

Consumption of Antioxidants Vitamins and Macronutrients by Institutionalized Elderly

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Abstract

Introduction: The accelerated growth of the elderly population makes aging a widely studied topic. With the greater number of elderly, there is the emergence of several chronic conditions and nutritional deficiencies.

Aim: evaluate the dietary intake of antioxidant vitamins and macronutrients of institutionalized elderly in the city of Santos Dumont/MG.

Methods: Intake of total calories, macronutrients and antioxidant vitamins (A, C and E) were evaluated by food registry of three days. The nutritional status of the population was evaluated through anthropometric measures such as weight, height and Body Mass Index. Statistical analysis was performed in the software Statistical Package for the Social Sciences, version 17.0.

Results: The sample consisted of 34 elderlies, 50% men and 50% women. Consumption of macronutrients and antioxidant vitamins A and C were adequate, even though the population showed high consumption of simple carbohydrates and ultra-processed products. The consumption of vitamin E was insufficient, with a mean of 5.51 mg/day, not reaching the recommendation of 15mg/day. There was no correlation between the prevalence of chronic diseases and the time of institution, number of sons, consumption of macronutrients and antioxidant vitamins.

Conclusion: the elderly evaluated had satisfactory consumption of antioxidant vitamins, except for vitamin E, which may have been influenced by the monotonous diet that is offered and rich in industrialized foods. This factor may to compromise the action of the vitamins analyzed in the antioxidant defense.

Keywords: *Old Age Assistance; Macronutrient Deficiency; Risk Groups Nutrition; Deficiency of Antioxidant Vitamins; Oxidative Stress*

Abbreviations

FICT: Free and Informed Consent Term; BMI: Body Mass Index; DRI's: Dietary Recommended Intake; SPSS: Statistical Package for the Social Sciences; LTIE: Long-Term Institution for the Elderly; ROS: Reactive Oxygen Species

Introduction

Population aging is a worldwide phenomenon that has been gaining an increasingly rapid rhythm in the Brazilian population, mainly due to the rapidity with which fertility rates have declined [1]. It is a process that generates diverse morphological, functional, biochemical and psychological alterations that culminate in reduction of the capacity of adaptation of the individual to the environment being able to be perceivable or not [2].

However, in spite of living longer, the elderly have presented greater chronic conditions, since the number of diseases in the age range over 65 years has been increasing perceptibly, and chronic-degenerative diseases (chronic non-transmissible diseases) are the most

frequent [3]. Among the theories proposed to explain these processes of occurrence of chronic-degenerative diseases, includes oxidative stress, which consists of an imbalance caused when the antioxidant defenses are quantitative and/or qualitatively impossible to neutralize the production and effects of molecules oxidants. Oxidative stress has a decisive influence on human aging, causing damage to biomolecules such as lipids, proteins and DNA, which accumulate over the years, producing cellular and tissue injuries and, thus, leading to the aging of the organism [4,5].

The body human has natural mechanisms of protection in order to control the peroxidation, and can inactivate, eliminate or prevent the transformation of the free radicals in products more toxic to the cells. The natural or non-enzymatic antioxidants, which can be obtained from the diet, are the vitamins retinol (vitamin A), ascorbic acid (vitamin C) and tocopherol (vitamin E), as well as minerals such as copper, selenium, zinc and manganese. There are also phytotherapics such as rosemary, artichoke, camomile, passion fruit, valerian, among others with antioxidant action, which can be prescribed with this function. In this way for a complete antioxidant action, it is interesting that the body has a good contribution of the antioxidant vitamins and minerals of the diet [6].

It's important to emphasize that oxidative stress in aging varies from individual to individual, as it depends, in addition to the genotypic factors, on the dietary balance of antioxidants (vitamins, minerals, phenolic compounds and others) and pro-oxidants (excess fat, ethanol And carbohydrates), caloric intake, physical activity level (physical inactivity x physically active), exposure to food, environmental toxins and the level of stress to which the individual is subjected throughout life. Less caloric diets, rich in antioxidants and poor in pro-oxidants, when associated with a healthy lifestyle, weight control and regular practice of physical activities, reduce Reactive Oxygen Species (ROS), improve mitochondrial function, increase longevity and improve the health and quality of life of the elderly [7].

In the diet of the elderly commonly the consumption of macronutrients is inadequate, as the consumption of antioxidants is low, both of vitamins, as of minerals. The literature have reported this evidence in elderly residents in geriatric institutions [8]. The relationship between the low consumption of vitamins and antioxidant minerals was observed with the increase of oxidative stress, with harmful consequences for the organism, such as cancer, Alzheimer's disease and cardiovascular diseases. Particular attention about these nutrients should be a part of the nutritional counseling to the elderly population.

Considering the importance of antioxidant vitamins in the prevention of oxidative stress, studies that evaluate their consumption in the diet of elderly individuals are of paramount importance, aiming to minimize the impacts of a pro-oxidant diet on the health of this population. Considering the importance of the presence of macronutrients and antioxidant compounds in the diet of the elderly, the objective of this study was to verify the daily consumption of antioxidant vitamins in the diet of institutionalized elderly, and the impact of this consumption on their nutritional status.

Materials and Methods

Delineation, Sample and Study Location

The present study consists of a cross-sectional study carried out with a non-probabilistic sample, in which 34 elderly people of both sexes, institutionalized at the Lar São Miguel restroom of the city of Santos Dumont - MG, Brazil, who agreed to voluntarily participate in the study, were evaluated. The participants signed the Free and Informed Consent Term (FICT) and were clarified about the purpose of the research. The inclusion criteria were adopted: to be institutionalized at the time of the study and to be older than 60 years, and were excluded from the study, only the elderly who refused to participate in the study. The present study was approved by the Ethics Committee in Research with Human of the Federal University of Juiz de Fora (CAAE: 58661316.2.0000.5147).

Procedures Performed

Four visits were performed on random days. During the first visit, an explanatory lecture on the objectives and methods of this project was presented, as well as a brief conversation about the importance of adequate nutrition in health. On the second visit, which occurred

one week after the first contact, the anthropometric evaluation of all the elderly participants of the project and the completion of the questionnaires containing the data of the participants, information on chronic non-transmissible diseases and time of institution were carried out. On that same day the menu of all the meals offered for the elderly was collected at the day, considering breakfast, snack morning, lunch, afternoon snack and dinner. In the same week of the second visit, the third and fourth visits were made, considering a typical day (mid-week) and an atypical day (weekend), for recollection of the menu of the day, of the same meals mentioned above.

The anthropometric evaluation was performed through Body Mass Index (BMI). The results of the BMI calculation were classified according to the classification points proposed by LIPSCHITZ (1994) [9]. For the anthropometry, digital balance Gonew Deluxe 2, with capacity for 180 kg was used, and inelastic tape measure was used to determine the height. For both weight and height determination, subjects remained barefoot, with relaxed arms and head in the horizontal plane. For the bedridden individuals or wheelchair users, a stadiometer was used to estimate their height, using the following formulas: Men = $64.19 - (0.04 \times A) + (2.02 \times KH)$ and Women = $84.88 - (0.24 \times A) + (1.83 \times KH)$, where A is the age in years and KH is the knee height in centimeters [10].

Evaluation of the menu offered

The data were collected using the three-day food registration method, aiming at qualitatively and quantitatively analyze, through an average estimate, the foods served to all institutionalized, since all receive the same menu. Three different days were observed, being two typical days and one atypical, considering the menu of a whole day (breakfast, morning snack, lunch, afternoon snack and dinner). From the information obtained, we evaluated the average dietary intake of energy, carbohydrates, proteins, lipids, vitamins A, C and E. Macronutrients and vitamin A and C were analyzed based on the Philippi 2002 food composition table [11]. Vitamin E was analyzed based on DietSmart® software. Intake of these nutrients was compared with the daily intake values recommended by the Institute of Medicine in Dietary Recommended Intake (DRI'S) [12].

Statistical Analysis

Statistical analysis were performed in Statistical Package for the Social Sciences software (SPSS), version 17.0. The Kolmogorov Smirnov test was used to analyze the data distribution. The chi-square test was used for the categorical variables, and the T-student test was used to compare the means between the parametric variables. The level of significance was $p < 0.05$.

Results and Discussion

The study population consisted of 34 elderly, 50% (n = 17) female and 50% (n = 17) males. The mean age of the elderly was 76.79 ± 1.84 years, with a minimum of 60 years and a maximum of 94 years. The mean age of women was 80.24 ± 10.44 years and of men was 73.06 ± 8.74 years. Regarding the length of stay of the elderly in the institution, the average found was 8.30 ± 2.20 years, with a minimum of 6 months and a maximum of 60 years. For the anthropometric variables, weight and height, the means and standard deviations were $56.85 \text{ kg} \pm 1.38 \text{ kg}$ and $1.54\text{m} \pm 0.20\text{m}$, respectively.

Regarding the dietary intake of macronutrients and antioxidants, the consumption of macronutrients and the antioxidant vitamins A and C were observed, being these values according to the DRI'S. However, the mean daily values for Vitamin E intake were inadequate, not reaching the daily minimum recommendations for this age group (Table 1). Although the contribution of most of the nutrients was adequate in the diet offered in the institution, in the analysis of the food consumption of the population, it was observed that the glycemic index of the diet is high and there is food monotony, with prevalence of simple carbohydrates consumption in most of the meals evaluated, as well as little diversity of foods offered to the elderly on alternate days and meals.

In nutritional status analysis, 50% (n = 17) of the total population was found eutrophic, with the majority female: 52.94% of the total number of women (n = 9). With a low weight, there were 29.42% (n = 10) of the total population studied, being composed mainly by men, 41.17% (n = 7). With overweight, there were 20.59% (n = 7) of the total population, with a higher prevalence among women, corresponding to 20.58% of the female population and 11.76% of the male population. The mean weight for men and women does not vary much, the average for men is $58.54 \pm 6.76\text{kg}$ and for women = $55.58 \pm 8.80\text{kg}$, and there are no statistically significant differences.

Nutrients	Mean Population Ingestion	Reference Values/DRIs for men and women
Energy	2070.51 kcal	2027.25 Kcal
Carbohydrates	264.24g	130g
Proteins	80.04g	51g
Lipids	69.37g	46g - 80.51g
Vitamin A	1469.13 ug	800 ug
Vitamin C	105.4 mg	82.5g
Vitamin E	5.51 mg	15 mg

Table 1: Average consumption of antioxidant vitamins and macronutrients in institutionalized elderly at Lar São Miguel (in results).

The studied population presented ingestion of the antioxidant vitamins A and C within the recommended adequacy standards and inadequacy of vitamin E consumption. This result is different from that found by Panziera F, *et al.* (2011) and M. Fernandes, *et al.* (2007) that reported a low ingestion and inadequacy of the antioxidant vitamins as a whole [13,14]. The adequacy presented in this study can be attributed to the fact that the elderly consume two servings of fruits and vegetables daily. This fact may help reduce the prevalence of chronic non-transmissible disease, associated with adequate intake of macronutrients and vitamins A and C. However, the institution does not present nutritional support, the menu is repetitive, there is no variety of snack options on weekdays. Daily is offered coffee with milk and bread with butter, in addition to the high consumption of industrialized products, such as teas, toast, biscuits and juices. Thus, this consumption can reduce the antioxidant capacity of the organism, even the elderly consuming quantities considered satisfactory of antioxidants daily, according to the DRIs.

It's known that when the diet is poor in complex carbohydrates, saturated fats and industrialized foods, the supplement of necessary antioxidants becomes higher, aiming at organic compensatory effect. The ideal, however, is to consume the adequate supply of antioxidants and at the same time do not consume the deleterious foods, which stimulate the increased of release of ROS. This eating behavior can affect the adequacy of nutrients in the body of the elderly and put them at risk of poor nutrition and low antioxidant defense. Since the elderly are considered the population group most susceptible to nutritional problems, there is an association between food consumption and the appearance of chronic diseases related to the advancement of age [15].

The majority of the population (50%) is eutrophic, with a mean BMI of approximately 24.2 kg/m². This result was also found in the study by Navarro and Bennemann (2006), who evaluated the nutritional status of elderly residents in an asylum institution in the city of Marialva, State of Paraná, Brazil. The majority (58.3%) of the elderly had adequate weight, with higher prevalence in males and cases of undernutrition found only in females [16]. This result differs from that was found in the present study, where the majority of the eutrophic population is female and the majority of the population with low weight is male. Bennemann (2002), when evaluating elderly individuals with age between 65 and 90 years, found a greater proportion (75%) of elderly with BMI values within the adequacy limits, with a similar distribution between the sexes (75.5%) in females and 74.0% in males [17]. In old age, the decrease in BMI results from both the reduction of muscle mass and redistribution of adipose tissue and the reduction of stature. Inadequate redistribution of adipose tissue may impair the health of the elderly, as it favors the development of chronic diseases and metabolic alterations such as cardiovascular diseases, diabetes, cancers and neurodegenerative diseases.

Conclusion

Analyzing the nutritional and food profile of the institutionalized elderly at the Lar São Miguel, it's possible to conclude that the nutritional risk is not considerable. The most of the elderly are eutrophic and the most of the population presents one or more chronic non-transmissible diseases, with systemic arterial hypertension being the most frequent.

In relation to antioxidant vitamins, its consumption is satisfactory, except for vitamin E, which does not reach the recommendations. The diet offered is rich in refined carbohydrates and industrialized food products. These findings reveal the importance of the presence of a professional nutritionist in this institution, in order to stimulate the food consumption of complex carbohydrates, fibers, vegetables and fruits, in order to occur better assistance of those individuals with a nutritional status compromised.

Conflict of Interest

No declared.

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