to data from the 2008-2009 Household Budget Survey (*Pesquisa de Orçamentos Familiares - POF*), the prevalence of excess weight in a national sample of 20,114 individuals over 60 years of age was 37.3%, being lower than that of the present study[17].

Obesity is a chronic disease interrelated to other illnesses, such as cardiovascular diseases and cancer. Strategies regarding the prevention and treatment of excess weight/obesity in the elderly Brazilian population should be established with the aim of minimizing the disorders caused by excess weight[18,19].

It was observed, in the present research, that the chance of developing obesity decreases with advancing age. The increase in body mass initiates at around 45 to 50 years, stabilizing at 70, when it begins to decline until 80 years[20]. This weight loss is a result of multiple factors involving the elderly, such as: functional dependence in activities of daily living; overuse of medicines; depression and isolation; financial difficulties; changes in the dentition; alcoholism; sedentary lifestyle and, mainly, muscular atrophy and catabolism associated with acute or chronic diseases[21].

Estimating the prevalence of diabetes mellitus by means of referred morbidity is advantageous, since this is a quick and low-cost way to obtain the information, which enables its use in large populations[22,23]. The prevalence detected in the present study (21.2%) was higher than that of the population- and household-based cross-sectional study held in Campina Grande, Paraíba, in which the prevalence of self-reported diabetes among 806 elderly was 14.7% and was significantly associated with excess weight in elderly women (OR: 2.09; 95% CI: 1.03-4.25). Excessive adipose tissue is one of the main factors for activation of inflammatory biochemical pathways, which cause impairment of intracellular insulin signaling[24].

In the present research, a positive association between dyslipidemia, systemic arterial hypertension (SAH) and excess weight or obesity was found. Data from a population-based cross-sectional study showed an association between dyslipidemia and excess weight, revealing a prevalence of dyslipidemia at 51.4% in elderly residents of the city of São Paulo without excess weight, and at 69.9% in those with excess weight (p-value: 0.01)[25]. Approximately 250 elderly persons undergoing outpatient treatment at a Health Center in Portugal were evaluated, which identified 43.6% of the sample with excess weight and 39.6%, with obesity. Half of those aged 65 and older who are overweight and obese have SAH, indicating that many elderly hypertensive individuals have excessive body weight[26].

Self-reported SAH is an appropriate indicator for monitoring the prevalence of arterial hypertension in the absence of measured blood pressure and is positively associated with excess weight[27]. Around 70% of the population evaluated in the present study reported a medical diagnosis of arterial hypertension. Inherent changes in aging render the individual more prone to the development of SAH, which proves to be worrying because it represents one of the major causes of reduction in individuals' quality and expectancy of life[28].

The low intake of fruits and vegetables is among the main factors related to the etiology of excess weight[29]. Nevertheless, in the present study, there was a high percentage of elderly people who consume them regularly. A study analyzing 2012's data retrieved from VIGITEL found that the regular intake of fruits and vegetables tended to increase with age (37.7% in the 45-54 age group; 42.1% in the 55-64 age group; and 46.2% in the group of 65 years or older), which is, however, still much lower than the minimum amount of 400 g/day recommended by the World Health Organization[30]. For maintenance of a healthy organism, the Food Guide for the Brazilian Population recommends that more *in natura* foods be consumed to the detriment of ultraprocessed foods[31].

Less than half of those evaluated in the present study had a daily intake of milk, which is recommended for being the main source of dietary calcium. Low intake of this nutrient leads to increased blood levels of parathormone and vitamin D, which stimulate the activity of enzymes related to lipogenesis and inhibit lipolysis. Low calcium consumption interferes with the level of this mineral inside the adipose tissue cells, favoring the metabolic pathways involved in increasing body fat[32]. Therefore, strategies that encourage the adequate intake of milk, fruits and vegetables among the elderly should be developed as a way of improving the quality of life and prevent illnesses[33].

Nutrition plays a major role among the factors accountable for the onset of chronic diseases such as the cardiovascular conditions, which constitute the main cause of morbidity and mortality in the elderly. Healthy eating habits and factors associated with the prevention of heart disease were identified in 212 elderly people with SAH, treated at a family health unit in the hinterlands of the State of Rio Grande do Sul[34].There was a high consumption of processed spices and high-sodium sausages, in addition to reports of having less than five meals a day. These findings reinforce the need for nutritional counseling aimed at this population, since the lack of knowledge and information about the nutritional composition of foods can also determine excess consumption[34].

The present study found a small percentage of elderly individuals with high or very high consumption of salt (5.1%). This finding contradicts an earlier study whose results show that salt consumption in Brazil is high, exceeding the maximum recommended limits for its intake in all regions of the country and in all income strata[35]. On the other hand, the high prevalence of SAH found in this sample and the recognition by the elderly of the severity of this disease caused by excessive salt intake may have been responsible for the low consumption of this food.

One limitation of the study in question is that the VIGITEL sample has been extracted from the cadastre of the existing residential telephone lines in the city. The coverage of this network is not universal, and may be particularly low in strata of lower socioeconomic level, which the study sought to circumvent through the application of post-stratification weights to the interviewees[9]. Another aspect to be considered would be the potential survival bias, which tends to reduce the magnitude of the associations found between risk factors and disease, given that elderly persons exposed to risk factors are more likely to die prematurely[36]. This is a possible explanation for the association between obesity and age in diabetics: the greater likelihood of being obese in diabetics aged 80 years or older may be due to the death of those who did not take proper care of the disease.

As a strength of the present study, one can mention the analysis of data collected by VIGITEL on elderly residents of Rio de Janeiro, in 2013. Knowing and disseminating the profile of the elderly with excess weight and obesity in this city materializes the objective of the system for monitoring of frequency and distribution of risk and protective factors for CNCDs.

CONCLUSION

An important part of the elderly residents of the city of Rio de Janeiro presents an unsatisfactory nutritional status represented by a high percentage of excess weight and obesity. The positive association observed between hypertension, dyslipidemia and the habit of replacing main meals with snacks (five or more times a week), with excess weight and obesity as outcomes, indicate the need for adoption of measures that stimulate healthy eating habits such as weight maintenance within a range regarded safe for prevention of disorders.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest in the present study

REFERENCES

1. Closs VE, Schwanke CHA. A evolução do índice de envelhecimento no Brasil, nas suas regiões e unidades federativas no período de 1970 a 2010. Rev Bras Geriatr Gerontol. 2012;15(3):443-58.

2. Instituto Brasileiro de Geografia e Estatística (IBGE). Censo de 2010 [accessed on 2016 Jan 10]. Available from: https://censo2010.ibge.gov.br/

3. Bezerra FC, Almeida MI, Nóbrega-Therrien SM. estudos sobre envelhecimento no brasil: revisão bibliográfica. Rev. Bras. Geriatr. Gerontol., 2012;15(1):155-67.

4. Silva JVF, Silva EC, Rodrigues PARA, Miyazawa AP. A relação entre o envelhecimento populacional e as doenças crônicas não transmissíveis: sério desafio de saúde pública. Cadernos Graduação Ciênc Biol Saúde. 2015;2(3):91-100.

5. Venturini CD, Engroff P, Sgnaolin V, El Kik RM, Morrone FB, Silva IG Filho, De Carli GA. Consumo de nutrientes em idosos residentes em Porto Alegre (RS), Brasil: um estudo de base populacional. Ciênc Saúde Colet. 2015;20(12):3701-11.

6. Ferreira SAD. Potencialidade dos inquéritos em saúde: uma contribuição para a epidemiologia nutricional [tese]. Belo Horizonte: Universidade Federal de Minas Gerais; 2011.

7. Mássimo EAL, Souza HNF, Freitas MIF. Doenças crônicas não transmissíveis, risco e promoção da saúde: construções sociais de participantes do Vigitel. Ciênc Saúde Colet. 2015;20(3):679-88.

8. Malta DC, Iser BPM, Claro RM, Moura L, Bernal RTI, Nascimento AF, et al. Prevalência de fatores de risco e proteção para doenças crônicas não transmissíveis em adultos: estudo transversal, Brasil, 2011. Epidemiol Serv Saúde. 2013;22(3): 423-34.

9. Ministério da Saúde (BR). VIGITEL – Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico. Estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e do Distrito Federal em 2013. Brasília: Ministério da Saúde; 2014.

10. Ainsworth BE, Haskell WL, Herrmann SD, Meckes N, Bassett DR Jr, Tudor-Locke C, et al. Compendium of physical activity: second update of codes and MET values. Med Sci Sports Exerc. 2011;43(8):1575-81.

11. Rao JNK, Scott AJ. On chi-squared tests for multiway contingency-tables with cell proportions estimated from survey data. Ann Stat. 1984;12:46-60.

12. Francisco PMSB, Donalisio MR, Barros MBA, Cesar CLG, Carandina L, Goldbaum M. Medidas de associação em estudo transversal com delineamento complexo: razão de chances e razão de prevalência. Rev Bras Epidemiol. 2008;11(3): 347-55.

13. Dobson AJ. An introduction to generalized linear models. 2nd ed. London: Chapman and Hall/CRC; 2001.

14. R Development Core Team. R: A language and environment for statistical computing. Vienna: R Foundation for Statistical Computing; 2010 [accessed on 2017 Mar 5]. Available from: http://www.R-project.org

15. Costa CS, Schneider BC, Cesar JA. Obesidade geral e abdominal em idosos do Sul do Brasil: resultados do estudo COMO VAI? Ciênc Saúde Colet. 2016;21(11):3585-96.

16. Venturini CD, Engroff P, Gomes I, De Carli GA. Prevalência de obesidade associada à ingestão calórica, glicemia e perfil lipídico em uma amostra populacional de idosos do Sul do Brasil. Rev Bras Geriatr Gerontol, 2013;16(3):591-601.

17. Pereira IFS, Spyrides MHC, Andrade LMB. Estado nutricional de idosos no Brasil: uma abordagem multinível. Cad Saúde Pública, 2016;32(5):e001788142016.

18. Ferreira PM, Rosado GP. Perfil de usuários e percepção sobre a qualidade do atendimento nutricional em um programa de saúde para a terceira idade. Rev Bras Geriatr Gerontol., 2012;15(2):243-54.

19. Santos RR, Bicalho MAC, Mota P, Oliveira DR, Moraes EN. Obesidade em idosos. Rev Med Minas Gerais. 2013;23(1):62-71.

20. Matsudo SM, Matsudo VKR, Barros TL Neto. Impacto do envelhecimento nas variáveis antropométricas, neuromotoras e metabólicas da aptidão física. Rev Bras Ciênc Mov. 2000;8(4):21-32.

21. Almeida RSV, Melo TGC, Pereira IFM, Cabido CET. Treinamento de força e desempenho do sistema neuromuscular em idosos. e-Scientia. 2014;7(1):16-26.

22. Pimenta FB, Pinho L, Silveira MF, Botelho ACC. Fatores associados a doenças crônicas em idosos atendidos pela Estratégia de Saúde da Família. Ciênc Saúde Colet. 2015;20(8):2489-98.

23. Menezes TN, Sousa NDS, Moreira AS, Pedraza DF. Diabetes mellitus referido e fatores associados em idosos residentes em Campina Grande, Paraíba. Rev Bras Geriatr Gerontol. 2014; 17(4):829-83.

24. Freitas MC, Ceschini L, Ramallo BT. Resistência à insulina associado à obesidade: efeitos anti-inflamatórios do exercício físico. Rev Bras Ciênc Mov. 2014;22(3):139-47.

25. Garcez MR, Pereira JL, Fontanelli MM, Marchioni DML, Fisberg RM. Prevalência de dislipidemia segundo estado nutricional em amostra representativa de São Paulo. Arq Bras Cardiol. 2014;103(6):476-84.

26. Mártires MAR, Costa MAM, Santos CSV. Obesidade em idosos com hipertensão arterial sistémica. Texto & Contexto Enferm. 2013;22(3):797-803.

27. Selem SSC, Castro MA, César CLG, Marchioni DML, Fisberg RM. Validade da hipertensão autorreferida associa-se inversamente com escolaridade em brasileiros. Arq Bras Cardiol. 2012;100(1):52-9.

28. Oliveira JG Neto, Carvalho DA, Sá GGM, Monteiro MM, Lopes KDCL, Martins MCC. Pressão arterial e perfil socioeconômico de idosos atendidos na Estratégia Saúde da Família de Floriano-PI. Rev Saúde Pública. 2014;7(2):17-28.

29. Machado RHV, Feferbaum R, Leone C. Consumo de frutas no Brasil e prevalência de obesidade. Rev Bras Crescimento Desenvolv Hum. 2016;26(2):243-52.

30. Malta DC, Bernal RTI, Nunes ML, Oliveira MM, Iser BPM, Andrade SSCA, et al. Prevalência de fatores de risco e proteção para doenças crônicas não transmissíveis em adultos: estudo transversal, Brasil 2012. Epidemiol Serv Saúde. 2014;23(4):609-22.

31. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Atenção Básica, Coordenação Geral de Alimentação e Nutrição. Guia alimentar para a população brasileira: promovendo a alimentação saudável. Brasília: Ministério da Saúde; 2014.

32. Arruda AP, Hotamisligil GS. calcium homeostasis and organelle function in the pathogenesis of obesity and diabetes. Cellular Metabolism. 2015;22(3):381-97.

33. Deon RG, Rosab RD, Zanardoc VPS, Clossd VE, Schwanke CHA. Consumo de alimentos dos grupos que compõem a pirâmide alimentar americana por idosos brasileiros: uma revisão. Ciênc Saúde Colet. 2015;8(1):26-34.

34. Gadenz SD, Benvegnú LA. Hábitos alimentares na prevenção de doenças cardiovasculares e fatores associados em idosos hipertensos. Ciênc Saúde Colet. 2013;18(12):3523-33.

35. Sarno F, Claro RM, Levy RB, Bandoni DH, Ferreira SRG, Monteiro CA. Estimativa de consumo de sódio pela população brasileira, 2008-2009. Rev Saúde Pública. 2013;47(3):571-8.

36. Lima-Costa MF, Barreto SM. Tipos de estudos epidemiológicos: conceitos básicos e aplicações na área do envelhecimento. Epidemiol Serv Saúde. 2003;12(4):189-201.

Mailing address:
Celia Cristina Diogo Ferreira
Universidade Federal do Rio de Janeiro - UFRJ
Avenida Aloizio da Silva Gomes, 50
Bairro: Novos Cavaleiros
CEP: 27930-560 - Macaé - RJ - Brasil
E-mail: celia.ferreira@macae.ufrj.br