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Nutritional status of homebound elderly subjects, with limited access to primary care services

Regina do Rio Alvares[1]
Maria Regiane Trincaus[2]
Carine Teles Sangaleti[2]

[1] Secretaria Municipal de Saúde de Guarapuava-PR.

[2] Departamento de Enfermagem da Universidade Estadual do Centro-Oeste UNICENTRO. Guarapuava-PR, Brasil.

Correspondence
Carine Teles Sangaleti
E-mail: sangaleti@usp.br

Abstract

Introduction: Increased life expectancy is a social achievement, but it may increase the number of dependent elderly, both in the social and the family environments. The reduction in the cost of hospital and institutional care is one reason why disabled elderly remain in their own homes, and makes home support a necessity. Health assessment of the elderly encompasses analyses of clinical and psychosocial aspects, and nutritional status is of the most important clinical conditions because it is associated with morbidity and mortality in this population. *Objective*: Through different nutritional assessment tools, to make a nutritional status assessment of homebound elderly people with restricted mobility. The study was conducted with 18 elderly men and women enrolled in the Family Health Unit – PSF Dourados, in the city of Guarapuava, Paraná, Brazil, who received regular visits of community health workers. *Results*: Many of the elderly had some degree of malnutrition, and the assessment with anthropometric measurements was more accurate than the mini nutritional assessment. *Conclusion*: Regardless of the instrument used for analysis, there was high prevalence of malnutrition, and nutritional assessment of homebound elderly people is a powerful tool for evaluation and intervention in their nutritional status.

Keywords: Nutritional Assessment. Elderly. Home Care.

Introduction

The world population is aging and, according to the World Health Organization (WHO), Brazil will be the sixth country in the world with the highest number of elderly people by the year 2025, with an estimated 31.8 million. The segment of the population above 65 years of age will increase 8.9 times, and the one over 80, 15.6 times. If this demographic trend continues, Brazil will have one of the largest elderly populations in the world, in absolute numbers.[1-4]

Between 2008 and 2009, according to the National Household Sample Survey (PNAD, 2009), there was a 3.3% growth in the population aged 60 or over, compared with a 1% increase in the total population of the country.[5] By 2030, a national average of 78.33 years is expected as aresult of increase in longevity.[6] On the one hand, increased life expectancy is a social achievement, but on the other hand, it may increase the number of dependent elderly, both in the social and the family environments.[7,8]

In Brazil, this possibility poses a significant challenge, as the social support network - comprised of health and social services, health professional educational institutions, among many other components - does not have enough infrastructure to meet such demand. This unpreparedness is due to regional differences and Brazil's social inequality, as well as to the accelerated process of demographic transition, which occurred much more quickly and intensely than in the so-called Old World countries.[9,10]

For Silva, Galera & Moreno,[8] disabled elderly stay in their own homes, both in Brazil and in other countries, not only to reduce costs for hospital care but also because the current view of health care suggests that the elderly afflicted with a chronic condition and disabilities should receive health care in the environment where they have always lived. This raises the need to support the elderly at home.

The first organized Home Health Care (HHC) services were offered by the Boston Dispensary, USA, in the year 1796, currently known as *New England Medical Center*. In Brazil, the first HHC system was created at the *Hospital do Servidor Público Estadual de São Paulo* (Hospital of the Civil Servants of São Paulo State) in 1967, with the main purpose of reducing the occupancy rate of hospital beds.[11]

This study focuses on the perspective of health care, particularly nutrition, because although aging is a natural process, it involves several anatomical and functional changes that, while variable from one person to another, can impact the health and nutrition of the elderly. As a result, chronic health conditions and possible debilitating sequelae may emerge.[8,12]

Such changes makes it more difficult to provide health care to the elderly, who need specific and systematic care for their needs.[13] Skilled health professionals are required to give health care to frail elderly with geriatric syndromes and loss of functional capacity, by means of regular treatment and rehabilitation .[14] In addition, health assessment of the elderly includes analyses of clinical and psychosocial variables, and nutritional status is of the most important clinical conditions because of its association with morbidity and mortality in this population.[15]

Major conditions that affect the nutritional status of the elderly are decrease of functional capacity, reduced smell and taste sensitivity, use of prescription drugs, psychiatric problems (dementia, depression, alcoholism), social problems (isolation, poverty) and lifestyle (decreased physical activity, smoking, inadequate food intake).[16] Other conditions are obesity, particularly central obesity, regardless of sex and age, and their risk factors, such as heredity, systemic arterial hypertension, insulin resistance, diabetes mellitus, dyslipidemia, and increased incidence of noncommunicable diseases associated with obesity, e.g., atherosclerosis and its complications.[17]

Thus, the aim of this study was to check, by using different analytical tools, the nutritional status of homebound elderly people with limited access to the health unit because of restricted mobility, in order to contribute with updated information that may improve the quality of life of these individuals.

Material and methods

This is a descriptive cross-sectional study, which used the case study methodology with quantitative analysis. The study was approved by the Research Ethics Committee (COMEP) of the Universidade Estadual do Centro-Oeste (UNICENTRO, *Midwest State University*), under protocol number 322/2011. Each elderly person or their legal guardian signed an Informed Consent Form.

Study location

The study was conducted in households of elderly patients enrolled in the Family Health Unit - PSF Dourados, in Guarapuava, Paraná. The health unit is located in a neighborhood on the outskirts of the Guarapuava, whose main source of income is informal labor. The average income *per capita* of the local population is below the minimum wage: 622 reais at the time of the survey.

3,600 people move about the fully covered area of the health unit, and 202 of them are elderly people. The staff consists of a doctor, a nurse, a nursing technician, a nursing assistant and six community health workers (CHW), i.e., a total of ten members of staff. The Family Health Unit - PSF Dourados was chosen for this study for several reasons: it is located on the outskirts of the city, whose population has low family income; it covers a very wide range of geographical areas, and for this reason, access to it is sometimes difficult; there is no nutritionist on the staff; none of the parameters proposed are used for an assessment of the nutritional status of the target population.

Patients and methods

The study was conducted with both male and female elderly patients aged 60 years or over, enrolled in the Family Health Unit (USF), and whose access to the health unit was limited by restricted mobility or mental disability. For this reason, they were visited regularly by community health workers. The sample consisted of 18 elderly individuals referred to by CHWs as meeting the inclusion criteria.

Data collection was performed in the presence of a CHW through a structured questionnaire developed for this study, the Mini Nutritional Assessment (MNA) for the elderly, and also by means of anthropometric measurements.

The structured questionnaire administered for this study was designed for sociocultural characterization of the elderly, to investigate marital status, level of schooling, type of housing, access to basic sanitation, family income, receipt of social benefits and pathologies – either self-reported or reported by a relative or caregiver.

The MNA test was applied to all participants in this study to assess their nutritional status. It consists of simple measurements and quick questions that can be administered within ten minutes. The test includes the following assessments: anthropometric measurements (weight, height, and weight loss), overall assessment (six questions related to lifestyle, mobility and use of prew[scription drugs), dietary assessment (eight questions about number of meals, liquid and solid food intake and self-feeding) and subjective evaluation (self-perceived health and nutrition). It consists of questions with scores ranging between zero and three. Classification was made according to the score number, as follows: a total score greater than 23.5 equates with normal nutritional status; between 17 and 23.5, at risk of malnutrition; and less than 17, malnourished.[15,18,19]

The anthropometric assessment was performed to estimate the nutritional status of the elderly through measurements of weight (kg), height (m), skinfold thickness (mm), arm circumference (cm) and calf circumference (cm). The measured skinfolds were: triceps skinfold (TSF) and subscapular skinfold (SSF). The subjects stood on a G-Tech® portable digital scale with 100 g precision and 150kg capacity for weight measurement, while wearing light clothes. Height was estimated using the equation proposed by Chumlea[20] by measurement of knee height. The measurements of weight and height were used for calculation of the body mass index (BMI), using the cutoff points proposed by the Pan American Health Organization (PAHO)[1] for the elderly. For measuring arm circumference (AC), a tape measure was used at the midpoint between the acromion and the olecranon , and the results were compared with those recommended by Frisancho.[21] Calf circumference (CC) was measured with a tape measure at the widest point of the calf, while the subjects were sitting down, with values below 31 cm considered as cut-off points.[22]

According to the technique recommended by Heyward & Stolarczyk,[23] skinfold thickness was measured in triplicate on the right side of subjects, with a Cescorf® clinical adipometer. Triceps and subscapular skinfolds were measured by calculating the mean of three measurements. TSF and SSF were evaluated using as a reference the tables proposed by NHANES III[15] and by Frisancho,[21] respectively. The measures of AC and TSF were used for calculation of arm muscle circumference (AMC) with the formula AMC = ACcm - (π/10 x TSFmm), and the results were compared with the tables proposed by NHANES III.[15]

After collection of anthropometric data, the nutritional status of the elderly was assessed, based on their BMI, and according to the classification of Blackburn & Thomton[15]. AC, TSF and AMC were converted to percentage values, i.e., the measurements were divided by the value of the 50th percentile, in the respective table, and multiplied by 100, yielding the following results: severe malnutrition, <70%; moderate malnutrition, ≥ 70% and <80%; mild malnutrition, ≥ 80% and <90%; normal weight, ≥ 90% and <110%; overweight ≥ 110% and <120%; obesity ≥ 120%

The results were evaluated by simple descriptive statistics across frequencies, means and standard deviations, using Microsoft Excel® software. Nutritional status was classified according to the scores of nutritional assessment tools (as described above), and the results were discussed based on the review of the literature of this study as well as other similar research in the field.

Results

A total of 18 elderly patients were assessed in this study, and most of them (77.8%) were female. The age of the elderly ranged from 66 to 92 years; the mean was 77.3 years, with a standard deviation of 7.2 years. The average household income was 1,175.56 reais, with a standard deviation of 567.08 reais, and the number of residents in each household ranged from two to nine, with a mean of 4.28 and a standard deviation of 1.99 residents. Table 1 shows the socio-cultural characterization of the elderly subjects. Most of the subjects were widowed or single (50% and 27.8%, respectively), and had low level of schooling: 33.3% were illiterate and the rest of them did not finish primary school. It is noteworthy that almost all of the assessed subjects (88.9%) had no access to basic sanitation, and did not receive any social benefits from the federal government (77.8%). Systemic arterial hypertension was the most frequently mentioned pathology (77.8%), followed by bone diseases (22.2%) and psychiatric disorders (22.2%). The food eaten by the subjects was prepared, in most cases (66.7%) by family members and only in 33.3% of cases the elderly prepared their own food.

Table 1. Sociocultural characterization of the homebound elderly subjects, enrolled in the PSF- Dourados, Guarapuava (PR) in 2012.

Characteristic	n	%
Sex		
Female	14	77.8
Male	4	22.2
Marital Status		
Widow(er)	9	50.0
Married	4	22.2
Single	5	27.8
Religion		
Catholic	16	88.9
Evangelical	2	11.1

Characteristic	n	%
Schooling		
Incomplete elementary school	12	66.7
Illiterate	6	33.3
Type of Housing		
Mixed	11	61.1
Bricks and mortar	4	22.2
Wood	3	16.7
Basic Sanitation		
No	16	88.9
Yes	2	11.1
Receipt of social benefits		
None	14	77.8
Bolsa Família	3	16.6
Sickness Benefit	1	5.6
Aforementioned pathologies		
Systemic Arterial Hypertension	14	77.8
Diabetes Mellitus	2	11.1
Bone Diseases (osteoarthritis, osteoporosis, rheumatism)	4	22.2
Mental disorders (depression, schizophrenia, dementia)	4	22.2
Cholesterolemia	1	5.6
Pulmonary Emphysema	1	5.6
COPD	1	5.6
Preparation of meals		
Other people	12	66.7
Elderly person himself or herself	6	33.3

COPD: Chronic obstructive pulmonary disease

Table 2 shows the subjects' nutritional status, according to the Mini Nutritional Assessment (MAN) for the elderly. There was no variation in the mean scores between the groups. More than half of the female subjects (64.3%) had normal nutritional status, but it should be noted that 35.7% of women were at risk of malnutrition and malnourished, while most men (75%) were at risk of malnutrition, according to this assessment.

Table 2. Nutritional status by gender, according to the MNA. Guarapuava-PR, 2012.

Classification*	M of Score	SD of Score	Normal Nutritional Status	Risk of Malnutrition	Malnourished
Female (n=14)	23.0	4.08	9 (64.3%)	3 (21.4%)	2 (14.3%)
Male (n=4)	23.0	3.34	1 (25%)	3 (75%)	0

*Malnutrition Indication Score ≥ 23.5 points = Normal Nutritional Status; 17 to 23.5 points = At risk of Malnutrition; < 17 points; Malnourished

MNA - Mini Nutritional Assessment

Table 3 shows the nutritional status of the elderly subjects according to their BMI. The mean did not vary considerably between males and females; it was below the level recommended by PAHO (2005)[1], i.e., 23 kg/m². In addition, it is noteworthy that most females (64.3%) and males (75%) were underweight and only 14.3% of females were overweight.

Table 3. Nutritional status by sex, according to the BMI. Guarapuava-PR, 2012.

BMI Classification*	M	SD	Underweight	Normal	Overweight
Female (n=14)	22.65	3.26	9 (64.3%)	3 (21.4%)	2 (14.3%)
Male (n=4)	20.48	3.75	3 (75.0%)	1 (25.0%)	0

*According to the PAHO, 2005[1]. BMI <23 kg/m² = Underweight; BMI ≥ 23 kg/m² and < 28 kg/m² = Normal; BMI ≥ 28 kg/m² = Overweight

BMI: Body Mass Index

The anthropometric assessment, using various analysis tools, is shown in Table 4. The result of the assessment for AC showed that all of the males (100%) and 50% of the females had some degree of malnutrition. When the instrument used was TSF thickness, it was found that more than half of women (64.3%) had some degree of malnutrition and all men (100%) were malnourished. The assessment for AMC also showed that all male subjects had some degree of malnutrition, but 64.3% of females had normal nutritional status. The mean CC was almost the same in both groups, but half of the men's group showed some degree of malnutrition.

Table 4. Nutritional status of the homebound elderly subjects by sex, estimated by different anthropometric variables. Guarapuava-PR, 2012.

Anthropometric Variable	M	SD	Malnutrition*	Normal	Overweight/ Obesity
AC					
Female**	27.92	3.46	7 (50%)	5 (35.7%)	2 (14.3%)
Male***	25.85	1.12	4 (100%)	0	0
TSF					
Female**	17.07	7.41	9 (64.3%)	2 (14.3%)	3 (21.4%)
Male***	7.25	1.26	4 (100%)	0	0
AMC					
Female**	22.51	2.05	3 (21.4%)	9 (64.3%)	2 (14.3%)
Male***	23.58	1.28	4 (100%)	0	0
CC					
Female**	33.07	3.47	4 (28.6%)	10 (71.4%)	0
Male***	32.65	3.62	2 (50%)	2 (50%)	0

* Malnutrition (Severe/Moderate/Light); ** n = 14; *** n = 4; AC: arm circumference; TSF: triceps skin-fold thickness; AMC: arm muscle circumference; CC: calf circumference

Discussion

Population aging is a fact, and the elderly who are not in health care facilities, are at home. Comprehensive care comprises monitoring of nutritional status and its determinants; thus, assessment of the nutritional status of elderly people is an important tool for promoting their health. It should be noted, however, that there are few studies assessing the nutritional status of the elderly in primary care.

Distinguishing malnutrition per se from malnutrition as a result of a disease is a challenge in the prognosis of the elderly because there is still no universally accepted definition for malnutrition. Virtually all nutritional assessment parameters are affected by physiological and pathological changes.[15]

The present study showed that all the assessed subjects had a family income below two minimum wages and low level of schooling, which is not surprising because the family health unit is located in a poor area of the city. Among the aforementioned diseases, systemic arterial hypertension was the most frequent, as it affects about two-thirds of the elderly subjects. A study conducted in Mato Grosso do Sul found similar results for family income and schooling, and high prevalence of hypertension as a chronic disease.[16]

MNA for the elderly showed the same mean score value for both sexes, and although most of the female subjects had normal nutritional status, more than 35% of them were at nutritional risk or malnourished, while 75% of men were at risk nutrition. These findings corroborate other studies on the elderly, which reported a mean score of 19.5 points,[24] and more than half of the assessed subjects were at nutritional risk or malnourished.[19,25] In another study, Felix and Souza[26] evaluated the nutritional risk of institutionalized elderly and found similar results when they used MNA for the elderly as an evaluation tool; they noted a high prevalence (70%) of nutritional risk or malnutrition in men.

The use of BMI alone to assess the nutritional status of the elderly does not take into account the typical body alterations of this age group, such as adipose tissue accumulation and reduced lean body mass.[27] However, many studies use this analytical tool in combination with other instruments for assessing the nutritional status of the elderly and adults.[2,19,26,28]

In this work, the findings for BMI were more sensitive in detecting underweight women, unlike what was observed by MNA. BMI showed a higher prevalence of underweight women (64.3%) and men (75%), while 14.3% of women were overweight. Similar results were found in a study on elderly people in Santa Catarina, where men had the highest prevalence of underweight

(59.4%).[29] Andrade et al.,[25] assessing elderly subjects in a long term care facility, found that almost half (41.18%) had normal nutritional status and 35.29% were overweight, in disagreement with the results of this study. Lopes et al.[2] also found conflicting results when they observed higher prevalence of overweight elderly (38.7%). The occurrence of both underweight and overweight should be looked into because both cases may reflect risk of chronic diseases such as cardiovascular disease, systemic arterial hypertension and diabetes mellitus, among the most frequent ones.[26]

Assessment of nutritional status based on AC will reflect the reduction of body mass, as this measure is the sum of the areas consisting of fatty, muscle and bone tissues of the arm. TSF thickness is considered a good indicator of the amount of subcutaneous adipose tissue. The combination of these measures by means of formulas yields AMC, a measure related to protein malnutrition, indicative of muscle wasting. CC is considered a sensitive measure of muscle mass in the elderly, indicating changes in fat-free mass that occur with age and with reduced activity.[15]

The results found by using these anthropometric measurements showed good sensitivity, as many elderly subjects were shown to have some degree of malnutrition, especially in the group of males. However, it should be noted that the results of AMC and CC showed that the assessed patients did not have a high degree of malnutrition, because most women had normal nutritional status; therefore, there was preservation of muscles.

Gonçalves & Mattos,[30] analyzing homebound patients, found similar results. They observed that for AC and TSF, more than half of the elderly (54% and 53%, respectively) showed some degree of malnutrition, and 60% of the assessed subjects had normal nutritional status as far as AMC is concerned. The results of another study, conducted in Brazil's Federal District with institutionalized elderly, corroborate the findings in the present study for the mean total values of CC (30.9 ± 4.1) and AC; 54.6% of female subjects were malnourished.[26]

The degree of dependence of the elderly is increasing and they should be assessed in the environment where they live, given their difficulties and limitations, while taking into account the variations inherent to aging.

Final remarks

Considering the aging population profile, social conditions and the health support network of the study region, as well as the results of the nutritional status of the target population, this study demonstrated that the nutritional assessment of homebound elderly patients is a powerful tool for assessment and intervention in their nutritional status. It also showed that nutritional assessment through anthropometric measurements was more accurate than the assessment made by MNA.

In this context, nutritionists play a crucial role in primary health care, since the anthropometric assessment is a tool used by nutritionists in particular. In addition, in the context of the health team, this study also demonstrated that the measurement of BMI (when measured properly) can help assess nutritional risk, but this measurement is not properly considered or even made.

Regardless of the parameter used to assess nutritional status of the elderly, a high prevalence of malnutrition was detected in this study. This can perhaps be due to the fact that family members and/or caregivers lack knowledge, preparation and advice, or because there is a lack of connection between caregivers and the elderly. This result is worrisome, because not only relatives and caregivers but also elderly patients themselves must be advised on the quality of their food, so that the latter can have better quality of life.

The limitations in this study are the use of MNA in situations of cognitive deficits, and also the location of the elderly by referral of the CHWs, rather than by active search in all households.

References

1. Organização Mundial da Saúde. Envelhecimento ativo: uma política de saúde. Brasília: OPAS; 2005.
2. Lopes AF, Braga CP, Boliani E, Almeida FQA. Perfil antropométrico e alimentar dos participantes do Programa Universidade Aberta à Terceira Idade (UNATI) do Instituto de Biociências de Botucatu/SP. Rev. Ciênc. Ext. 2010; 6(1):1-13.
3. Costa MFBNA, Ciosak SI. Atenção integral na saúde do idoso no Programa Saúde da Família: visão dos profissionais de saúde. Rev. Esc. Enferm. 2010; 44:(2):437-44.
4. Cavalcanti CL, Gonçalves MCR, Cavalcanti AL, Costa SFG, Asciuti LSR. Programa de intervenção nutricional associado à atividade física: discurso de idosas obesas. Ciência & Saúde Coletiva 2011; 16(5):2383-90.
5. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios. Síntese de indicadores. Rio de Janeiro: IBGE; 2009.
6. Instituto Brasileiro de Geografia e Estatística. Indicadores Sociodemográficos. Prospectivos para o Brasil 1991-2030. Rio de Janeiro: IBGE; 2006.
7. Chaimowicz F. A saúde dos idosos brasileiros às vésperas do século XXI: problemas, projeções e alternativas. Rev. Saúde Pública 1997; 31(2):184-200.
8. Silva L, Galera SAF, Moreno V. Encontrando-se em casa: uma proposta domiciliar para famílias de idosos dependentes. Acta Paul. Enferm. 2007; 20(4):397-403.
9. Wong LLR, Carvalho JÁ. O rápido processo de envelhecimento populacional do Brasil: sérios desafios para as políticas públicas. Rev. Bras. Est. Popul. 2006; 23(1):5-26.

10. Nogueira SL, Geraldo JM, Machado J, Ribeiro RCL. Distribuição espacial e crescimento da população idosa nas capitais brasileiras de 1980 a 2006: um estudo ecológico. Rev. Bras. Estud. Popul. 2008; 25(1):195-98.

11. Amaral NN, Cunha MCB, Ladronici RHDD, Oliveira ASB, Gabbai AA. Assistência Domiciliar à Saúde (Home Health Care): sua História e sua Relevância para o Sistema de Saúde Atual. Rev. Neurociências 2001; 9(3):111-17.

12. Campos MTFS, Monteiro JBR, Ornelas APRC. Fatores que afetam o consumo alimentar e a nutrição do idoso. Rev. Nut. 2000; 13(3):157-65.

13. Rosa MRQP, Patrício ZM, Silvério MR, Rumel D. Motivos que levaram idosos a buscar a atenção em uma unidade básica de saúde. Rev. Latino Am. Enfermagem 2009; 17(5): 670-76.

14. Veras R. Envelhecimento populacional contemporâneo: demandas, desafios e inovações. Rev. Saúde Pública 2009; 43(3):548-54.

15. Cuppari L. Guia de nutrição: nutrição clínica no adulto. 2. ed. Barueri, SP: Manole; 2005.

16. Alvarenga MRM, Oliveira MAC, Faccenda O, Amendola F. Avaliação do risco nutricional em idosos atendidos por Equipes de Saúde da Família. Rev. Esc. Enferm. USP 2010; 44(4):1046-51.

17. Dantas AMC, Soares EA, Frank AA. A obesidade como precursora de aterosclerose encontrada em indivíduos da terceira idade. Revista Brasileira de Obesidade, Nutrição e Emagrecimento 2007; 1(3):60-71.

18. McGee M, Jensen GL. Mini Nutritional Assessment (MNA): research and practice in the elderly. Am. J. Clin. Nutr. 2000; 71(1):158.

19. Campanella LCA, Farias MB, Breitkopf T, Almeida CB, Mendes L, Fenilli M et al. Relação entre padrão alimentar e estado nutricional de idosos hospitalizados. Rev. Bras. Nutr. Clin. 2007; 22(2):100-6.

20. Chumlea, WC, Roche AF, Mukherjee D. Nutritional assessment of the elderly through anthropometry. Columbus, Ohio: Ross Laboratories; 1987. 45 p.

21. Frisancho AR. New norms of upper limb fat and muscle areas for assessment of nutritional status. Am. J. Clin. Nutr. 1981; 34(1):2540-5.

22. World Health Organization. Physical status: the use and interpretation of antropometry. Geneva: WHO; 1995. Who Thechnical Report Series, 854.

23. Heyward VH, Stolarczyk LM. Avaliação da composição corporal aplicada. São Paulo: Manole; 2005.

24. Paula HAA, Oliveira FCE, São José JFB, Gomide CI, Alfenas RCG. Avaliação do estado nutricional de pacientes geriátricos. Rev. Bras. Nutri. Clin. 2007; 22(4):280-5.

25. Andrade DDG, Fonseca SS, Stracieri APM. Mini Avaliação Nutricional, avaliação da capacidade cognitiva e funcional de idosos em uma instituição de longa permanência no Município de Ipatinga, MG. Nutri Gerais Rev. Dig. Nutr. [online]. 2009; 3(5):428-43.

26. Felix LN, Souza EMT. Avaliação nutricional de idosos em uma instituição por diferentes instrumentos. Rev. Nutr. 2009; 22(4):571-80.

27. Bicudo-Salomão A, Aguilar-Nascimento JE, Caporossi C. Risco nutricional em cirurgia avaliado pelo índice de massa corporal ajustado ou não para pacientes idosos. Arq. Gastroenterol. 2006; 43(3):219-23.

28. Barbosa AR, Souza JMP, Lebrão ML, Marucci MFN. Estado nutricional e desempenho motor de idosos de São Paulo. Rev. Assoc. Med. Bras. 2007; 53(1):75-9.

29. Ruen MS, Moreira EAM, Calvo MCM, Lobo AS. Avaliação do estado nutricional de idosos intitucionalizados. Rev. Nutr. 2008; 21(3):303-10.

30. Gonçalves SP, Matos KM. Perfil nutricional de pacientes restritos ao domicílio na região oeste de Santa Maria, RS. Disc. Scientia 2008; 9(1):135-47.

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