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Relationship between anxiety symptoms and nutritional status in elderly residents of Florianópolis-SC

Relação entre a presença de sintomas de ansiedade e estado nutricional em idosos residentes de Florianópolis-SC

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Abstract

Objective: To investigate the association between the presence of anxiety symptoms and nutritional status estimated by the body mass index (BMI) in the elderly. *Methods:* Cross-sectional study that evaluated 146 elderly people attending the Third Age Research Center (NETI/UFSC, Florianópolis, Brazil). To evaluate the presence of anxiety symptoms, the Geriatric Anxiety Inventory (GAI) was applied. Nutritional status was evaluated by the BMI [WHO (2008) and Lipschitz (1994)]. The Stata 11.0 software was used for analysis, and the chi-square test and Pearson's correlation were calculated for BMI and presence of anxiety. Logistic regression was applied to evaluate odds ratio (OR) for anxiety risk in each BMI category. *Results:* The majority of individuals were women (88.36%) and their age was below 80 years (93.15%). Thirty-nine individuals (26.71%) had a score >10 points, hence they were classified as anxious. There was association between presence of anxiety symptoms with BMI when using the categories recommended by WHO (β = 13.09, P = 0.004), but not when using the categories recommended by Lipschitz (β = 3.78, P = 0.151). When regression logistics was applied, there was increased risk for anxiety with BMI ≥ 30 (OR = 2.67; 95% CI 1.2375 to 5.7621; P = 0.012). In the adjusted model by age, this risk remained and increased (OR = 2.91; 95% CI 1.3257 to 6.4047; P = 0.008). *Conclusion:* There is a relationship between presence of anxiety and obesity in the elderly population. Elderly obese individuals had nearly 3 times the risk of being anxious than the other BMI categories.

Keywords: Anxiety. Elderly. Nutritional Status. Body Mass Index.

Resumo

Objetivo: Investigar a associação entre a presença de sintomas de ansiedade e estado nutricional, estimado pelo índice de massa corporal (IMC), em idosos residentes de Florianópolis/SC. *Métodos:* Estudo transversal realizado com 146 idosos frequentadores do Núcleo de Estudos da Terceira Idade (NETI) – UFSC/Florianópolis. Para avaliar presença de sintomas de ansiedade, aplicou-se o *Geriatric Anxiety Inventory* (GAI). O estado nutricional foi avaliado por meio do IMC, classificado de acordo com os parâmetros da World Health Organization (WHO, 2008) e de Lipschitz (1994). Para a análise estatística, utilizou-se o *software* Stata 11.0. Testes qui-quadrado e correlação de Pearson foram usados para aferir a relação entre IMC e presença de ansiedade. Utilizando regressão logística, verificou-se o risco para ansiedade segundo as categorias de IMC. Foi considerado $P<0,05$ para significância. *Resultados:* A maioria dos participantes foram mulheres (88,36%) e com idade menor que 80 anos (93,15%); 39 (26,71%) obtiveram pontuação >10, classificando-os como ansiosos. Houve associação da presença de sintomas de ansiedade com o IMC quando usados os critérios de classificação 1 da WHO ($\beta=13,09$; $P=0,004$), mas não quando usados os critérios de Lipschitz ($\beta=3,78$; $P=0,151$). Quando aplicada a regressão logística bruta, houve maior risco para ansiedade quando IMC ≥ 30 (OR=2,67; IC95% 1,2375 – 5,7621; $P=0,012$). No modelo ajustado pela idade, o risco aumentou (OR=2,91; IC95% 1,3257 – 6,4047; $P=0,008$). *Conclusão:* Existe relação entre a presença de ansiedade e obesidade em idosos. Idosos obesos têm quase 3 vezes mais risco de serem ansiosos que as demais categorias de IMC.

Palavras-chave: Ansiedade. Idosos. Estado Nutricional. Índice de Massa Corporal.

Introduction

Mood and anxiety disorders are common in the elderly and their prevalence is increasing in the world's population.[1,2] Data from the American research *National Survey on Drug Use and* Health, which was conducted by the Substance Abuse and Mental Health Service Administration (SAMHSA) between 2008 and 2012, showed that the most prevalent disorders in individuals aged 50 or older were depressive disorders, one or more anxiety disorders (generalized anxiety disorder, panic disorder) and alcohol abuse.[1] In Brazil, the document *Caderno de Atenção Básica* "Envelhecimento e

saúde da pessoa idosa (*Primary Health Care Handbook* "Aging and health of the elderly") published by the Ministry of Health, describes major depressive disorder as the most prevalent mood in the elderly population (from 4.7% to 36.8% depending on the scale and diagnostic criteria in use).[3] However, there are few population data available about other diagnoses of mood disorders experienced by the population, especially among the elderly; thus, it is difficult to develop public policies in order to meet the needs of this population.

Previous studies have shown that anxiety disorders are among the most frequent mental health problems in the lives of the elderly.[3] However, these disorders have different symptoms in elderly people, hence they are difficult to identify, and as a result, it may take a while before the elderly seek expert help.[4] In this sense, the psychosocial care network linked to the State of Santa Catarina developed a protocol entitled o *Protocolo para Acolhimento e Tratamento dos Transtornos de Pânico e Ansiedade Generalizada* ("Protocol for Support to and Treatment of Panic Disorder and Generalized Anxiety"), because there was a considerable demand for health services that could possibly tackle these disorders.[5]

Although aging is a natural process, the human body undergoes different morphological, physiological, biochemical and psychological changes that lead to a reduction of individuals' ability to adapt to the environment, and there are consequences for their health and nutritional status.[4] Adequate nutritional status is one of the contributing factors to healthy aging.[5] However, obesity has been increasing in the elderly population.[6,7]

Obesity is a multifactorial disease whose main determinants are environmental factors (sedentarianism, food intake), lifestyle (level of education, family income, parity, marital status), genetic factors (polymorphisms), iatrogenic effects (use of drugs that contribute to weight gain) and also behavioral factors (stress, mental health).[8] Previous studies have shown that nutritional status may influence mental health and lead to the development of mood disorders. Simon et al., with a representative sample of adults in the United States (n = 9125), found an association between obesity and mood disorders such as depression, bipolar disorder and panic disorder. They concluded that obese individuals are approximately 25% more prone to mood and anxiety disorders.[9] There is some evidence which suggests that high levels of stress, often present in anxiety situations, are associated with increased appetite and greater intake of high-calorie foods, which can contribute to weight gain.[10]

Few studies in the literature have evaluated the presence of mood disorders, in particular anxiety in the elderly population and its relation to nutritional status. Therefore, the objective of the present study was to investigate the association between the presence of anxiety symptoms and nutritional status in the elderly.

Method

The research project followed the criteria of Resolution 466 of December 12, 2012, and it was approved by the Human Research Ethics Committee of the Federal University of Santa Catarina (UFSC) (Protocol 485 331, 2014).

This cross-sectional study was conducted with 146 elderly, both males and females, who participate in the activities of the Third Age Research Center (NETI) - UFSC / Florianópolis, Santa Catarina. Convenience sampling was used. Inclusion criteria established that subjects had to be 60 years old or older (both males and females) and had to sign an informed consent form. As exclusion criteria, subjects with an amputated limb, edema or ascites, or other factors that could interfere in the results of nutritional status assessment by measurement of weight and height.

Data collection began in June 2016. The field researchers were Nutrition undergraduates at the Federal University of Santa Catarina. The project did not pose any risks for individuals who agreed to participate. The data collected in this research were kept anonymous, and each participant received an identification number, in case they were interested in learning about the outcome of their participation. Moreover, they could contact the researchers any time by telephone or e-mail address in order to check the progress of the research and/or to request clarification.

To check for the presence of anxiety symptoms, the *Geriatric Anxiety Inventory* (GAI) was used. It was originally prepared by Pachana et al.,[11] and later adapted to Portuguese and validated by Martiny et al.[12] This is a self-administered questionnaire, which avoids any kind of embarrassment to respondents. It was administered by the researchers when a particular respondent had difficulty in reading the questionnaire. The instrument consists of 20 statements about situations that can cause anxiety, and respondents are supposed to choose between two options for each statement, namely 'agree' or 'disagree'.[13] According to the authors of the instrument, people who scored 10 or higher were classified as anxious, as defined by the Statistical Manual of Mental Disorders (DSM-IV-TR).[14]

After the questionnaire, weight (kg) and height (m) were measured for each individual. To measure weight, a *Wiso* W920 portable digital scale with a tare function was used, with capacity of 200 kg and accuracy of 50 g. Height was measured with an *Alturexata* portable anthropometer with an attached platform (2m in length and precision of 1 mm). Subsequently, BMI was calculated for classification of nutritional status, based on the cutoff points recommended by the WHO for definition of low weight (BMI <18.5 kg / m^2), normal weight (body mass index between 18.5 and 24.9 kg/m), overweight (body mass index between 25 and 29.9 kg/m^2) and obesity (BMI> 30 kg / m^2)[15]. BMI was also calculated using the criteria by Lipschitz, who recommends cutoff points to

define low weight (body mass index <22 kg / m²), normal weight (body mass index between 22 and 27 kg / m²) and overweight (body mass index> 27 kg / m²)[16], as recommended by the Ministry of Health.[17]

After collection, the data were tabulated in the *software MS Excel 2010*, and then transferred by the software *StatTranfer* to the *software Stata* 11.0 for further analysis. The data were presented as absolute and relative frequency, and were evaluated for symmetry by the Shapiro-Wilk test. The symmetrical data were expressed as mean ± standard deviation, and asymmetric data were expressed as median and interquartile range. To check the correlation between weight, BMI, age and score on the anxiety scale, simple linear regression and Pearson's correlation test were performed. Student's t-test was used to measure the difference between the anthropometric data of individuals with and without anxiety. To check the association of categorical variables (BMI, age, and presence of anxiety), the chi-square test was applied. When there was an association (BMI and presence of anxiety), logistic regression was performed to calculate the odds ratio (OR), for both crude analysis and adjusted analysis for age, and anxiety as outcome and the BMI categories as an independent variable.

Results

Among the elderly that participate in the activities at NETI, 146 individuals who met the inclusion criteria agreed to be subjects in the present study. Table 1 shows the characteristics of the population assessed. Most individuals (n= 129, 88.35%) were females, and 136 (93.15%) individuals of the sample were aged less than 80 years. Among the participants assessed, 39 (26.71%) scored higher than 10 points, and hence were classified as anxious; 30 of those (76.92%) had BMI of 24.9 kg/m²; 12 of them (30.77%) were overweight and 18 (46.15%) were obese.

Table 2 shows the difference in mean weight and BMI of the subjects with and without anxiety. It can be seen that mean BMI of anxious individuals is higher than that of non-anxious individuals.

Table 1. Characteristics of the elderly population assessed. Florianópolis – SC, 2016.

		Frequency (n)	%
	Total	146	100
Sex	Males	17	11.64
	Females	129	88.36
Age	>80 years	136	93.15
	≥80 years	10	6.85
Anthropometric measures	Weight (kg)	70.61 ± 13.97*	-
	Height (m)	1.58 ± 7.66*	-
BMI (WHO, 2008)		28.0 ± 4.80*	
	Malnutrition	2	1.37
	Normal weight	39	26.71
	Overweight	61	41.78
	Obesity	44	30.14
IMC (Lipschitz, 2004)	Low weight	18	7.53
	Normal weight	52	35.62
	Overweight	83	56.85
Presence of anxiety	Yes	39	26.71
	No	107	73.29

*Weight, height and BMI were presented as mean ± SD.

Table 2. Weight and BMI stratified by presence of anxiety in elderly people from Florianópolis – SC, 2016.

	Anxious	Not anxious	P-value
Weight (kg)	72.98 ± 16.20	69.75 ± 13.04	0.271
BMI (kg/m²)	29.30 ± 5.86	27.53 ± 4.29	0.049

*Weight and BMI were presented as mean ± SD.

According to Pearson's correlation test, there was a weak and statistically non-significant correlation between BMI, body weight and anxiety score (r = 0.1157, p = 0.164 for BMI; r = 0.063, p = 0.447 for weight).

There was an association between presence of BMI and anxiety when using the WHO classification (β = 13.09, P = 0.004) but f or the parameters of Lipschitz, recommended by Ministry of Health, there was no association (β = 3.78; P = 0.151). There was no association between age and presence of anxiety (β = 1.53; P = 0.2).

Table 3 shows the RO values for presence of anxiety and BMI (in continuous form as categorized by the criteria recommended by the WHO). The crude analysis showed that for individuals classified as obese, risk of anxiety is 2.67 times higher (P = 0.012). This risk becomes even greater when the analysis was adjusted for age (OR = 2.91; 95% CI 1.3257 to 6.4047, p = 0.008).

Table 3. Association between presence of anxiety and BMI categories (WHO, 2008) n elderly people from Florianópolis – SC, 2016.

BMI (WHO, 2008)	Odds ratio	CI 95%	P-value
Gross Analysis			
BMI (continuous)	1.08	1.0055 – 1.1752	0.036
Normal weight (18.5 – 24.9 kg/m²)	0.5126	0.2050 – 1.2820	0.153
Overweight (25.0 – 29.9 kg/m²)	0.5260	0.2413 – 1.1466	0.106
Obesity (≥30 kg/m²)	2.6703	1.2375 – 5.7621	0.012
Adjusted analysis (age)			
BMI (continuous)	1.09	1.0081 – 1.1798	0.031
Normal weight (18.5 – 24.9 kg/m²)	0.4827	0.1910 – 1.2199	0.124
Overweight (25.0 – 29.9 kg/m²)	0.5246	0.2396 – 1.1486	0.107
Obesity (≥30 kg/m²)	2.9139	1.3257 – 6.4047	0.008

Four of the issues present in the GAI questionnaire had the highest level of agreement among the participants. These are the statements which had the most agreement: *"I worry a lot of the time"* - 85 subjects (58.21%); *"I think of myself as a worrier"* - also with 85 subjects (58.21%); *"My own thoughts often make me anxious"* - with 68 (46.57%) respondents; and *"I think that my worries interfere with my life"* - also with 68 (46.57%) respondents. Although not all the elderly who agreed with these alternatives have been classified as anxious after applying the cutoff points recommended by the authors of the scale, they answered questions about symptoms of anxiety, because they considered themselves to be people who worry a great deal of the time and sometimes feel anxious to worry about things. This indicates that many of them have symptoms but not necessarily anxiety disorder per se.

Discussion

This study assessed the relationship between presence of anxiety and nutritional status of a group of elderly people in Florianópolis, SC, Brazil. An association was found between BMI and presence of anxiety, and obese people have the highest risk of experiencing this mood disorder.

A literature review whose aim was to evaluate the effects of aging on the clinical expression of anxiety estimated that the number of people over the age of 65, classified with presence of anxiety disorder, ranges from 3.2% to 14.2%.[18]

In the present study, 26.71% of the elderly people have been classified as anxious. This percentage value is similar to and higher than other findings in the above-mentioned review.

As for the panorama of the nutritional status of the elderly population, a study using data from the survey *Pesquisa de Orçamentos Familiares* ("Household Budget Survey") carried out in Brazil in 2008-2009[7] concluded that overweight was very prevalent in the elderly of every color/race, and it was more common among elderly women (41.9%). The highest prevalence of obesity was found in the South (45.1%) and Southeast (38.3%) regions and in urban areas (39%). There was an inverse relationship between overweight and increasing age and a directly proportional relationship between overweight and increase in the income of this population.[19]

According to the current study, the proportion of elderly classified as overweight was 41.78% while 30.14% of the sample had nutritional status of obesity, based on the parameters by the WHO. This is indicative that most of the elderly in the sample (71.92%) were identified as overweight, similarly to the Brazilian Household Budget Survey.[7]

There was an association between presence of anxiety and higher BMI and this sample of elderly. Individuals identified with anxiety had a higher mean BMI than those classified as non-anxious. Similar results were reported by other authors.

A study conducted in two large epidemiological surveys of the general population in Germany, whose purpose was to investigate mental disorders in obese patients (n = 910), compared with healthy (n = 495) and overweight (n = 1550) ones. It was concluded that there obese individuals have an increased risk of developing mental disorders, not only depression but also anxiety and mood disorders.[20]

Another study conducted in the United States with the results of the National Epidemiologic Survey on Alcohol and Related Conditions,[21] which evaluated a sample of 40,790 adults aged over 18 years or older, was aimed at examining differences between males and females in the association with BMI and affective disorders. The prevalence of anxiety disorders was associated with higher BMI in both sexes. However, women had higher rates than men.[21]

In a study with a representative sample of German adults, consisting of 4,185 subjects between 18 and 65 years of age, whose purpose was to examine associations between obesity and socio-demographic determinants, psychological problems and mental disorders, there were no differences for most mental disorders among obese and nonobese individuals.[22]

A systematic review of the literature and meta-analysis, which used the above-mentioned studies, found moderate evidence and a positive association between obesity and anxiety. Of the 16 selected studies (two longitudinal studies and 14 cross-sectional studies), more than half showed significantly higher probability of anxiety disorders in obese than in nonobese individuals.[23]

The review showed that the causal effect of obesity on the development of anxiety cannot be concluded on the basis of current data. In the review, an association also was found between obesity and anxiety in terms of sex. More than half of the studies which were stratified by sex showed a positive trend for females. In some studies, there was a positive trend for males.[23]

According to Canetti et al.,[24] it is widely accepted that feeding behavior in humans changes depending on their emotions, e.g. anxiety, anger, joy, sadness and depression. Negative emotions have been studied and research suggests that they can influence food intake.[24]

A nationwide study conducted at the University of Brasilia (UNB)[25], which assessed the contributions of psychological and nutritional aspects to changes in eating behavior, with a sample of 11 subjects of both sexes aged between 22 and 62, identified that psychological factors influence the practice of proper eating habits. Feelings such as sadness, anger, depression, anxiety, difficulties in family relationships, low self-esteem, negative evaluation of body image, motivation and joy affected food choices. It was found, in this sample, that depression and anxiety were the most frequent emotions.[25]

However, the influence of emotions on feeding behavior are stronger in obese people than in people who are not overweight. This has been explained in a study on psychosomatic theories of obesity.[24]

According to França et al.,[25] when obese people were anxious, they ate too much and that reduced their anxiety. This relationship could involve different effects of proteins and carbohydrates in the synthesis of neurotransmitters such as serotonin. Also, obese individuals also find it difficult to differentiate between hunger and anxiety, because they eat in response to both situations.[25] According to the above-mentioned studies, obese individuals were more prone to anxiety.

Some factors may have influenced the findings of the present research; for example, the fact that most participants (nearly 90% of the elderly) were females. The same limitation occurred in other studies using different approaches and objectives, as the study performed by Previato et al.[26] in Ouro Preto, state of Minas Gerais, Brazil, in which 71.4% of participants were elderly women.[26] Another study conducted in Viçosa, Minas Gerais, showed high participation of women (84.4%).[27] Another study with predominance of female participants is the one by Victor et al.,[28] conducted in Fortaleza, state of Ceará, in which 77.1% of the participants were elderly women.[28]

In the present study, among the elderly classified as anxious, 95% are women. It can be claimed that anxiety was more prevalent in females, since the study was conducted in a specific population; also, there is increased participation of women in research. Another point to note is the fact that at NETI / UFSC there are more female than male students enrolled. 2003 IBGE Census data indicated that women are the ones that seek medical care most often and report higher prevalence of chronic diseases in Brazil.[29]

Conclusão

This study has reported the association between obesity and presence of anxiety in an elderly population of the city of Florianópolis (SC), Brazil. Most of this population consisted of women, which may have influenced the findings described herein. Nevertheless, the role of obesity in the pathogenesis of affective disorders (including anxiety) still remains unclear.

The world population has been aging. Thus, further research needs to be encouraged in this field to support the development of policies and programs for provision of mental health care to the elderly, as well as programs and initiatives to prevent overweight, which is increasingly frequent in this population.

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Contributors

De Matos PP and Ribeiro SV participated in the design of the research project, data collection, statistical analysis and writing of the manuscript. Moreira JD participated in the design of the research project, statistical analysis, writing of the manuscript and academic advice.

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