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Factors associated with metabolic complications and feeding in elderly from the rural area

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Abstract *This study aimed to evaluate factors associated with metabolic complications and feeding in the elderly from rural area, in Uberaba, Minas Gerais, guided by the "10 Steps to Healthy Eating for Older People" of the Ministry of Health. Household services with 833 people, aged 60 or older, with no cognitive decline were conducted. Data were collected using Food Frequency Questionnaire, anthropometric measurements, being submitted to descriptive analysis, prevalence rate and Chi-Square Test ($p < 0.05$). Metabolic complications were associated with female gender ($p = 0.001$) and overweight ($p = 0.006$). Women were suited to five steps: number of meals, adequate intake of milk and lean meat, reduced consumption of soft drinks, sweets and salt, physical activity practice, not smoking and not drinking alcohol; while men followed three steps: adequate intake of cereals, rice and beans and water. Seniors with less than 80 years complied most with water consumption. Three steps were associated with normal weight, two with no-risk rating for metabolic complications and none with schooling. It is concluded that the diet of the rural elderly is not appropriate to healthy eating recommendations of the Ministry of Health.*

Key words *Aged, Nutrition assessment, Food habits, Rural population*

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Introduction

Feeding in the third age requires special attention, since physiological and psychological changes in the organism of the elderly can modify the needs and the nutritional status. Therefore, feeding must whet the appetite and pleasure for eating, being tasty, colorful, smelling good, with ideal texture and temperature, besides having all food groups[1].

This way, proper and healthy food must provide the individuals from all age group with feeding practices suitable for their culture, income and biological needs, as well as being sustainable to the environment[2].

Brazilian diet has many influences characterized by the combination of a "traditional" feeding (rice and beans) with ultra-processed foods (rich in calories, fat, sodium and sugar, and low levels of nutrients). However, it is believed that with aging the consumption of these ultra-processed foods tends to decrease, while fruits and vegetables intake increases. In addition, residents of the rural zone have a better quality of diet when compared to feeding from residents of urban area[2].

Since the relation of feeding with health and well-being is comprehensive, Brazilian Ministry of Health developed the "10 Steps to Healthy Eating for Older People"[3]. This action is part of the politics with the aim to guarantee integrated health care to the aged population, with the purpose of promoting an active and healthy aging, maintaining and rehabilitating functional capacity, supporting development of informal care, also warranting food and nutrition security of the Brazilian population[4].

In this scenario, rapid demographic transition is highlighted, which has brought a continuous increase on life expectancy and elderly proportion in the Brazilian population, followed by the nutritional transition, with hunger and malnutrition decrease and a staggering increase of overweight, including the old people. If actions of control and prevention of the weight gain are not implemented, it is estimated that in 20 years' time at about 70% of the Brazilian people from all age groups and income will be overweight, increasing the risk factors associated[2,5].

Therefore, when sociodemographic, economic and anthropometric indicators are associated with feeding, it is assumed that increased longevity can determine important repercussion in the social and economic fields of the society. Thus, health professionals should offer integrated and humanized nutritional assistance, taking into account the specific needs for each elderly, respecting diversity and food culture.

This assistance must be grounded on the promotion of healthy diet, search for self-esteem, self-knowledge, pleasure and incentive to physical activity practice. In doing so, the participation of the nutritionist in Health Care field is important, due to the possibility he/she has to combine general with more specific knowledge on health, among them the dietotherapy prescription, dietary technique and educational practices in nutrition[1].

Considering the above, it is inquired: is the diet of the elderly of the rural area adequate? Which factors affect this diet?

This way, this study is evaluating the factors associated with metabolic and feeding complications in elderly of the rural area of Uberaba, Minas Gerais, guided by the *10 Steps to Healthy Eating for Older People* manual of the Ministry of Health.

Material and methods

This research is part of a major study, household survey, analytic, transversal and observational type, developed in the rural zone of the municipality of Uberaba-MG, in the period from June 2010 to March 2011, which has 100% coverage by the Family Health Strategy (FHS). In order to compound the rural zone population, in June 2010 it was obtained the number of elderly registered in the FHS units, in a total of 1,297 people.

Inclusion criteria in this study were: being 60 years old or over, living in the rural zone of the municipality, from both genders and not presenting cognitive decline. From the 1,297 elderly, 833 met the established criteria and 464 were excluded. From these, 117 changed address, 105 presented cognitive decline, 75 refused participating, 57 were not found after three attempts, 11 had died, three were hospitalized, nine were in bed with no possibility of measuring weight and consequently the BMI, eight did not give consent to measure the abdominal circumference and 79 due to other reasons.

Data were collected at the elderly home, by 14 interviewers previously trained. Community Health Agents (CHA) have collaborated for the home location. It is highlighted that the Municipal Health Secretariat authorized data collection in partnership with the FHS. Interviews were reviewed by field supervisor and, in case of incom-

plete or inconsistent questions they were sent back to the interviewer, who has made contact with the elderly in order to appropriate filling.

Cognitive evaluation of the elderly was carried out before the interview so to verify their condition to answer the questionnaire. It was applied the version of the Mini-Mental State Examination (MMSE), translated and validated in Brazil. MMSE score ranges from 0 to 30, having as a cutoff point ≤ 13 for elderly with no education, ≤ 18 for 01 to 11 years of study and ≤ 26 for those with education superior to 11 years[6].

For characterization of sociodemographic and economic data part of the structured instrument was used, based on the Brazilian Multidimensional Functional Assessment Questionnaire (BOMFAQ)[7]. Variables evaluated were: gender (male and female); age group in years (60 ⊢70, 70 ⊢80 and 80 years or older); schooling in years of study (no study, 1 ⊢4, 4 ⊢8, eight, nine years or over); and individual income of the minimum wages (no income, < 1.1, 1 ⊢3, 3 ⊢5, > 5).

Abdominal circumference (AC) was measured using flexible and non-elastic tape measure, 2 meters length, divided into centimeters and sub-divided in millimeters; during normal expiration, with the elderly standing into an upright position, wearing as few clothes as possible. Measurement was checked in an average imaginary line, at the midpoint between the costal margin and the iliac crest, at the level of the umbilical scar, with no pressure of the soft tissues. Values followed the risk criteria of metabolic complications: men – no risk (< 94 cm), moderate risk (94 to 102 cm), high risk (≥ 102 cm); women – no risk (< 80 cm), moderate risk (80 to 88 cm), high risk (≥ 88 cm)[8].

Weight (Kg) was measured with the elderly with no shoes and wearing light clothing, in a portable electronic digital scale, platform type, Bioland® mark, with capacity for 150 kg and 100g precision. Stature (m) was assessed by using the same tape measure described in AC, fixed on the wall in a flat and regular location, with no skirting board, with the elderly with no shoes, in an orthostatic posture with feet close together, with the back to the marker and eyes on the horizon. BMI was calculated in kg/m^2. Weight rate through BMI used the following cutoff points: low weight (BMI ≤ 22 kg/m2), eutrophy (BMI between 22 and 27 kg/m^2) and overweight (BMI > 27 kg/m2)[9].

Diet was assessed using the adapted Food Frequency Questionnaire (FFQ), made by the technician team of the General Coordination of the National Food and Nutrition Policy (CGPAN) of the Health Care Secretariat, Ministry of Health[10].

The elderly reported the amount of food intake in its common form of use (units, pieces, spoons and glass). Brazilian Adapted Food Pyramid was used to the conversion of home measures into portions[11]. Then, it was evaluated the food habit of the elderly using as the guiding principle the Feeding Guide *10 Steps to Healthy Eating for Older People* proposed by the Brazilian Ministry of Health. The nine first steps are specifically related to the food consumption, and the 10th related to the behavior towards a healthier life[3]. Chart 1 contains a description of the steps and categories used to verify adequacy for each step.

Data about the nine first steps related to feeding, alcoholic beverage consumption and physical activity practice, categories that are part of the 10th step, were collected using the FFQ adapted by the CGPAN. The category about smoking, which is also part of the step 10, was checked using the question: "Do you smoke?" Grounded on these values, dietary intake was categorized into appropriate or not.

Data were double-entered into an electronic spreadsheet in the Excel® program. Then, consistency between the two database was done and, after that, the transportation to the SPSS software, version 17.0. Statistical analysis was done by using the distribution of absolute and percentage frequencies, prevalence ratio and bivariate analysis through Chi-square test. Significance level (α) was 0.05 and tests were considered significant when $p < \alpha$.

The Project was approved by the Ethics Committee in Research with human beings of the Federal University of Triângulo Mineiro (Universidade Federal do Triângulo Mineiro), Protocol number 1477. Before the signing of the Free and Informed Consent, or the agreement by using fingerprint collection of the illiterate, the objective of the research was presented to the elderly with the relevant information, according to Resolution number 46612 of the National Health Council.

Results

It is worth highlighting that the index of losses and refuses represented 35.8%. However, it is considered that this fact has not affected the representativeness of the population studied, considering that all the elderly registered at the FHS of the rural area, who have 100% coverage, were

Chart 1. Description of the "10 Steps to Healthy Eating for Older People" proposed by the Ministry of Health and categories used to verify adequacy

Steps	Adequacy to the step
Step 1 - Have at least three meals and two snacks a day; do not skip any meal.	Habit of having breakfast, lunch, dinner and, at least, two snacks, in a total of five meals a day.
Step 2 – Daily include six portions of cereals (rice, corn, wheat, tubercles – potato, roots, cassava, manioc and pasta) in the meals, giving preference to whole grains and food in its natural form.	Have five to nine portions of cereals in the meals.
Step 3 – Eat at least three portions of vegetables and three or more portions of fruits	Consume at least three portions of vegetables and three or more portions of fruits a day.
Step 4 - Eat beans with rice every day or at least five days a week.	Consumption of at least a portion (two tablespoons/ day) of beans.
Step 5 - Daily consume three portions of milk and dairy products and a portion of meat (beef, poultry, fish or eggs) and remove the apparent fat from meat and the skin from the poultry when preparing food.	Daily consumption of at least three portions of milk and/or dairy products, and one to two portions of lean meat.
Step 6 - Consumption a maximum of one portion a day of vegetable oils, olive oil, butter or margarine.	Step not followed due to operational difficulties of measuring the oil or lard dose used to cook
Step 7 – Avoid soft drinks and industrialized juices, cakes, sweet and stuffed biscuits, sweet deserts and snacks. Eat them at most twice a week.	Consumption of food rich in sugar, such as soft drinks, industrialized juices, stuffed biscuits and others, twice a week or less than that.
Step 8 - Decrease the amount of salt in the food and remove the salt shaker of the table.	When there was a negative answer to the question about salt addition to the food already prepared.
Step 9 - Drink at least two liters of water a day (six to eight glasses) and prefer consuming it in the intervals of the meals.	Daily consumption of at least six glasses of water a day.
Step 10 - Make your life healthier, practice at least 30 minutes of physical activity every day and avoid alcoholic beverage and smoking.	Practice at least 30 minutes of physical activity every day, do not smoke or drink alcoholic beverage on a daily basis.

approached and a large number of them were interviewed (n = 833).

The majority of the elderly were male (52.8%), aged between 60 ├70 years (60.7%), had 4 ├8 years of study (36.9%), a minimum-wage income (48.1%) and BMI in the normal range (39.1%).

When BMI was assessed by the gender, overweight was more present in women gender (54.6%) and low weight prevailed in the male one (58.3%) ($\chi 2 = 10.316$; $p = 0.006$). Regarding the age group, it was observed that overweight prevalence decreased with age, while the low weight significantly increased with age ($\chi 2=19.752$; $p = 0.001$). The highest overweight percentage was found between 60 ├ 70 years (39.7%) and thinness in elderly aged ≥ 80 years (40.3%).

When gender, BMI and age group were associated, having as a dependent variable the abdominal circumference, it was verified a large propor-

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tion of older women with high risk to develop metabolic complications, compared to men. The majority of the overweight elderly had AC substantially increased, while the majority of them with low weight did not present risk for metabolic complications. There was no significant association with elderly age and AC (Table 1).

Concerning the influence of the sociodemographic and economic variables (from here dichotomized), in the adequacy of the steps, Table 2 describes the prevalence of the nine steps assessed.

It was verified that the adequacy to step 1, number of meals; 5, appropriate milk and lean meat consumption; 7, consumption of soft drink and sweets in general no more than twice a week; 8, decrease salt intake and withdrawal from salt shaker of the table; and 10, 30-minute practice of physical activity/day, no smoking and no alcoholic beverage consumption were associated with the female gender. Whereas step 2, daily cereal consumption; 4, rice and beans consumption at least five days a week and 9, drink at least two liters of water/day were associated to the male

Table 1. Prevalence of risk for metabolic complications associated to abdominal circumference according to gender, BMI and age group of the elderly population of the rural zone. Uberaba. 2012.

	Abdominal circumference*							
	No risk		Moderate risk		High risk			
	n	%	n	%	n	%	χ^2	p value
Gender								
Male	223	50.6	105	24.0	112	25.4	88.24	< 0.001
Female	62	15.7	73	18.5	258	65.7		
BMI (Classification) Kg/m^2								
Low weight (≤22)	159	73.6	37	17.1	20	9.3		
Eutrofic (>22 e <27)	93	28.5	110	33.7	123	37.7	47.97	< 0.001
Overweight (≥ 27)	17	5.8	38	13.1	236	81.1		
Age group								
60 ├ 70	151	29.8	113	22.3	242	47.8		
70 ├ 80	89	34.8	59	23.0	107	42.2	4.59	0.33
80 or more	29	39.7	15	20.5	28	39.7		

* Men – no risk (< 94 cm), moderate risk (94 to 102 cm), high risk (≥ 102 cm) for cardiovascular diseases and Women – no risk (< 80 cm), moderate risk (80 to 88 cm), high risk (≥ 88 cm) for cardiovascular diseases (WHO, 2000).

Table 2. Prevalence of adequacy to the "10 Steps to Healthy Eating for Older People" in the rural population, according to variables gender, age group, education and income. Uberaba, 2012.

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 7	Step 8	Step 9	Step 10
Gender [p*]	**0.009**	**0.001**	**0,566**	**< 0,001**	**0.049**	**< 0.001**	**0.023**	**< 0.001**	**0.045**
Male	27.8	49.4	13.6	85.3	4.9	51.2	93.3	69.2	19.1
Female	36.2	38.2	15.0	74.3	8.2	65.6	96.8	45.0	24.8
Age group (years) [p*]	0.895	0.286	0.218	0.828	0.917	0,334	0.889	**0.006**	0.530
60 ├ 80	31.8	43.6	14.7	80.0	6.4	58.5	95.0	59.2	22.1
80 and more	31.1	50.0	9.5	81.1	6.8	52.7	94.6	42.5	18.9
Education (years) [p*]	0.108	0.188	0.190	0.492	0.414	0.844	0.215	0.215	0.106
Illiterate	27.3	40.2	11.5	78.5	5.3	57.4	93.3	54.1	17.8
Educated	33.2	45.4	15.1	80.7	6.9	58.2	95.5	59.0	23.1
Individual income [p*]	0.681	0.112	0.686	0.005	0.507	0.101	0.082	0.622	0.684
No income	33.7	36.0	12.8	68.6	8.1	66.3	98.8	55.3	23.5
With income	31.5	45.0	14.4	81.4	6.3	57.1	94.5	58.1	21.6

Note: Step 6 was not measured, as described in the methodology. * Pearson's Chi-square.

gender. In step 3, fruit and vegetables consumption; have not presented significant differences between genders (Table 2).

When comparing age groups, it was observed that elderly aged 60 ├80 had higher adequacy to step 9, drink at least two liters of water/day, comparing to those aged ≥ 80 years. With regard to education, neither of the steps presented association with this variable, and regarding the income, step 4 presented a significant association, rice and beans consumption at least five days a week, with more adequacy by the elderly with incomes.

In its turn, prevalence of the nine steps assessed according to the BMI and AC variables are found in Table 3. It was verified that adequacy to step 2, daily cereal consumption; 4, rice and beans consumption at least five days a week and 8, decrease salt consumption and withdrawal of the salt shaker from the table were associated to the BMI in the normal range. Whereas step 3, consumption of fruits and vegetable and 7, soft drinks and sweets general consumption no more than twice a week were associated to overweight.

When comparing male and female abdominal circumferences, it was observed that related to the men step 1, number of meals, was associated with the *no risk* rate and that step 7, soft drinks and sweets general consumption no more than twice a week to the *high risk* for cardiovascular diseases. In its turn, related to women, association was between *no risk* AC and step 4, rice and beans consumption at least five days a week (Table 3).

Discussion

Considering the BMI of the elderly studied, overweight was associated with female gender, such as in two investigations among urban and rural elderly in Santa Catarina ($p < 0.001$)[12] e ($p < 0.05$)[13] and another one in Rio Grande do Sul[14]. In view of that, it is perceived that overweight and obesity, previously considered a phenomenon present in a higher level in the urban context, has already affected rural population nowadays, especially female gender[15]. This result can be related to women because they have higher reserves of adipose tissue, due to female metabolism being slower than the male[16].

On the other hand, low weight presented in this study affecting most elderly men has serious complications to health. In Malaysia, lack of nutritional education, financial restriction, physical and psychological decline for functional capacities, social isolation and comorbidities associated were reasons related to the low weight of the rural elderly. Predictors of inadequate dietary among them were loss of appetite; difficulty of chewing; irregular consumption of fruits and less than three meals a day[17].

These findings serve as an alert to the health professionals of the Primary Care. Thus, it becomes a challenge to them, especially to the nutritionist, to motivate the elderly to have an adequate and healthy food intake, both for body fat elimination and weight regaining when it is low, identifying changeable determinants in this population.

Table 3. Prevalence of adequacy to the *10 Steps to Healthy Eating for Older People* in the rural population, according to variables BMI and AC. Uberaba, 2012.

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 7	Step 8	Step 9	Step 10
BMI [p* value]	0.588	**0.014**	**0.034**	**0.008**	0.695	**0.019**	**0.003**	0.114	0.301
Low weight (≤22)	28.3	25.7	25.2	27.4	30.9	24.5	24.8	23.2	26.8
Eutrofic (>22 e <27)	37.5	44.2	30.3	40.4	36.4	36.8	39.4	41.3	34.4
Overweight (≥27)	34.2	30.0	44.5	32.2	32.7	38.7	35.8	35.5	38.8
AC [p* value] – Male[a]	**0.029**	0.053	0.137	0.098	0.956	**0.029**	0.050	0.515	0.604
No risk	33.5	50.7	15.3	88.4	5.1	44.7	91.6	70.1	18.8
Moderate risk	21.9	57.0	15.8	85.1	5.3	55.3	91.2	71.9	22.1
High risk	22.3	41.1	8.0	79.5	4.5	58.9	98.2	65.2	17.0
AC [p* value] – Female[b]	0.738	0.688	0.689	**0.046**	0.605	0.116	0.502	0.322	0.571
No risk	40.7	33.3	11.1	85.2	11.1	53.7	94.2	39.6	19.2
Moderate risk	34.2	35.6	16.4	65.8	8.2	71.2	95.9	40.3	27.4
High risk	36.0	39.0	15.0	74.5	7.1	65.5	97.4	48.1	24.7

Note: Step 6 was not measured, as described in the methodology. * Pearson's Chi-square. [a] Men – no risk (< 94 cm), moderate risk (94 to 102 cm), high risk (≥ 102 cm) for cardiovascular diseases (WHO, 2000). [b] Women - no risk (< 80 cm), moderate risk (80 to 88 cm), high risk (≥ 88 cm) for cardiovascular diseases (WHO, 2000).

When associated with the age group, national scientific literature corroborates the presence of the overweight among the younger urban and rural elderly ($p < 0.001$)[12] and international literature has shown prevalence of low weight in older rural elderly[18]. These are characteristics of the aging process, in which there is fat accumulation in the first decades of the old age and weight loss at the later stage of life[17,18].

Thus, it should be pointed out the importance of monitoring the anthropometric profile of the elderly. If any alterations are detected, the elderly should be referred to a Basic Health Unit for clinical and nutritional assessment.

Regarding the association between gender and increased AC, the highest percentage of elderly women with high risk for developing cardiovascular diseases was consistent with the study in Pelotas ($p<0.001$)[19] and in the rural area of Malaysia ($p<0.010$)[17]. However, it differed from a research in Lageado (RS), in which the very increased AC prevailed among the elderly men ($p<0.01$)[14]. A probable explanation is due to the fact that elderly individuals, especially women, suffer changes in body fat distribution with greater accumulation in the abdominal area[20].

As regards the BMI and AC, it was verified a significant association among the variables. Associating the two measurements can be a combined way of assessing the risk and helping limitation decrease of each isolated evaluations. According to WHO[8], individuals with BMI in the normal range, but with substantially increased AC, are susceptible to developing diabetes mellitus and cardiovascular diseases.

This susceptibility was highlighted in the rural zone of Jequitinhonha, in which the abdominal obesity was shown as a potential predictor of insulin resistance (that precedes diabetes mellitus), even presenting BMI in the normal range[15]. In this current study, more than a third (37.7%) of the elderly with BMI in the normal range presented AC substantially increased, showing risk for metabolic complications.

Increased AC is an avoidable risk, which can be submitted to medical or nutritional intervention. AC measurement using tape metric should be part of the daily actions of the FHS, since CHA and/or nurses are capable of using the standard technique. So, measurement can be monitored if it is registered in the field spreadsheet in each home visit. With respect to dietary and nutritional orientations, it is suggested the increase of dark green leafy vegetables, vegetables and fruits consumption, prefer whole grain bread to white flour ones, avoid soft drinks and added sugar to the food, include oats in the daily eating habit, remove the skin and the apparent fat from the meat, cook with little oil or lard and eat every three hours. These are conducts that help preventing and reducing increased AC.

Related to the gender influence on step adequacy, a research in Pelotas – RS, which investigated de frequency of healthy eating habits in adults and elderly, found predominance of adherence by the women[21], similar to this study, in which women followed more steps than men.

In general, there seems to have greater concern of women in relation to their own body. One of the reasons can be the cultural issue, in which throughout life female figures, such as the mother and the partner, are responsible for mediating the care, not stimulating men to worry about their own health[22].

Comparing the age groups, age was not directly associated with the adhesion to the steps, except step 9, drink at least two liters of water a day; in which the elderly aged less than 80 years presented more adequacy.

Such an outcome can be due to the fact that the thirst mechanism becomes less efficient as years go by. This way, the older the individual is, less thirsty he becomes and, consequently, less water he drinks. It must be remembered that water is essential to the perfect human body work; therefore, its intake must be stimulated and its access facilitated to the elderly[23], especially the oldest elders. Nutritionist and health professionals of the FHS should encourage the benefits of the water for health in the elderly, and orientate family and/or caregiver that glasses, mugs and water filters must be available to them. Also, the water must be offered to them even when they do not express thirst.

With regard to education, it is believed that association with this variable was not seen in any of the steps, because almost all of the elderly from rural zone (91.4%) have no education or have studied less than eight years. Probably, school has not receive due valorization and been taken seriously enough by the parents of these elderly, who raised them to work in the field or at home[24,25].

It is also considered the fast and peculiar nutritional transition that the Brazilian society has experienced. Individuals who are less educated and poorer consume unhealthy diets, which are rich in higher energy density and low nutrient concentration. At the same time, population with better socioeconomic and educational level consume ultra-processed food, with high content of

sodium, fat and sugar, an inappropriate characteristic as well[26].

Nevertheless, despite the nutritional transition process has been deeply studied since 1960's in the urban areas of Brazil, there have been some doubts about the determinants being the same for the rural areas[15].

It is worth highlighting that dichotomization of variables age and education can have influenced the results mentioned above, being it one of the limitations of this study.

Only step 4, consumption of beans and rice at least five days a week, presented association with the income, being the elderly with income the ones with better adequacy. It is likely that the economic factor has appeared in only one step because although the elderly receive income, almost half of them received only a minimum wage, placing them on the same financial level.

When BMI and AC were related to the steps, it was observed that the consumption of rice and beans at least five days a week (step 4) helped maintaining appropriate weight and AC in the normal range. The bean is a legume rich in complex carbohydrates, vitamins, minerals, bioactive compounds and fibers, so presenting lower glycemic index[1], what contributes to the eutrofism and adequate AC[1,27]. It is believed that in the rural area population has maintained the traditional Brazilian eating habit very deeply rooted, giving privilege to the typical combination of rice with beans.

In this research, association with overweight and the adequate consumption of vegetables and fruits (step 3), and the low sweet intake (step 7), can be related to reverse causality, that is, resulting from overweight. With this in mind, the elderly could present better eating habits.

Finally, men who reported following step 1 (consumption of at least five meals a day) presented AC with no risk for metabolic complications, different from a study that did not present any association between the nutritional status and the number of the meals[14]. It is significant to emphasize that regardless the composition of the diet and the genetic and environmental factors, fractionating meals favors the lipid profile and reduces BMI, AC and triglycerides, improving resistance to insulin and the metabolic syndrome[28].

Based on the above considerations, it is concluded that the diet quality of the rural elderly does not seem to be better than the urban ones, as stated by the MH[2]. One of the examples is related to the consumption of fruits and vegetables (step 3), since in this investigation only 14.5% of the elderly from rural area presented this adequacy, while data from the National Health Survey pointed out 40.1%[5].

During data collection, it was noted that many of the rural properties used to cultivate different quality of fruits and vegetables in their yards and gardens, what expresses easy access of these people to the food. However, it is believed that daily intake cannot be continuous, because of the harvest and pre-harvest period or due to cultivation been intended more to commercialization than their own consumption. Since the majority of them do not own the properties, it limits the rights and conditions for cultivation.

It is noted that the findings from this work showed the need of nutritional management of the elderly living in the rural zone of Brazil, since there are few studies carried out in this field. With these data, the importance of the nutritionist in primary care is highlighted, giving support to the health professionals on the organization of the nutritional attention and as responsible for the necessary adaptations recommended to health conditions specific to each elderly. Carrying out an appropriate and continuous nutritional assessment of the elderly, identifying nutritional knowledge among them and their relatives/caregivers will help health services to develop strategies to improve dietary and nutritional patterns, minimizing or postponing possible complications. Sensibilizing these elderly for more beneficial attitudes in life through continuous nutritional education, aiming to maintain healthy weight, an active life and adequate eating habits, must be one of the concerns of the public health service.

At last, although the Food Frequency Questionnaire is considered one of the main instruments used for dietary data collection in epidemiologic studies, since it captures the consumption probability of most of the food, a limitation is highlighted: dependency on the memory of the individuals interviewed, especially because they are elderly. Another limiting factor is the cross-sectional type of this research, which does not allow establishing any causality relationship.

Collaborations

SFD Heitor worked on the conception, design, analysis, data interpretation, writing and critical review of the manuscript. LR Rodrigues worked on data interpretation, critical review and final approval of the version to be published. DMS Tavares worked on critical review and approval of the version to be published.

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