Malnutrition and associated variables in an elderly population of Criciúma, SC

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Summary

Objective: Determining malnutrition and associated variables in the elderly. **Methods:** A cross-sectional study was conducted among elderly people vaccinated against influenza in order to evaluate their nutritional status. Nutritional assessment was performed with the Mini Nutritional Assessment. To verify association of studied variables with the outcome, odds ratios was estimated using multiple logistic regression. **Results:** A total of 236 elderly patients were recruited. The Mini Nutritional Assessment identified three patients (1.3%) with malnutrition and 59 (25%) at risk of malnutrition. Factors with a positive association to the outcome were psychological stress or acute disease in the past three months, weight loss (< 3 kg) during the last three months and sores or skin ulcers. On the other hand, consuming two or more servings of fruits or vegetables daily, eating meat, fish or poultry every day and drinking more than three cups of fluids per day were negatively associated to malnutrition and risk of malnutrition. **Conclusion:** The low prevalence of malnutrition found in this study may be due to the study sample of elderly individuals in good health. Some factors related to a recent health problem (psychological stress or acute disease) seem to be positively associated while regular consumption of fluids and certain foods seem to be negatively associated with malnutrition.

Keywords: Elderly; malnutrition; prevalence.

Resumo

Desnutrição e variáveis associadas em uma população de idosos em Criciúma-SC

Objetivo: Determinar a desnutrição e suas variáveis associadas em idosos. **Métodos:** Estudo transversal foi conduzido entre idosos vacinados contra a gripe, a fim de medir o seu estado nutricional. A avaliação nutricional foi realizada por meio da Mini Avaliação Nutricional. Para verificar a associação das variáveis estudadas com o resultado foi estimada a odds ratios usando a regressão logística múltipla. **Resultados:** No total 236 idosos foram recrutados. A mini avaliação nutricional identificou três pacientes (1,3%) com desnutrição e 59 (25%) em risco de desnutrição. Os fatores com uma associação positiva para o resultado foi o estresse psicológico ou doença aguda nos últimos três meses, perda de peso < 3 kg durante os últimos três meses e feridas ou úlceras na pele. Por outro lado, o consumo de duas ou mais porções de frutas ou vegetais ao dia, consumir carne, peixe ou frango todos os dias e beber mais de três xícaras por dia de fluidos foram negativamente associadas à desnutrição e risco de desnutrição. **Conclusão:** A baixa prevalência de desnutrição encontrada neste estudo é, provavelmente, devido à amostra estudada de idosos em boa saúde. Alguns fatores como problema de saúde recente (estresse psicológico ou doença aguda) parecem estar positivamente associados a desnutrição e risco de desnutrição, enquanto o consumo regular de fluidos e alguns tipos de alimentos parece estar associado negativamente com desnutrição

Unitermos: Assistência a idosos; desnutrição; prevalência.

Study conducted in the Laboratory of Epidemiology of the Universidade do Extremo Sul Catarinense, Criciúma, SC

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Introduction

Despite the high prevalence of malnutrition among elderly patients, nutritional problems are not yet acknowledged by health professionals as a priority for the elderly. The need for nutritional assessments and interventions is particularly crucial in this age group, where incidence of chronic illness is high and a myriad of socioeconomic factors enhance likelihood of malnutrition[1].

The nutritional status of the elderly may be influenced by many factors, including dentition, Alzheimer's disease, depression, functional limitations, income and polypharmacy[2]. Prevalence of malnutrition, which is relatively low in community living elderly (5-10%), is considerably higher (30-60%) in those hospitalized or institutionalized [3].

The elderly are typically major users of health care services and place a burden on limited health care resources. Malnutrition in this age group is associated with serious negative consequences, such as higher prevalence of infections, hospitalization and increased morbidity and mortality[4]. Prevalence of malnutrition among the elderly living in nursing homes ranges from 17% to 65%[5].

Conventional malnutrition assessment techniques include anthropometrics, dietary recall and laboratory investigation. The Mini Nutritional Assessment (MNA)[6-8] was first validated in 600 elderly people of varying health status (healthy community-living, frail, or hospitalized). The MNA classifies individuals into three levels of nutritional status on the basis of scores that range from 0 to 30. A score of 24 or higher indicates satisfactory nutritional status; a score of 17-23.5 indicates risk of malnutrition and a score lower than 17 indicates protein energy malnutrition.

The MNA is easy to administer[9-11], patient-friendly, inexpensive (laboratory investigations are not required), very sensitive (96%), highly specific (98%) and reproducible. A study of geriatric inpatients [9] found that interrater reproducibility is good for scores of 17-23.5 and excellent for scores above and below this range.

The purpose of this study was to estimate the prevalence of malnutrition and its associated variables in elderly between 60-92 years of age who participated in the campaign of vaccination against influenza.

Methods

A cross-sectional study was conducted enrolling the elderly who participated in the campaign of vaccination against influenza in the first half of 2008 in southern Brazil. This campaign is part of a strategy developed for the adhesion of the elderly to influenza vaccination. The sample size calculation was performed considering a maximum variability of $p = 0.4$, a confidence interval level equal to 95%, an error of 0.065 and a finite population (people aged 60 or older in 2007) equal to 12 717 (source: IBGE). We calculated a sample of 236 elderly, chosen randomly in consecutive order with an estimated interval of 10 to 10 elderly vaccinated against influenza whose nutritional status was assessed by questionnaires including demographic data administered by trained fieldworkers.

Mini Nutritional Assessment

Baseline nutritional status was defined and graded according to the MNA. This instrument consists of eighteen questions in four groups addressing anthropometry (BMI, weight loss, mid-upper arm and calf circumferences), general state (medications, mobility, presence of pressure ulcers, lifestyle, presence of psychological stress or neuropsychological problems), dietary assessment (autonomy of feeding, quality and number of meals, fluid intake) and self-perception about health and nutrition. When all items are completed, a maximal score of thirty points is achievable and threshold values are set as follows: adequately nourished, MNA ≥ 24; at risk of malnutrition, MNA in the range of 17-23.5; protein-energy malnutrition, MNA, < 17[8-12] .

Anthropometric measurements

All anthropometric measurements were taken in duplicate by trained interviewers and an average of the two measurements was calculated. Height was recorded using a stadiometer and weight was recorded on a calibrated scale to the nearest 100 g. BMI was calculated as weight (kilograms) divided by height (meters) squared and classified according to World Health Organisation categories[13]. Calf circumference was measured to the nearest 0.5 cm at the largest circumference of the calf with the knee and ankle bent at 90-degree angles[13]. Mid-arm circumference (MAC) was measured as the circumference of the right upper arm (centimeters).

Statistical analysis

Data are presented as mean values and standard deviations. To verify the association of categorical variables with the outcome i.e. malnutrition and risk of malnutrition defined by MNA, the chi-square test (or Fishers exact, when indicated) were applied. The Student's t test or Mann-Whitney test was used for continuous variables. All results with $p < 0.15$ in univariate analysis and/or with clinical/epidemiological relevance for the study were selected for the logistic regression model. All variables associated to the outcome with $p < 0.05$ remain in the final model. Analysis was performed using SPSS software (version 17.0).

The present study was performed in accordance with the principles established by the Declaration of Helsinki. The protocol was approved by the local Ethics Committee. We also obtained written informed consent from all subjects in the study.

Results

A total of 236 elderly patients (37.3% male and 62.7% female) were recruited. The overall mean age was 68.0 (± 7.0) years (range 60-92 years). The age group with the largest number of individuals was the 60-69 years group (66.1%), followed by the 70-79 years group (25.0%). Regarding educational status, 11.0% had never gone to school, 20.4% had eight or more years of schooling.

Anthropometric measurements showed that the age groups present a statistically significant difference between women and men regarding weight, height, BMI, calf circumference and MNA score. For each age group, men were taller ($p < 0.001$); the 60-69 group was heavier ($p = 0.04$); and in the 70-79 year group, men had a higher average MNA score than women ($p = 0.05$). In the 60-69 year group, women had greater calf circumference ($p = 0.04$) and BMI ($p = 0.02$) (Table 1). No statistical differences were found between genders in mid-arm circumference of any age group. The distribution of MNA responses, stratified by gender is shown in Table 2.

BMI was used to classify participants as malnourished, overweight or obese. Most women (43.9%) were obese and an additional 35.2% were overweight. Most men (47.7%) were overweight, while 26.1% had BMI in the desirable range for health and an additional 26.1% were obese. None had a BMI of 18.5 kg/m^2 or less (i.e., underweight).

Incomplete responses to items in the MNA score resulted in missing data for five subjects. Mean MNA scores and SD were calculated for men (25.6 ± 2.6, range 15-30) and women (24.8 ± 2.8, range 16-30). Considering both genders together, 27.7 percent of participants were in the "at risk of malnutrition" category (i.e., 17-23.9). Three subjects were classified as malnourished (i.e., MNA score < 17).

In univariate analyses, many variables were associated with the outcome (malnutrition and risk of malnutrition), whereas upon adjustment for confounding factors through a logistic regression model the following factors showed significant association to the outcome: "psychological stress or acute disease in the past three months", weight loss (< 3 kg) during the last three months and sores or skin ulcers. On the other hand, factors that negatively associated to malnutrition and risk of malnutrition were: consuming two or more servings of fruits or vegetables per day, eating meat, fish or poultry every day and drinking more than three cups of fluid per day (Table 3).

Discussion

In both, clinical practice and epidemiology, BMI is the most used indicator of individual and collective general nutritional status. In this study, malnutrition was determined using the BMI (< 18.5) and MNA (< 17) scores. Malnutrition was not observed in terms of BMI scores, whereas by MNA it was observed in 1.3% of the studied population. Some authors have indicated that BMI thresholds should be modified for the elderly population. Sergi *et al.*[16] recommended a BMI < 20.0 as the threshold for malnutrition among the elderly. Using this criterion, our study included a single elderly individual with malnutrition (0.4%). Prevalence of malnutrition observed in this study is lower than in other studies[17,18], perhaps because it included only elderly people who came to a healthcare unit for vaccination against influenza and excluded the elderly hospitalized population.

Studies in elderly hospitalized populations have shown a higher percentage of malnutrition and weight loss a month prior to hospital admission. Thus, weight loss and malnutrition may increase the risk of hospital admission[17,18].

In most previous studies of malnutrition screening tools, investigators did not use multivariate techniques to assess the weighted effects of the variables of interest[19]. In the present investigation, logistic regression analysis was used to identify the most significant variables associated to malnutrition and then this item was incorporated to the screening process.

Prevalence of malnutrition, which is relatively low in community living elderly (5 ± 10%), is considerably higher (30 ± 60%) in hospitalized or institutionalized elderly [18].

Recently, Saletti *et al.*[20] completed a study of 994 elderly persons in assisted living situations. They found that the

Table 1 – Social demographic characteristics of the studied population

Variables	Gender		Total (n = 236) n (%)
	Women (n = 148) n (%)	Men (n = 88) n (%)	
Age (years)			
60-69	97 (65.5)	59 (67.0)	156 (66.1)
70-79	37 (25.0)	22 (25.0)	59 (25.0)
≥ 80	14 (9.5)	7 (8.0)	21 (8.9)
Schooling (years)			
None	20 (13.5)	6 (6.8)	26 (11.0)
< 8 years	117 (79.1)	73 (83)	162 (80.5)
≥ 8 years	11 (7.4)	9 (10.2)	48 (8.5)

Table 2 – Distribution of Mini Nutritional Assessment responses stratified by gender

Variables	Gender		Total n (%)	*p value
	Women (n = 148) n (%)	Men (n = 88) n (%)		
Weight loss in the last three months				
Yes	46 (31.1)	22 (25.0)	68 (28.8)	
No	82 (55.4)	56 (63.6)	138 (58.5)	0.68
Does not know	20 (13.5)	10 (11.4)	30 (12.7)	
Amount of weight lost				
< 3 kg	12 (8.1)	7 (8.0)	19 (8.1)	
1-3 kg	33 (22.3)	16 (26.1)	49 (20.8)	0.74
Does not know	103 (69.6)	65 (73.9)	168 (71.2)	
Lives at home				
Yes	13 (8.8)	6 (6.8)	19 (8.1)	0.59
No	135 (91.2)	82 (93.2)	217 (91.9)	
Psychological stress/acute disease in the past 3 months				
Yes	55 (37.2)	18 (20.5)	73 (30.9)	0.07*
No	93 (62.8)	70 (79.5)	163 (69.1)	
Takes 3 or more prescription drugs daily				
Yes	80 (54.1)	42 (47.7)	122 (51.7)	0.34
No	68 (45.9)	46 (52.3)	114 (48.3)	
Mobility				
Bed or chair bound	4 (2.7)	1 (1.1)	1 (0.4)	
Able to get out of bed/chair but does not go out	0	3 (3.4)	7 (3.0)	0.30
Goes out	144 (97.3)	84 (95.5)	228 (96.6)	
Neuropsychological problems				
Yes	2 (1.4)	2 (2.3)	4 (1.7)	
No	141 (95.3)	85 (96.6)	226 (95.8)	0.61
Does not know	5 (3.4)	1 (1.1)	6 (2.5)	
Body mass index (BMI) +				
Underweight (< 18.5 kg/m^2)	0	0	0	
Desirable (18.5-24.9 kg/m^2)	29 (20.0)	23 (26.1)	52 (22.0)	
Overweight (25-29.9 kg/m^2)	51 (35.2)	42 (47.7)	93 (39.4)	0.25
Obese (≥ 30 kg/m^2)	65 (43.9)	23 (26.1)	88 (37.3)	
Pressure sores or skin ulcers				
Yes	17 (11.5)	11 (12.5)	28 (11.9)	0.81
No	131 (88.5)	77 (87.5)	208 (88.1)	
Full meals daily				
1-2 meals	22 (14.8)	11 (12.5)	33 (14.0)	0.61
3 meals	126 (85.2)	77 (85.5)	203 (86.0)	
Two or more daily servings of fruits/vegetables				
Yes	115 (77.7)	64 (72.7)	179 (75.8)	0.39
No	33 (22.3)	24 (27.3)	57 (24.2)	
Two or more weekly servings of legumes/eggs				
Yes	110 (74.3)	77 (87.5)	187 (79.2)	0.01*
No	38 (25.7)	11 (12.5)	49 (20.8)	
At least one daily serving of dairy products				
Yes	124 (83.8)	66 (75.0)	190 (80.9)	0.13
No	24 (16.2)	22 (25.0)	45 (19.1)	
Fish or poultry daily				
Yes	128 (86.5)	78 (88.6)	206 (87.3)	0.63
No	20 (13.5)	10 (11.4)	30 (12.7)	
Declined food intake over the past three months (loss of appetite, digestive problems, chewing or swallowing difficulties)				
Severe	44 (29.7)	16 (18.2)	60 (25.4)	
Moderate	100 (67.6)	72 (81.8)	176 (74.6)	0.04*
No loss of appetite	4 (2.7)	0		
Fluid consumption per day				
Less than 3 cups	32 (21.6)	19 (21.6)	51 (21.6)	
3 to 5 cups	66 (44.6)	34 (38.6)	100 (42.4)	0.90
More than 5 cups	50 (33.8)	35 (39.8)	85 (36.0)	
Mode of feeding				
Unable to eat without assistance	4 (2.7)	1 (1.2)	5 (2.1)	
Self-fed with some difficulty	2 (1.4)	1 (1.2)	3 (1.3)	0.42
Self-fed without any problem	142 (95.9)	86 (97.7)	228 (96.6)	
Self view of nutritional status				
Malnourished	8 (5.4)	5 (5.7)	13 (5.5)	
Uncertain about nutritional state	31 (20.9)	11 (12.5)	42 (17.8)	0.90
No nutritional problems	109 (73.6)	72 (81.8)	181 (76.7)	
Comparing to other people of the same age, how does the patient view his/her health status				
Not good	28 (18.9)	6 (6.8)	34 (14.4)	
Does not know	5 (3.4)	0	5 (2.1)	0.02*
Good	79 (53.4)	42 (47.7)	121 (51.3)	
Better	36 (24.3)	40 (45.5)	76 (32.2)	

* p-values for Pearson c2 test; +BMI (Body Mass Index) was calculated by (weight in kg) / (height in m^2)

Table 3 – Crude and Adjusted Odds Ratio for the relationship between studied variables and outcome (malnutrition and risk of malnutrition)

Variable	OR crude (95% CI)	OR ajdjusted* (95% CI)
Psychological stress/acute disease in the last 3 months		
Yes	6.28 (3.34-11.82)	10.5 (4.78-23.30)
No	1	1
Weight loss during the last 6 months		
< 3 kg	1.01 (1.00- 1.01)	1.01 (1.01- 1.02)
1-3 kg	1	1
Pressure sores or skin ulcers		
Yes	3.33 (1.48-7.47)	5.10 (1.90-13.65)
No	1	1
Amount of fluid consumed daily		
Less than 3 cups	1.96 (1.31-2.93)	2.85 (1.65-4.92)
More than 3 cups	1	1
Fish or poultry consumed daily		
Yes	0.48 (0.21-1.06)	0.29 (0.10-0.83)
No	1	1
≥ 2 servings of fruits or vegetables daily		
Yes	0.45 (0.24-0.86)	0.41 (0.18-0.92)
No	1	1

*Adjusted for age and gender and for all other variables in the model.

MNA score was below 17 in 21% of individuals in service, 33% of those living in retirement homes, 38% of those in group living homes for dementia sufferers and 71% of those in nursing homes. A study in Switzerland of 166 hospitalized patients older than 70 years of age showed that admission MNA scores below 17 correlated with mean hospital stays that were 10 days longer than those of individuals with MNA scores higher than 17 at admission[21] .

In the final model, variables that conferred a positive association with malnutrition were: a worse state of health as compared to others, loss of appetite and loss of more than 3 kg during the last three months, indicating that relative health status and weight loss in the elderly should be warning signs for health professionals.

It seems that elderly individuals should be encouraged to consume meat, fruits and vegetables and drink at least three glasses of liquid daily since these factors seem to be negatively associated to malnutrition or risk of malnutrition.

The number of older adults in the world is growing both in absolute and relative terms. Good nutrition seems to play a crucial role in maintaining the elderly healthy. Older adults often have health problems that can lead to decreased appetite or trouble eating, such as chronic illness, use of certain medications, trouble chewing due to dental issues, problems swallowing or difficulty to absorb nutrients. A recent hospitalization may be accompanied by loss of appetite or other nutrition problems. In other cases, a diminished sense of taste and smell decreases appetite.

Research efforts and nutrition education strategies should be directed towards health of the elderly to develop nutritional guidelines promoting successful aging.

Weight loss in the elderly is clearly a prevalent and complex problem. It is associated with increased risk of morbidity and mortality and therefore merits serious attention by the attending physician. Patients who are identified as high risk require immediate intervention, including medical and psychological evaluations. Although such diagnostic uncertainty may be troubling, the prognosis in most cases is surprisingly good. Appropriate social and psychological support is necessary and until more is known about the effective treatment of this problem, practical approaches that improve caloric intake should be envisaged [22,23].

Conclusion

Although the low prevalence of malnutrition found in this study is probably due to the studied sample of elderly individuals in good health, some factors related to a recent health problem (psychological stress or acute disease) seem to be positively associated to malnutrition, while regular consumption of fluids and certain foods seem to be negatively associated to this outcome.

Contributors

RSVB organized the study, collected the data and helped draft the article. MIR and M.C.B. did the statistical, interpreted the data and drafted the manuscript.

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