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NUTRITIONAL STATUS, DEMENTIA AND ASSOCIATED FACTORS IN INSTITUTIONALIZED ELDERLY

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ABSTRACT

Background: Dementia is a neurodegenerative process considered the primary characteristic in a group of diseases with similar qualities in which the elderly presents decreased global cognitive function, with impairment on daily activities, being Alzheimer's disease (AD) the most common cause.

Objective: The present study aimed to evaluate the dementia presence, nutritional status and associated demographic factors in elderly assisted in a Health Assistance Reference Centre in Montes Claros, Minas Gerais, Brazil.

Methods: It is a Cross-sectional, documental and quantitative study performed through the analysis of medical records from patients assisted in the Eny Faria de Oliveira Referral Center for Elderly Health Care (CRASI) (n=702). Dementia was evaluated through the Clinical Dementia Rating (CDR) scale and the nutritional status accessed via Body Mass Index (BMI). Binary Logistic Regression was used as a multivariate analysis to evaluate the association between dementia and the investigated variables.

Results: dementia was positively associated with young old, old old, illiterate and underweight elderly. Regarding the nutritional status, the elderly classified as underweight presented 1.909 more chance of introducing dementia as compared with overweight elderly.

Conclusion: The very old, illiterate and underweight elderly were associated with the outcome, suggesting that BMI, age group, and schooling should be considered in the investigation and prevention of this relationship.

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INTRODUCTION

Aging is a natural life process, which is part of a natural cycle such as infancy, adolescence and adult life. Aging is a multifactorial process that englobes the participation of social, psychological, cultural and biological processes¹. The age pyramid structure is changing worldwide, and the elderly population growth predominates².

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This occurs as a consequence of the fertility rates decline and life expectancy increase. Therefore, a child born in Brazil in 2015, lives around 20 years or more than a child born in the fifties³. The definition of elderly is based on chronological age, and thus, are considered elderly those with 60 years of age or more in the developing countries and more than 65 years old in developed countries. In Brazil, the individual with more than 60 years old it is considered elderly⁴. A young old elderly is aged from 60 to 74 years old, old old aged from 75 to 84 years old and very old aged 85 years old or more¹. The occurrence of chronic-degenerative diseases as age advances is common, although not inherent to the aging process. However,

it is a condition that may favor the diseases development^{5,6}. Dementia is a neurodegenerative process, being the main characteristic of a group of diseases with similar qualities in which the elderly presents decreased global cognitive function, with daily activities impairment^{7,8}, being Alzheimer's disease (AD) the most common cause^{9,10}. In 2015, dementias affected more than 47 million people worldwide, and it is expected that in 2030 this number will increase to 76 million in low or median-income countries^{11,12}. A systematic review of the dementia prevalence in Brazil, from 2000 to 2014, estimated the involvement of around 5.1 to 17.5% of the population⁹. The dementias more frequently found, following the Alzheimer's disease (60-70%), are vascular and mixed dementia^{9,13}. Age and schooling are associated with this condition, being the very old and illiterate elderly with a higher chance of developing dementia¹⁴. The nutritional status is also associated with dementia; it is believed that obese adults in middle age have an increased predisposition to develop dementia in the future. This situation has been occurring due to the nutritional transition that is rising the obesity prevalence instead of malnutrition in the general population. On the other hand, the dementia development predisposes the elderly to malnutrition^{15,16}. It is important to emphasize that as dementia progresses, the elderly tend to forget about basic care as food and water intake, which can lead to malnutrition¹⁷. This condition may still lead to the development of swallowing disorders, dysphagia, and lingual motor dysfunction, leading to low caloric intake in this population¹⁰. In Brazil, 19.9% of the male and 18.2% of the female elderly are underweight. Overweight is present in a more significant proportion of individuals: 31.6% men and 41.9% women¹⁸. The greater overweight parcel found in women occurs, mainly, after menopause¹⁹. Therefore, the investigation of dementia, nutritional status and associated factors in the elderly might contribute to the development of strategies aimed to improve the quality of life in this population. Thus, the present study aimed to evaluate the presence of dementia, the nutritional profile and demographic factors associated with elderly assisted in a Health Assistance Reference Centre in Montes Claros, Minas Gerais.

MATERIALS AND METHODS

A cross-sectional, documental and quantitative study performed through the analysis of medical records from patients assisted in the Eny Faria de Oliveira Referral Center for Elderly Health Care (CRASI), Montes Claros, Minas Gerais. The studied population comprised 702 elderly from both genders, aged 60 years old or more. Following the institution authorization and ethical approval, the electronic medical records of patients assisted at CRASI from 2008 to 2011 were requested. Two trained and calibrated researchers performed the medical records checking procedure. The inclusion criteria were: medical records from individuals aged 60 years old or more, evaluation by a geriatric physician via the CDR scale, as well as complete data regarding nutritional status. Medical records with incomplete data were excluded. Posteriorly, the data was transferred to an electronic spreadsheet on Statistical Package for the Social Science (SPSS®) – version 22.0, for data analysis. The following socio-demographic data were evaluated: schooling, gender, marital status and age group. Regarding schooling, the elderly were classified as illiterate and literate. The marital status was categorized into married and not-married; the age groups analyzed were from 60 to 74 years old (young old), 75 to 84

years old (old old) and 85 years old or more (very old)¹. For the nutritional status evaluation, the following anthropometric data were assessed in the medical records: body mass (Kg) and height (m). The Body Mass Index (BMI) was calculated (Body mass (Kg)/height² (m)). The nutritional diagnosis based on BMI used specific cut-off points for the elderly evaluation according to the Nutrition Screening Initiative guidelines²⁰, which considers the aging-associated physiological alterations. The same cut-off points are adopted in Brazil, according to the Food and Nutrition Surveillance System (SISVAN)²¹. The elderly were classified as underweight, eutrophic, overweight/obese. For the BMI-based analysis, it was considered underweight (BMI <22 Kg/m²), eutrophic (BMI from 22 and 27 Kg/m²), and overweight/obesity (BMI > 27 Kg/m²)²¹. The dementia classification was based on data from the CDR scale that is divided into six categories: memory, orientation, judgment and problems resolution, community affairs, domestic activities, hobby, and personal care. Each of the categories could be ranked as (0) no alterations, (0.5) questionable, (1) mild, (2) moderate, and (3) severe. The personal care category did not have the 0.5 option. For the final CDR classification, the evaluation criteria proposed by Morris²² and validated by Montano²³, considered the "memory" category a priority over the others categories. The final classification was categorized as (0) normal, (0.5) very mild dementia, (1) mild dementia, (2) moderate dementia, and (3) severe dementia²². As a general rule, if the memory punctuation is equal to two or more secondary categories, the final CDR will have the same value as memory²³. Following all the above-mentioned classifications, the elderly were categorized into two groups: dementia presence and absence. Those with 0 and 0.5 CDR were classified in the dementia absence group and those with 1, 2 and 3 CDR in the dementia presence group. Based on the data transferred to SPSS®, descriptive analysis with the frequency distributions of all investigated variables was performed. Binary logistic regression was conducted as a multivariate analysis to evaluate the association of studied variables with the occurrence of dementia (odds ratio and confidence intervals (95%) were retrieved). The adjustment method "stepwise backward conditional" was used to define the more significative model. The statistical significance level was set at 95% ($p < 0.050$). The research was approved by the Research Ethics Committee of the Universidade Estadual de Montes Claros (UNIMONTES: protocol 152.340/2012), ensuring the information confidentiality, which was used exclusively for scientific purposes.

RESULTS

The investigated population mean age was 74.6 years old (SD \pm 8.2 years old), varying from 60 to 104 years old. The classification among age groups, revealed that most elderly (50.7%) were aged from 60 to 74 years old. Besides that, the predominant groups were: women (73.3%), literate elderly (66.9%), and not married (55.9%). Table 1 presents crossed information of sociodemographic data with the nutritional profile and dementia evaluation. Regarding the nutritional profile, the mean BMI was 26.1 kg/m² (SD \pm 5.8 kg/m²), varying from 13.9 to 51.8 kg/m². Overweight was slightly more often observed among young old (52.8%), women (48.2%), literate (46.2%) and married individuals (47.4%). Underweight, on the other hand, was more prevalent on the very old population (52.6%), and among men (36.9%). Dementia was mainly observed among the very old (45.3%),

Table 1. Frequency distribution on the data crossing on dementia and body mass index variables with sociodemographic variables

Variables	Body Mass Index			Dementia	
	Underweight	Eutrophic	Overweight/obesity	Absent	Present
Age	78.5 ± 9.0	75.1 ± 7.4	71.8 ± 7.1	73.2 ± 7.6	78.9 ± 8.3
Young old	62 (17.4%)	106 (29.8%)	188 (52.8%)	305 (85.7%)	51 (14.3%)
Old old	63 (25.1%)	97 (38.6%)	91 (36.3%)	183 (72.9%)	68 (27.2%)
Very old	50 (52.6%)	29 (30.5%)	16 (16.8%)	52 (54.7%)	43 (45.3%)
Gender					
Female	106 (20.6%)	161 (31.3%)	248 (48.2%)	403 (78.3%)	112 (27.1%)
Male	69 (36.9%)	71 (38%)	47 (25.1%)	137 (73.3%)	50 (26.7%)
Schooling					
Illiterate	74 (31.9%)	80 (39.5%)	78 (33.6%)	145 (62.5%)	87 (37.5%)
Literate	101 (21.5)	152 (32.3%)	217 (46.2%)	395 (84%)	75 (16%)
Marital status					
Married	70 (22.6%)	93 (30%)	147 (47.4%)	252 (81.3%)	58 (18.7%)
Not-married	105 (26.8%)	139 (35.5%)	148 (37.8%)	288 (73.5%)	104 (26.5%)
Total	175 (24.9%)	232 (33.1%)	295 (42.0%)	540 (76.9%)	162 (23.1%)

Table 2. Frequency distribution on data crossing between Body Mass Index and dementia

Dementia	Body Mass Index		
	Underweight	Eutrophic	Overweight/Obesity
Absent	104 (59.4%)	183 (78.9%)	253 (85.8%)
Present	71 (40.6%)	49 (21.1%)	42 (14.2%)

Table 3. Binary Logistic Regression to evaluate the relationship between dementia and the studied variables. Data represent the most significant model after the stepwise backward conditional adjustment. The model was adjusted for the better significance. OR: odds ratio. * values statistically significant (p<0.05)

Variables	OR	Confidence interval of 95%		p
		Inferior	Superior	
Age				
Young old			Reference	
Old old	1.862	1.217	2.850	0.004*
Very old	2.824	1.640	4.864	<0.001*
Schooling				
Literate			Reference	
Illiterate	2.560	1.745	3.753	<0.001*
Body Mass Index				
Overweight/obesity			Reference	
Eutrophic	1.296	0.806	2.082	0.284
Underweight	2.909	1.807	4.683	<0.001*

illiterate (37.5%), not married (26.5%) and underweight individuals (40.6%, Table 2). The dementia associated factors results obtained in the binary multivariate logistic regression are indicated in table 3. The variables categories that were statistically associated with dementia were: old old, very old, illiterate and underweight elderly. The dementia chances were higher among the very old elderly (OR=1.824; CI= 1.640-4.864) as compared to young old. It was verified that illiterate elderly had higher chances of developing dementia, with 1.56 more chance as compared to literate elderly (OR=2.560; CI= 1.745-3.753). Regarding the nutritional status, the elderly classified as underweight had 1.909 more chance of presenting dementia as compared to elderly with overweight (OR=2.909; CI= 1.807-4.683).

DISCUSSION

Similarly to other studies performed with elderly^{17,24,25}, the women population was more prevalent in the present study (73.3%). In research performed with 257 elderly in an Elderly Referral Centre in Belo Horizonte, Minas Gerais, 63.8% did not inform having a spouse and 74.5% were literate²⁶, corroborating our findings (55.9% and 66.9%, respectively). Concerning age groups, the elderly percentage decreased as age advances, with a higher number of young old (50.7%) as compared to old old (35.7%) as compared to very old (13.5%),

corroborating another study¹⁷ that used data from the Family Budgeting Search (2008/2009)¹⁸ with 20,114 individuals. The overweight and obesity frequency was 42%, similar to research performed with 882 elderly individuals in Vitória, Espírito Santo that reported 41.8%²⁷. These results are in line with another study conducted with North American elderly, in which the weight excess increased from 32% in 2000 to 37.4% in 2010²⁸. According to the literature, the weight gain in this population is due to nutritional transition²⁹ and physiological alterations associated with the aging process, including body composition changes, as a consequence of weight gain³⁰. In the present study, we found a higher prevalence of underweight among the very old individuals, corroborating other national studies^{17, 31}. As age advances, especially after the 75 years old²⁴, a BMI reduction is observed mainly due to decreased muscle mass, and body fat amount³⁰ and digestive system aging with reduced nutrients usage³². It is noted that age presents an inverse relationship with the nutritional status, where the very old individual has a higher chance of being underweight¹⁷, which may increase the susceptibility of developing other diseases. Regarding the gender analysis, there was a predominance of overweight in women (42.8%). This situation was also reported in studies performed in Pelotas, Rio Grande do Sul²⁴ and with a population aged over 60 years old in the Family Budgeting Search (2008/2009)¹⁷. This weight gain occurs especially after menopause, as a

consequence of hypoestrogenism caused by ovarian structure and function decline³³. The ovaries mean volume decreases with aging, leading to a reduction in estrogen and inhibin production by the follicles, which causes an increase of FSH and LH via negative feedback by the pituitary gland, consequently modifying the structure adipose tissue distribution from gynoid to Android, also increasing the total fat mass³⁴. Because of this, women have a higher predisposition of fat accumulation as compared to men, and following age advance, the weight starts to decline in men from the age of 65 years old and in women around ten years later^{35, 36, 37}. The present investigation evidenced that 41% of the elderly with dementia were underweight, as reported in other similar studies^{38,39}. Additionally, the reported results pointed out that underweight elderly had 1.909 more chance of presenting dementia as compared to elderly with overweight. A research performed in the United States³⁹, showed that, independently from the dementia degree and etiology, these elderly presented a BMI of at least 10% smaller than those without cognitive alterations. Another study performed in geriatric outpatient clinics in a university hospital did not find associations between dementia etiology and elderly nutritional status. However, the cognitive damage severity was associated with the nutritional status impairment⁴⁰. Multiple factors are responsible for this finding: decreased functionality, evidenced by the inability of shopping, preparing and eating the meals, taste and smell functions alterations, and changes in energy balance, with decreased appetite and earlier satiety as compared to younger people⁴¹. On the other hand, the advanced age found in the studied elderly population with underweight associates with this result, since the main risk factor for the occurrence of underweight is age.

A study performed in the United States, with an 8-year follow-up, evaluated the relation between suffered alterations on BMI with the risk of dementia, demonstrating that patients with increased weight loss over follow up and consequently BMI decline was a protective factor⁴². Another study found that a lower BMI may be an early clinical sign of the disease due to the alterations observed during its initial stage, and not a risk factor⁴³. The malnutrition found in these older adults may be associated with a low intake of nutrients, such as deficiency in the vitamins intake (thiamin (B1), B12 vitamin and folic acid), which can trigger changes in congenital functions, leading to nutritional dementia⁴⁴. These dementia conditions are potentially reversible, especially if early treated, since the progression may be irreversible⁴⁵. Besides that, the low nutrients intake also decreases the antioxidant vitamins offer, which may lead to the neuronal cells oxidative stress, consequently leading to cognitive alterations in the elderly⁴⁴. When analyzing the dementia risk concerning the age group, it was observed that older adults presented 1.824 more chance of developing dementia as compared to the young adults. Studies that used the same age classification were not found in the literature. However, it is observed that the chance of elderly with advanced age to present dementia is significantly higher as compared to young old⁴⁶. The aging process leads to nervous system alterations, such as neuronal population and nerve conduction speed reduction, development of senile plaques and decreased acetylcholine production^{47, 48}. Also, the nervous system does not have regeneration capacity, which is still subject to intrinsic (genetic, metabolic) and extrinsic (lifestyle, drugs, radiation) factors that exert deleterious activity, leading to damage accumulation⁴⁸. In the present study, illiterate elderly presented 1.560 more chance of

developing any dementia as compared to literate elderly, in consonance with previous studies that showed a higher chance of cognitive deficits development in illiterate elderly or those with lower schooling degrees. A higher schooling degree is a protective factor for the development of cognitive decline since schooling stimulates neuronal activation^{49, 50, 51}. Besides, there is a hypothesis known as Cognitive Reservation (CR), which predicts that individuals with higher CR have a higher capacity to use different approaches to cognitive processing and compensatory strategies in function of a given stimulus, such as a neurocognitive test. Thus, the pathological burden evidenced by the tests may vary depending on the individuals CR, where individuals with a higher CR have better cognitive performance and consequently the dementia diagnosis is usually later as compared to those with low CR^{52, 53, 54}. The present study has a cross-sectional characteristic, which hinders the interpretation of causal relationships between the studied variables (e.g., dementia occurrence and the nutritional profile). However, the results found demonstrated that BMI is an efficient parameter when specific cut-off points for the elderly population are used, although other body fat markers with good quality are found in the literature. The documental investigation did not allow the retrieve of detailed nutritional information, such as B12 vitamin plasma concentrations, which is important for neuronal myelination processes and if absent may cause demential disorders. In this perspective, it is believed that a cohort study could more precisely establish the causal relationships inferred in our study. From the results reported in the present study and considering that it is a population in a significant current rise, it is reiterated the importance of knowing the nutritional reality of the elderly population, since alterations in the nutritional status can be associated with several pathologies, besides being an important predictor for this population quality of life. Thus, it is of extreme importance the elderly monitoring with the objective of early interfering in any alteration found. However, health promotion strategies aimed to improve the elderly quality of life with a multidisciplinary approach effectively implemented are urgently needed, which might lead to a healthy old age.

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