

Risk of malnutrition in elderly during hospitalization: evaluating food intake and anthropometry

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Abstract

Hospitalized elderly people are at higher nutritional risk and have worse prognosis. The nutritional evaluation of this group is complex, anthropometry and food intake being priority items. This study aimed to evaluate anthropometry and food intake of hospitalized elderly people. The study was conducted on 51 individuals of both sexes with a mean age of 76 ± 9 years. Anthropometric evaluation was performed by indirect methods (estimated weight and height) and direct methods (calf circumference [CC] and arm circumference [AC]). Regarding anthropometry, by using the body mass index (BMI) it was possible to identify that 41% of the elderly subjects had some degree of malnutrition, whereas, according to the percentage of AC adequacy, the rate of malnutrition was found to be 63%. The CC values were suggestive of nutritional risk in 59% of the elderly subjects. Sixty one percent of the participants showed insufficient food intake before hospitalization. After hospitalization only one of 30 elderly on hospital oral diet prescription met the predefined energy requirements. We conclude that the rate of malnutrition among hospitalized elderly subjects is high, a fact that may impair their clinical condition. Thus, anthropometric measurements are fundamental and AC and CC were important for the detection of nutritional risk in bed-ridden patients. The low food intake during hospitalization contributes to a worsening of clinical signs and symptoms and of quality of life and is another priority item for patient follow-up during hospitalization.

Key words: nutritional status, sub-nutrition, anthropometry, food intake, elderly.

Introduction

According to the World Health Organization (WHO, 2008), an elderly is a person aged over 65 years in developed countries and over 60 years in developing countries. The elderly are the fastest growing population in the world and represent a challenge for the public health services (GUEDES; GAMA; TUSSI, 2008). It is expected that by 2025 the elderly population in Brazil will be 32 million (TAVARES; ANJOS, 1999). In 2008, Brazil had 21 million people aged 60 or more, exceeding the elderly population of various European countries (IBGE, 2009). In Brazil, such growth has not been positive because it is causing a great impact on the country since it is not prepared to deal with the problems that the older population brings, such as appropriate public healthcare (GUEDES; GAMA; TUSSI, 2008).

The age of the older people is characterized by physiological, social, biochemical, psychological, and economic alterations, which are responsible for nutritional disorders. Malnutrition in hospitalized elderly is frequent, varying from 15 to 60%, and can be aggravated by the presence of diseases such as chronic degenerative disorders (GUEDES; GAMA; TUSSI, 2008). Among the elderly, involuntary weight loss, reduction or loss of appetite, and cachexia are usual (ACUÑA; CRUZ, 2004). The tendency is that the sense organs (vision, hearing, smell, taste and touch) are affected and due to the fact that they are directly and indirectly associated with eating habits there can be a loss of interest in it (GUEDES; GAMA;

TUSSI, 2008). Environmental factors can also have a strong influence, besides the presence of chronic diseases, leading the elderly people to lose interest in eating all meals properly, besides the fact that they do not want to bother or do not feel pleasure in eating. These can cause a longer stay in the hospital as well as morbidity and mortality to this population (GUEDES; GAMA; TUSSI, 2008).

Therefore, an appropriate nutritional status is extremely important to the life quality of this group as well as to reduce morbimortality. The use of methods to assess the nutritional status provides early diagnosis, identifying possible nutritional risks (GUEDES; GAMA; TUSSI, 2008). This work aims to evaluate anthropometry and food intake by hospitalized elderly patients.

Material and methods

Cross-sectional study carried out at the Foundation of Santa Casa de Misericórdia in Franca, SP, for two months (January and February, 2011). The study was approved by the Committee of Ethics in Research under register no. 030/2011–CEP/FSCMF. All patients or their legal representatives signed the term of free and informed consent.

During two months 51 older persons of both sexes, regardless of skin color, class or social group, were evaluated. The criteria for inclusion as participants in the survey were: age over 60 years and having been admitted to the 2nd floor (Neurology and Nephrology)

or 3rd floor (Pulmonology and Infectious Diseases) of the Foundation of Santa Casa de Misericórdia in Franca. The only exclusion factor was the patient's refusal to participate in the survey. All subjects were assessed within 48 hours after admission.

The general characteristics and clinical conditions were recorded, such as the presence of comorbidities, preexisting diseases, reason of hospitalization and presence of edema. For the anthropometric evaluation, knee height (KH) and arm circumference (AC) were measured according to the procedures proposed by Duarte and Castellani (2007). These values were included in Santa Casa's standardized formulae, which use Chumlea (1988) to estimate height, and Lee and Nieman (1995) to estimate body weight. The height for men over 60 years is calculated by $[64.19 - (0.04 \times \text{age}) + (2.02 \times \text{KH})]$, and for women over 60 years is $[84.88 - (0.24 \times \text{idade}) + (1.83 \times \text{AJ})]$. The weight for Caucasian men was calculated by $(\text{KH} \times 1.10) + (\text{AC} \times 3.07) - 75.81$, and for Caucasian women $(\text{KH} \times 1.09) + (\text{AC} \times 2.68) - 65.51$.

For classification, we used three indicators: first, the standard body mass index for older people, obtained by dividing weight by height squared, being classified as eutrophic when they had BMI between 22 and 27 kg/m², undernourished when BMI was lower than 22 kg/m² and obese when BMI was over 27 kg/m² (LIPSCHITZ, 1994). The second indicator was the percentage of adequacy of arm circumference (AC) compared to the reference values of Frisancho (1990), and when they

were found to be below 90% the patient was considered undernourished (BLACKBURN; THORNTON, 1979). And finally, the value of the calf circumference (CC), measured at the most protruding portion of the left leg with inelastic tape, and was considered at nutritional risk if it was lower than 31 (SBGG, 2011). In addition to these data, we also collected information about weight loss in the last three months.

The dietary intake assessment method was the historical diet described by the elderly or caregivers who reported verbally the qualitative and quantitative eating habits before hospitalization. To quantify the nutrients, we used the software Dietpro[®]. With respect to food intake during hospitalization, we requested records of the meals eaten in one day (24 hours) of hospitalization, to be evaluated later regarding their nutritional composition. After obtaining the elderly energy intake, this figure was compared with the energy requirements, as determined by the Harris-Benedict equation, multiplied by 1.3, using this value as the activity and/or injury factor (LEISTRA et al., 2011). The energy intake was considered sufficient when it was higher or equal to 100%, and insufficient when lower than 100% of the needs (LEISTRA et al., 2011).

The dietary prescriptions were obtained, and the patient could be either on oral diet (general, pureed, soft or liquid) or enteral diet. We considered as change of consistency the consumption of soft, pureed or liquid diet for more seven days.

For statistical analysis, we used the version 15 of the software SPSS (*Statistical Package for the Social Sciences*). All continuous variables were presented in means and standard deviation, and the categorical variables were presented in frequencies and percentages.

Results

Fifty-one elderly inpatients were invited to participate in the survey; all of them agreed to participate and none was excluded. All were 60 years old, with mean age of 76 ± 9 years.

The prevailing comorbidities were systemic hypertension (63%), diabetes mellitus (DM) (41%) and dyslipidemia (12%). Many subjects reported illness prior to the current hospitalization, and 31% of them had had at least one stroke event, and 16% reported previous cancer diagnosis. The main reasons for the hospitalization were related to the

respiratory system in 47% of the elderly, followed by DM (18%), urinary tract infections (18%) and cerebrovascular accident (CVA) (14%); less prevailing were hospitalizations due to vascular diseases, cancer, and Parkinson's disease. The presence of edema was observed in 31 (61%) of the subjects.

Concerning the anthropometric evaluation, there was recent weight loss (less than three months) in 30 (59%) of the individuals. Table 1 presents the data relating to mean BMI, AC, and CC. To calculate BMI, weight and height of all elderly were estimated, because all of them were confined to bed. The nutritional status, according to BMI, was described in Figure 1, in which 21 of the individuals (41%) presented malnutrition. With respect to the adequacy of the nutritional status, according to AC percentile, the diagnosis of malnutrition occurred for 63% of the elderly ($n=32$). And according to the CC values, 30 individuals (59%) had values below 31 cm.

Table 1. Anthropometric measurements of elderly individuals assessed at Santa Casa de Franca. Franca, SP, 2011.

Measures	Mean values and standard deviations
Arm circumference (cm)	25.97 ± 4.73
Calf circumference (cm)	29.68 ± 4.45
Estimated weight(kg)	56.96 ± 13.58
Estimated stature (m)	1.57 ± 0.10
Body mass index (kg/m^2)	23.29 ± 5.59

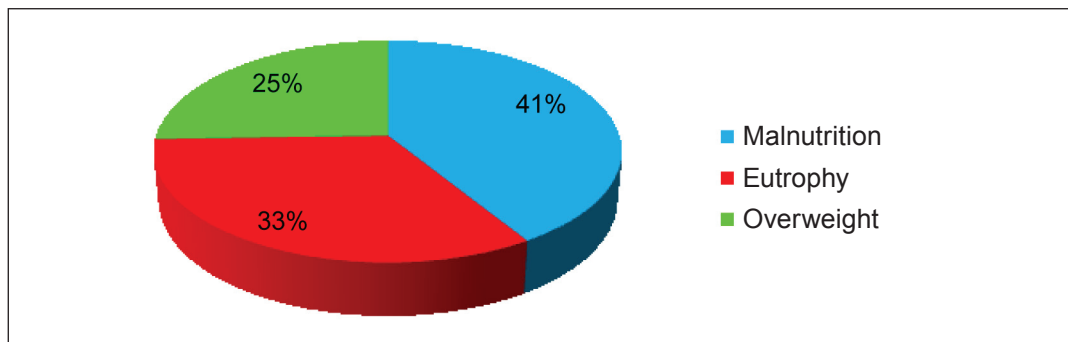


Figure 1. Classification of the nutritional status according to the body mass index of elderly assessed at Santa Casa de Franca, 2011.

Regarding the evaluation of the 51 subjects' dietary intake, 14 (27%) had already changed the diet consistency prior to hospitalization, and the same number of patients had already been submitted once to enteral nutrition or was using it for some time. Table 2 shows the results of the nutritional calculation of the usual food intake reported by the elderly before admission to the hospital. By comparing the patients' usual diet with the energy requirements, 31 of them (61%) had eaten insufficient amounts (Figure 2). During hospitalization, this has

worsened, and Figure 3 shows that of all individuals on oral diet prescription ($n=30$), only one met the energy requirement proposed by the Harris-Benedict's formulae. Table 3 shows the mean values of the energy intake in one day of hospitalization. Concerning those exclusively on enteral diet ($n=18$), 50% were starting this kind of nutrition with a lower amount, and, therefore, insufficient at that time if we consider the proposed energy needs. There were three individuals fasting during the hospitalization.

Table 2. Dietary background of elderly individuals assessed at Santa Casa de Franca, Franca, SP, 2011.

Daily typical diet	Mean values and standard deviations
Energy (kcal/day)	1304.29 \pm 437.11
Protein (% TCV)	19.63 \pm 5.80
Carbohydrates (% TCV)	48.26 \pm 9.68
Lipids (% TCV)	32.08 \pm 7.22

Abbreviations: kcal = kilocalories; TCV = total calorie value.

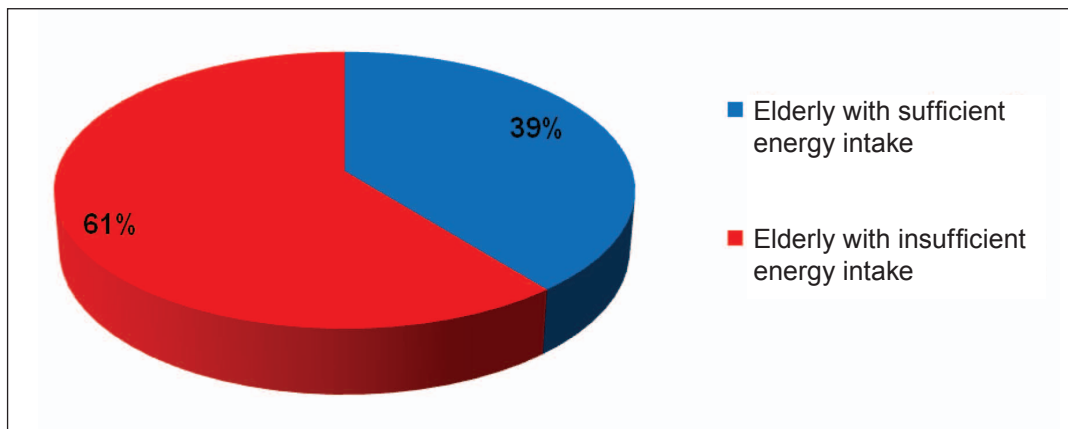


Figure 2. Comparative results between required energy intake and reported energy intake before elders' admission to the hospital. Franca, SP, 2011.

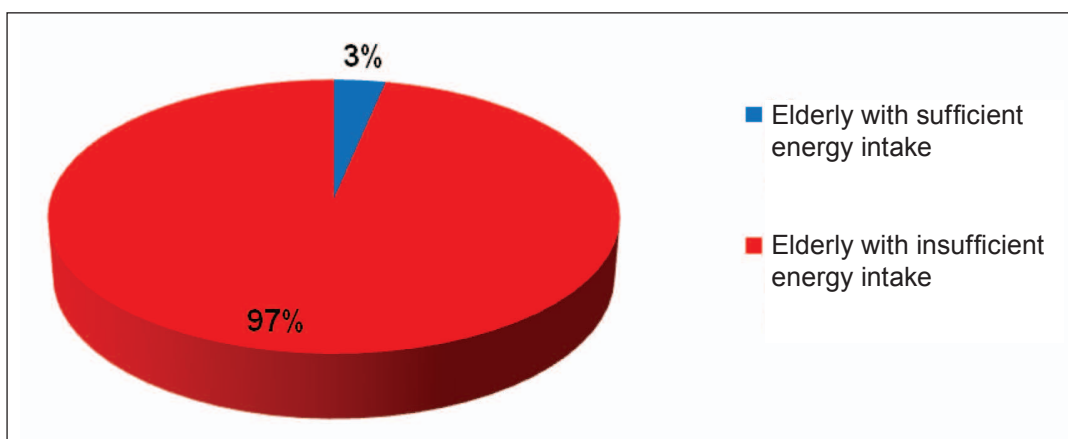


Figure 3. Comparative results of one-day dietary intake by elderly individuals and their energy needs, as assessed at Santa Casa de Franca, 2011.

Table 3. Record of one-day (24h) dietary intake of elderly hospitalized at Santa Casa de Franca. Franca, SP, 2011.

One-day dietary intake	Mean values and standard deviations
Energy(kcal)	933.25 ± 506.50
Proteins (% TCV)	31.71 ± 26.57
Carbohydrates (% TCV)	96.48 ± 51.79
Lipids (% VTCV)	41.92 ± 17.04

Abbreviations: Kcal = kilocalories; TCV = total calorie value

Discussion

This study presents as major findings the early diagnosis done by indirect measurements to assess nutritional risk and insufficient energy intake by hospitalized elderly individuals.

The high prevalence of malnutrition found in this study has already been extensively described in the literature. A study conducted on 52 elderly of both sexes admitted at the Hospital Associação Beneficente de Saúde São Sebastião (ABSSS) in the city of Coronel Fabriciano, MG, obtained similar results, in which 38% of the elderly conditions were classified as underweight; 27% eutrophy; and 34% overweight (MORAIS; CAMPOS; LESSA, 2010). Paula et al. (2007) assessed the nutritional status of 41 geriatric patients in a hospital located in the city of Viçosa, State of Minas Gerais, and according to the BMI, 37% were considered undernourished and 34% at nutritional risk.

Anthropometry is a noninvasive, easy to perform, low cost, and safe method, with accurate predictive value to identify populations at nutritional risk (GARCIA; ROMANI; LIRA, 2007). The literature brings BMI as a parameter to diagnose malnutrition, but this study shows that other parameters may be interesting and more sensitive to determine nutritional risk in this specific group.

BMI is determined by the weight and height measures, which in this study was not possible because all individuals were bed-ridden, and it had to be calculated indirectly by means of formulae. This could partly explain why this parameter was not the most suitable to detect malnutrition. In this context, circumferences measurements can be useful in the clinical practice because they are direct measures of easy longitudinal follow-up and more sensitive to determination of malnutrition in bed-ridden individuals.

In aged people, AC is a good indicator of malnutrition, and represents the sum of the areas constituted by the bone tissues, muscles and arm adiposity (PONT, 2009). A work performed in 20 philanthropic, governmental and private healthcare institutions in the cities of Recife, Cabo de Santo Agostinho, Vitória de Santo Antão, Olinda and Caruaru assessed the anthropometry by BMI using the arm span to estimate height and by AC in 308 elderly individuals of both sexes and aged 60 years or over (GARCIA; ROMANI; LIRA, 2007). This study corroborates AC as a high sensitive and specific parameter similar to BMI, and can be useful in the diagnosis of elderly malnutrition (GARCIA; ROMANI; LIRA, 2007).

According to WHO (1995), CC is also another key measure and considered sensitive to determine muscle mass of elderly individuals, and it is accurate in this age range. A research carried out to assess the nutritional status of independent elderly from a long-stay institution in the municipality of Erechim, RS, measured CC of 20 elderly individuals and found that 50% of them presented muscular mass loss (SPEROTTO; SPINELLI, 2010), similar to the results of our study.

Another important result of this study refers to insufficient food intake, either prior or during hospitalization. In a study conducted on elderly hospitalized in Blumenau, SC, it was found that most of the elderly (74%) ate less than 75% of the meal offered, and the mean

caloric and protein intake were below the recommended levels (CAMPANELLA, 2007). The study observed that among the main causes of low food intake were poor dental conditions, interference of medications, appetite loss, physical impairments, because many of them had difficulty to take the food to the mouth or handle the dish (CAMPANELLA, 2007).

Thirty-five percent of the elderly were exclusively on enteral diet. A study conducted in the Herzog Hospital in Jerusalem, Israel, evaluated 88 aged patients, and twice as many elderly subjects were on enteral tube feeding – 70% (JAUL; SINGER; CALDERON-MARGALIT, 2006). The reason for solely enteral nutrition in our study was similar to that found by Martins (2011), whose study showed that enteral feeding was present in 86% of the cases due to dysphagia, and 14% due to the patient's refusal to eat (MARTINS, 2011).

Our study has limitations. It was not possible to weigh and measure the participants' height, and therefore BMI was estimated. If it had actually been measured, the malnutrition percentage by BMI might have been different. Similarly, the presence of edema in some individuals might have camouflaged a worse malnutrition condition.

The conclusion is that the rate of malnutrition in elderly inpatients is high and is harmful to their clinical conditions. Indirect measurements of the elders' arm and calf circumference can be useful to

assist on early diagnosis of nutritional risks. And low food intake during hospitalization also contributes to the malnutrition status, worsening the conditions and the quality of life, and should then be a priority issue during elderly hospitalization.

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