

The nutritional status of older people attended at Eliza Queiroz Maciel Living Center in Manacapuru, Amazonas, Brazil

Abstract

Purpose: To evaluate the nutritional status of older people attended at Eliza Queiroz Maciel Living Center in Manacapuru, Amazonas, Brazil.

Methods: A descriptive cross-sectional research study approach.

Results: It was found that among the 78 older people participants, older women (83.3%), widows (41.0%), between 65 and 69 years old (37.2%), mediums brown (46.1%), Catholics (76.9%), incomplete elementary education (35.9%), with 4 to 6 children (30.8%), retired (78.2%), monthly income 1 to 3 minimum wages (73.1%), own house (88.5%) of masonry (75.6%) and with electrical services, piped water, garbage collection and sewage network (48.7%). It was observed, on average, higher prevalence of overweight by World Health Organization and Lipschitz cut points (39.7% and 55.1%), respectively, followed by obesity (41.0%) by PAHO cut points, with greatly increased risk in body fat index (BFI) (53.8%), waist circumference (WC) (82.1%) and increased for waist circumference/hip circumference (WC/HC) (94.9%).

Conclusions: It can be concluded that 51.1 % of the evaluated older people were overweight, and older women showed a very high risk for diseases associated with overweight (90.8 %), with the predominance of android fat in older women (86.2%).

Keywords: evaluation of nutritional status, obesity, overweight, nutritional transition, ageing, gerontology, health of older people

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Abbreviations: UEA, universidade do estado do amazonas; TCLE, termo de consentimento livre e esclarecido (free and informed consent form); AM, Amazonas; IBGE, Instituto Brasileiro de Geografia e Estatística; CEP, comitê de ética em pesquisa (research ethics committee); BFI, body fatness index; WC/HC, waist circumference/hip circumference; BMI, body mass index; BAI, body adiposity index; PAHO, Pan American Health Organization; WHO, World Health Organization; IPEA, Instituto de Pesquisa Econômica Aplicada; UnATI, Universidade Aberta da Terceira idade

Introduction

Brazil is currently experiencing a rapid nutritional transition, understood as a change in the nutritional profile of a population, where the patterns of distribution of nutritional problems change generating new health aggravations and this transition is characterized by a shift from malnutrition to increased obesity in the general population.¹ Even though there are different nutritional and economic aspects in a country or region that influences the transition process, the main characteristic changes in lifestyle, such as poor diet and reduction in caloric expenditure and fibre consumption, thus causing the increase in obesity together with the lack of physical activity, mainly in urban regions and constituting one of the major public health problems.^{2,3} Brazil had high rates of malnutrition in the 1970s and 2008, half the adult population was overweight, affecting individuals of all age groups, both sexes and all income levels.^{3,4} The increase in the prevalence of obesity in various subgroups of the population has become an important nutritional complex of global magnitude, with serious social and psychological dimensions, causing a high incidence of cardiovascular diseases, cancer and diabetes influencing the profile of population morbidity and mortality and interfering with the

quality of life of the individual, especially the older people.⁵ In recent decades, overweight has reached about 1/3 of the Brazilian adult population and presents a growing trend, with a higher prevalence of obesity among women, including the older, and both sexes, reaching especially the age group between 50 and 65 years.⁶

Brazil is among the countries with the highest prevalence of malnutrition, with significant regional disparities, and the Amazon region and part of the Northeast region have historically been considered as significant endemic hunger zones.⁷ The evolution of the health level among Brazilian regions in 1979, 1990 and 2003 showed that the Northern and Northeastern regions went from type III (low health level, with a high proportion of deaths in children under 1 year and preschool children) to type II (regular health level, where there is a clear increase in the proportion of deaths in individuals aged 50 and over and the lowest proportion of child deaths).⁸ In 2004, the National Research of Food and Nutritional Security, observed greater prevalence of severe food insecurity in the State of Amazonas, being more critical both in the urban area (44.6%) and in the rural area (35.2%).⁹

The analysis of the nutritional status of Brazilian older people based on data from the Family Budget Survey (2008/2009) found a higher prevalence of overweight in older women (41.9%), living in the urban stratum (39.0%), as well as in the South (45.1%) and North (33.6%).¹⁰ It was also observed, higher prevalence of low weight in older people living in the rural stratum (26.3%), being in the Northeast (23.7%) and North (18.0%). The low weight was still more prevalent in older people of yellow (32.1%) and black (23.6%). And those who lived alone had higher percentages both of low weight (20.4%) and overweight (38.5%).¹⁰

In 2013, overweight and obesity in adults reached 56.9% and 20.8% of the population, respectively.^{11,12} Overweight tends to increase with age and happens more rapidly among men, but more slowly among women, with changes in diet and lack of physical activity, it being the main determinants of obesity, which is the most important nutritional disorder in developed countries also affecting developing countries.¹³ Among the older people, there is an alternation of nutritional states of obesity and malnutrition, malnutrition being verified as an independent factor and not as a basic disease and occurring as a consequence of socioeconomic conditions, with the fastest growth rate in the population with lower family income, physiological changes due to age and functional disability.^{14,15} Changes in nutritional status can cause increased morbidity and mortality, as malnutrition contributes to several serious complications, such as infection, wound healing deficiency, respiratory failure, among others. On the other hand, overweight and obesity are risk factors for the emergence of various health conditions, among which ischemic heart disease, hypertension, stroke, among others.¹⁶ The older people present a strong tendency to develop malnutrition due to the incidence of chronic morbidities and physical changes inherent to advanced age, thus becoming a relevant nutritional deficiency in this population.¹⁷

Although malnutrition is quite prevalent in the older people and in populations living in extreme poverty, Brazil and other developing countries experiencing a nutritional transition determined by malnutrition see a continuous decrease in cases of malnutrition giving rise to an increasing prevalence of overweight and chronic non-communicable diseases associated with obesity, these diseases being the main causes of death today.¹⁸ Therefore, the antagonism of temporal trends between malnutrition and obesity constitute one of the characteristics that mark the nutritional transition process in the country and affect not only the health system but also the cultural, social and economic context, making it necessary in the health sector to prioritize strategies aimed at promoting healthy eating and encouraging regular physical activity practices.¹⁸ In this perspective, this study aimed to evaluate the nutritional status through anthropometric data, as a way to predict the risk of morbidity and mortality and to identify the sociodemographic profile of the older people attended at the Eliza Queiroz Maciel Living Center in Manacapuru, Amazonas, Brazil.

Methods

A cross-sectional descriptive research study approach, with analysis of primary data, was realized with 78 older people attended at the Eliza Queiroz Maciel Living Center in Manacapuru, Amazonas State, whose collection period was from August 2010 to December 2011. A questionnaire was used and an interview carried out to know some socio-demographic characteristics at the place of study, in a reserved place, on days of group activities, before or after the activities. After the student's training period for data collection. The body weight was measured through a KRATOS platform scale, with a precision of 1.25 kg and a maximum capacity of 150 kg. The scale was gauged before and after the weight was taken. The individuals were weighed, wearing light clothing, barefoot and with lateral distance from the feet. Stature (m) was checked with an inelastic anthropometric tape, with the older people in orthostatic position, with the feet together and barefoot and arms extended downwards. In the anthropometric evaluation for the classification of the body mass index (BMI, the measures of weight (w) and height (H) were used to apply the equation $BMI = (W/H^2)$. For classification of the nutritional status of the older people through BMI three specific cut-off points for older people were employed: proposed by Lipschitz¹⁹ the Pan American Health Organization (PAHO)²⁰ and the World Health Organization (WHO)²¹ (Table 1) was taken as a comparative reference.

Table 1 Nutritional classification according to body mass index (BMI) cut-off points recommended by Lipschitz, WHO and PAHO for the older people

BMI Scales (kg/m ²)	Nutritional status
LIPSCHITZ (1994)	
<22	Low weight
22–27	Eutrophic
>27	Overweight
PAHO (2001)	
≤23	Low weight
>23<28	Normal
28<30	Pre-obesity or overweight
≥30	Obesity
WHO (1995)	
<18.5	Low weight
18.5–24.99	Normal
25.00–29.99	Overweight
≥30	Obesity

Source Lipschitz,¹⁹ 1994; PAHO,²⁰ 2001, WHO,²¹ 1995

The hip circumference (HC) was measured in centimetres, with the inelastic tape measure surrounding the hip in the area of greater gluteal protuberance between the waist and thigh, without compressing the skin in a horizontal plane. Waist circumference (WC) was also checked in centimetres at the edge of the iliac crest.^{22,23} WC measurement alone was analyzed from the cut-off points suggested by the WHO,²¹ where for women ≥80 is considered high risk and ≥88 for very high risk; for men ≥94 is considered high risk and ≥102 for very high risk.²⁴ The waist circumference/hip circumference (WC/HC) was established by dividing the waist (WC) and hip circumference (HC) values and using the cut-off points for body fat distribution recommended by the WHO.²¹ The body fat index (BFI) was calculated from the following equation:²¹

$$BFI = \frac{\text{Hip circumference}}{\text{Height} * \sqrt{\text{Height}}} - 18$$

In the estimation of the prevalence of body adiposity index (BAI) the cut-off points of 35.0% for females and 25.0% for males were utilized. In the data analysis, absolute and relative frequency measurements were employed. The database was organized in Microsoft Office Excel, version 2010, and the analysis of variables in Minitab v.14²⁵, SPSS v. 20²⁶ and Epi Info v.6 and 7.1.²⁷ The initial project of this work was reviewed by the Research Ethics Committee of the University of the State of Amazonas (UEA), according to opinion n^o 003/11-CEP/UEA on February 25, 2011. All participants authorized their participation by signing or printing a dactyloscopic on the Term of Free and Informed Consent (Termo de Consentimento Livre e Esclarecido - TCLE), following Resolution 196/96 of the National Health Council (Conselho Nacional de Saúde – CONEP) on research involving human beings.

Results

In total, 78 older people participated in the study, older women were predominant (83.3%), widows (41.0%) and self-defined as married (46.1%). The prevailing age was between 65 and 69 years old (37.2%), and schooling level was the incomplete elementary education (35.9%). The majority of older people were retired (78.2%) with monthly income between 01 and 03 minimum wages (73.1%) (Table 2).

Table 2 Distribution according to the socio-demographic aspects of the older people attended at the Eliza Queiroz Maciel Living Center in Manacapuru - Amazonas, Brazil – 2011

Variables	n	%
Sex		
Older men	13	16.7
Older women	65	83.3
Marital status		
Single	3	3.8
Married	23	29.5
Widowed	32	41.0
Divorce	13	16.7
Others	7	9.0
Age group		
60-64	21	26.9
65-69	29	37.2
70-74	21	26.9
75 or +	7	9.0
Race/colour		
White	35	44.9
Black	5	6.4
Indian	2	2.6
Yellow	0	0.0

Table continues

Variables	n	%
Brown	36	46.2
Schooling and education		
Illiterate	20	25.6
Read and write a note	13	16.7
Incomplete elementary school	28	35.9
Complete elementary school	5	6.4
Incomplete high school	1	1.3
Complete high school	9	11.5
Incomplete higher education	1	1.3
Complete higher education	1	1.3
Filhos		
0-3	15	19.2
4-6	24	30.8
7-9	18	23.1
10 or +	21	26.9

Source Hurtado-Guerrero et al.²⁸; n, sample size; %, percentage

The mean weight of the older people was 67.1 kg, the highest mean (69.7 kg) was found in older men. The stature mean was 1.5 m, with the highest mean found in older males (Table 3). The mean values for other variables were: body mass index (BMI) (28.8 kg/m²); body adiposity index (BAI) (36.8); waist circumference (WC) (99.0 cm); hip circumference (HC) (103.1 cm) and WC/HC (0.96). All these means were higher in older women, except for WC/HC (Table 4). Most of the older people were overweight followed by obesity. The prevalence of excess body fat with much-increased risk was 53.8%, being in older men, the highest prevalence (84.6%). Waist obesity measured by waist circumference showed a much-increased risk (82.1%) and WC/HC with increased risk (94.9%). The latter two measures were higher among women (Table 4). In the comparison of the classification of the BMI for the older people in the nutritional assessment. The cut points of the WHO and Lipschitz had a predominance for overweight (39.7% and 55.1%), respectively. While the results by the Pan American Health Organization cut points had obesity (41.0%) (Table 4).

Table 3 Descriptive statistics of the nutritional status of the older people attended at the Eliza Queiroz Maciel Living Center in Manacapuru - Amazonas, Brazil – 2011

Variables	Older women (n=65)		Older men (n=13)		Total (n=78)	
	\bar{x}	S	\bar{x}	S	$\bar{x} \pm S$	Range
Weight (kg)	66.6	11.42	69.7	11.03	67.1±11.35	42.2–94.4
Height (m)	1.5	0.05	1.6	0.07	1.5±0.07	1.4–1.7
BMI (kg/m ²)	29.2	4.93	26.4	3.76	28.8±4.85	21.0–41.4
BAI	38.32	6.19	29.0	3.78	36.8±6.81	22.2–53.8
WC (cm)	99.6	10.49	96.2	9.61	99.0±10.36	78.0–124.0

Table continues

Variables	Older women (n=65)		Older men (n=13)		Total (n=78)	
	\bar{x}	S	\bar{x}	S	$\bar{x} \pm S$	Range
HC (cm)	104.3	10.79	97.2	6.28	103.1±10.50	87.0–128.0
WC/HC	0.96	0.05	0.99	0.05	0.96±0.05	0.81–1.07

\bar{x} , arithmetic mean; **S**, standard deviation; **BMI**, body mass index; **BAI**, body adiposity index; **WC**, waist circumference; **HC**, hip circumference; **WC/HC**, waist circumference/hip circumference

Table 4 Comparison of the nutritional status classification of the older people attended at the Eliza Queiroz Maciel Living Center in Manacapuru – Amazonas, Brazil – 2011

Variables	Classification	Older women		Older men		Total	
		n	%	n	%	n	%
BMI ^I	Lower weight	1	1.5	1	7.7	2	2.6
	Normal weight	26	40.0	7	53.8	33	42.3
	Overweight	38	58.5	5	38.5	43	55.1
BMI ^{II}	Normal Weight	12	18.5	5	38.5	17	21.8
	Overweight	27	41.5	4	30.8	31	39.7
	Obesity	26	40.0	4	30.8	30	38.5
BMI ^{III}	Lower weight	4	6.1	3	23.1	7	9.0
	Normal weight	23	35.4	5	38.5	28	35.9
	Overweight	10	15.4	1	7.7	11	14.1
	Obesity	28	43.1	4	30.8	32	41.0
BAI	Normal	13	20.0	0	0.0	13	16.7
	Increased Risk	21	32.3	2	15.4	23	29.5
	Very Increased Risk	31	47.7	11	84.6	42	53.8
WC	Normal weight	2	3.1	7	53.8	9	11.5
	Increased Risk	4	6.1	1	7.7	5	6.4
	Very Increased Risk	59	90.8	5	38.5	64	82.1
WC/HC	Low Risk	1	1.5	3	23.1	4	5.1
	Increased Risk	64	98.5	10	76.9	74	94.9

Source ^ILipschitz,19 1994; ^{II}PAHO,20 2001; ^{III}WHO,21 1995; **n**, sample size; **%**, percentage; **BMI**, body mass index; **BAI**, body adiposity index; **WC**, waist circumference; **WC/HC**, waist circumference/hip circumference

Discussion

The research of the older people at the Eliza Queiroz Maciel Living Center in Manacapuru, Amazonas, found a predominance of women, low schooling, retirement, income between 01 and 03 minimum wages, corroborating findings in other studies in the country.^{29,30,31} The National Health Survey in 2013 found that 24.4% of the older people reported participation in organized social activities, with women

showing a greater custom of participating in these activities compared to men: 28.1% and 19.8%, respectively. Fewer percentages were found for people 75 years old or older (19.3%) and uneducated people (18.1%).³² Several factors that may explain the higher participation of women in these studies, such as age, empty nest syndrome, the higher life expectancy of women, higher demand for health services due to concern about their health, as well as the mortality risk associated

with decreased social engagement and its benefits for physical and cognitive functions and well-being.^{33,34,35} Observing that the levels of social engagement increase at the beginning of old age until 75 years old and that the social participation of the older people is related to culture, beliefs, religion, voluntary work, education, sports practice, functional capacity, socially acceptable habits, as well as the opportunities and resources available.^{36,37,38} Thus, the social disengagement observed in older people is largely explained by the theory of socio-emotional selectivity, which explains that in old age, changes in the composition of social networks, in family structure, in work and leisure relationships, and especially in social roles influence social behaviour.³⁹

The findings from the study by Bruno et al.⁴⁰ highlighted the very low formal schooling average in women, with 66.6% of the institutionalized older people coming from the interior of the State of Fortaleza, CE were illiterate or had low schooling, showing similar results of this study. The same study showed that the older the age and less schooling, a worse cognitive performance, showing that the educational level is the main variable that influences the cognitive performance in older people. Machado et al.⁴¹ observed association between schooling and cognitive decline in older people, showing that those with \leq to one year of studies had 3.8 times worse chances of having a cognitive deficit when compared with those with one to four years of studies. Noting that many years of education can make the brain more resistant to the effects of diseases or changes caused by ageing.⁴²

It is worth pointing out that most of the population of this study are retired with a predominance of income between 01 and 03 minimum wage. According to the IPEA,⁴³ although older women receive the benefit for longer than older men, this one becomes systematically of lower value. In the case of rural retirement, whose value is 01 minimum wages for both sexes, the proportion of older women beneficiaries is much higher than that of older men. And that older men receive 1.5 times higher than older women. However, the income of welfare contributes to the reduction of inequality between older people and both sexes. Considering the population as a whole, it is observed that among older women, inequality is lower among beneficiaries than among non-beneficiaries. In summary, it can be stated that difference goes increasing between older the segment of the population is, already it was found that for every 100 older women there were 80.1 older men being justified by the differential mortality by sex.⁴³

There is also a predominance of older widowers (41.0%). The fact that was verified in a study by Bento et al.^{20,19,40,44} analyzing nutritional markers among older people with chronic diseases participating in the National Health Survey where there was a higher percentage of widowers. In the study of Graziano et al.^{35,45} analyzing cognitive alterations in Parkinson's disease, where most of these were widowers (56.9%). According to Camarano et al.^{42,46} in Brazil, the dependency ratio between sexes showed in 2010, a feminization of old age, increasing this difference, the older the population segment is, stating that for every 100 women there were 80.1 men, which is justified by the differential mortality by sex.

Based on the comparative percentage distribution of BMI, the population studied presented prevalence of overweight, according to the cutoff points recommended by the WHO²¹ and Lipschitz.¹⁹ These results were in concordance with those found by Souza et al.⁴⁷ and Raimundo et al.⁴⁸ when they evaluated the agreement between different classifications of BMI in older people. They showed that according to WHO²¹ there was the predominance of overweight (50.4%) but

its results were contrary to that 52.7% of eutrophic stipulated by Lipschitz.¹⁹ However, all those results were very close to the findings with older people reported by Palma et al.⁴⁹ using the cutoff points of the BMI, and the NSI parameters, reporting predominance of overweight for older women (53.8 %) and when analyzed by the PAHO²⁰ method, 45.6% of obesity for them, corroborating body changes during ageing.

Among the several recommended references for the classification of BMI in older people, those established by PAHO²⁰ WHO²¹ and Lipschitz¹⁹ stand out. However, due to the changes in body composition during the ageing process, many criticisms have been considered about the lack of consensus for these cut-off points to classify obesity in older people, which ends up making it difficult to compare the results of national and international researches, which is why we recommend caution when using the cut-off points of BMI for them.^{47,48,49,50} Only the cut-off points proposed by Lipschitz¹⁹ take into consideration the changes in body composition that occur with ageing with the adult population.

Similar results also were found in different regions of the state of Amazonas with the greater prevalence of overweight in older people: Lemos⁵¹ investigating older people from UNATI/Manaus, observed 46.6 % of overweight and the evaluations of CC and RCQ showed high risk for developing chronic diseases; Oliveira⁵² evaluating the nutritional profile of older people of the Center of Integral Attention to the Best Age (CAIMI) in Manaus, found 48.8% of overweight; Mendes et al.⁵³ analyzing the nutritional status of adults in the city of Coari, Amazonas, found that the overweight reached 45.0 % and Lima⁵³ reported overweight in older people in a study of anthropometric profile and quality of life in Borba, Amazonas.

The analysis of the nutritional status showed a higher percentage of overweight in older people. These results are in line with the findings of Hurtado-Guerrero, Mainbourg and Hurtado-Guerrero⁵⁵ in a study carried out with indigenous older people in the State of Roraima, where 42.9% in the 60 to 69 age group were overweight; and Souza et al.⁵⁶ who conducted a comparative study between BMI in older people of Rio Grande do Sul where overweight also prevailed in most of these (50.4%) following the classification of the WHO.

However, at the cut-off points determined by Lipschitz¹⁹ the opposite was true since most of older people were eutrophic (52.7%) and this finding was also similar to the predominance of overweight (54.6%) found by Cardozo et al.⁵⁷ in Pelotas (RS) and Souza et al.⁵⁸ at a Primary Health Care (50.0%). However, these results disagreed with the finding of Palma et al.⁴⁹ in their comparative study of BMI in the older people of Palmeiras das Missões (RS) whereby the cut-off points of the PAHO 46.3% were found with adequate weight. The measures of nutritional status evaluation are one of the first steps to be taken to obtain a partial diagnosis of the nutritional clinical picture of the older people for a possible intervention offered, if opportune.⁵⁹ Among the several methods to evaluate the nutritional status of the older, anthropometric measures are the most used in clinical and population studies.^{10,60}

BMI and WC/HC, when compared to other anthropometric indicators, are widely employed in studies to investigate the greater correlation between overweight, obesity and lipid profile in both sexes becoming important in determining the risk of many diseases.⁶⁰ Overweight is understood as an excessive increase in total body weight, it being a useful factor in predicting health risks associated with obesity.^{61,62} BMI values above normal points are indicators of increased risk of cardiovascular diseases, cancer and diabetes. while

low weight is usually positively associated with hunger and infectious diseases.^{63,64} In middle age between 50 and 65 years old, overweight is the main nutritional problem because it is associated with chronic degenerative diseases.^{65,66} On the other hand, people over 80 years of age have the greatest problems: thinness and loss of lean mass. Malnutrition in older people contributes to the emergence of diseases such as tuberculosis, obstructive pulmonary diseases, lung and stomach cancer, while overweight contributes to the emergence of cerebrovascular and cardiovascular diseases, diabetes and others.⁶⁵ Among the factors that contribute to overweight are: sedentary lifestyles, hypercaloric diet, genetic factors and family history; health conditions such as hormonal problems, anxiety and depression, sex, and age processes when there is a decrease in body mass and energy expenditure.⁶²

The increase in chronological age causes changes in body dimension, mainly in height and weight, and nutritional factors are involved in the changes of these two components during ageing. As the years go by, stature decreases due to vertebral compression, narrowing of the discs and kyphosis, affecting women more rapidly due to the higher prevalence of osteoporosis after menopause.⁶⁷ Bodyweight gain that usually begins around 45 to 50 years of age, stabilizing at 70 years of age, beginning to decline until 80 years of age. This weight loss is related to hormonal factors that control hunger and satiety, excessive use of medication, depression, financial stress, diseases among other factors.^{68,69} Among the older people, obesity and overweight have been prominent, with a tendency to produce serious adverse health problems, associated with increased mortality.^{68,69} The older population is particularly prone to nutritional deficiencies for both overweight and underweight.¹⁰ Malnutrition in older people may result in a deteriorated health, therefore some changes from the physiological process of ageing compromise the intake of nutrients causing malnutrition in the older people.¹⁰

In the older people studied group, we observed a high prevalence of overweight and draws attention because they participated in physical activities organized by the Living Center. However, low caloric expenditure may be influenced by factors such as nutrition, the lack of regular physical activities, age group, among others. Thus, the predominant result of overweight in older people is a concern mainly due to the association of obesity with the appearance of chronic diseases, which can cause an increase in morbidity and mortality in this group. The nutritional status in older people can be influenced by age, cognition, mobility, autonomy, whether living alone or accompanied, ability to prepare one's own food, income, schooling, the current situation or previous health, presence of co-morbidities, as well as eating habits, beliefs that marked childhood and adolescence and that end up having repercussions in the promotion of nutritional risks and deviations that reflect on the state of health in this stage of life.⁶⁵

Analyzing the Body Adiposity Index (BAI), it was observed that most older women were in increased risk range for the development of chronic non-communicable diseases compared to older men. This finding coincides with other studies realized: Lemos⁵¹ with older people attending UnATI/Manaus; Diniz et al.⁷⁰ comparing anthropometric indicators of overweight/obesity in older people residents in rural areas; Pinheiro and Cunha⁷¹ analyzing indicators of body fatness in the older people and Segheto et al.⁷² conducting a nutritional survey in the older people, where older women showed positive association with the body fatness index. Regarding BAI, Sopena et al.⁷³ found 37.6% in older women and 29.8% in older men,

coinciding with this study. All these findings corroborate with the fact those women presented a higher prevalence of obesity.

The BAI is an index that can be used for the identification of the body adiposity and the possible consequences of overweight and according to Bergman et al.⁷⁴ the BAI shows a better correlation with the percentage of body fat when compared to BMI. A population-based study that analyzed the factors associated with body fat index, in Brazilian adults, observed that in women there was an average increase of 6.2% in the BAI about men and concluded that factors such as gender, age, marital status, self-assessment of health, and dissatisfaction with body the image was determinant for the increase in BAI, indicating a strong risk for chronic non-communicable diseases,⁷² such as blood pressure, blood lipid profile, insulin resistance, among other factors.⁷⁵ Although the ageing process cannot be considered synonymous with diseases and disabilities, the current trend is that most of the older people live more is affected by chronic conditions and, generally, these chronic conditions are directly related to greater impairment of the functional capacity of the older people.^{29,28} The use of body fat results in the evaluation of Metabolic Syndrome in older people becomes relevant and studies showed a relationship between accumulated fat tissue and the incidence of adverse metabolic events, noting the higher risk of developing metabolic diseases mediating excess body fat.^{76,77} Thus some authors consider the BAI the best predictor of body fat in older people separately from the BMI.^{74,77,78}

The WC in older women constituted a very high risk (90.8%) for diseases associated with overweight. While older men presented no risk for diseases associated with overweight (53.85%). Findings of Kumpel⁶² in the older people attended in the Family Health Program of Passo Fundo (RS) detected that the majority of them presented a high risk for diseases associated with obesity (67.5%).

Our results diverged from those found in the study of Marim and Cecílio⁷⁹ with older people in the area of a Family Health Unit in the central region of the city of Marília (SP), showing very high risk for older men (37.4%) and older women (83.5%), opposite trends to our study for older men that were classified as not at risk for obesity-related diseases in their majority. The advancement of age causes changes in body composition since the fat-free mass decreases giving way to the fat mass that is stored intra-abdominal and intramuscularly and no longer subcutaneously as in the young adult.⁶⁷ An increased waist circumference represents a risk for the development of chronic noncommunicable diseases, especially cardiovascular diseases.⁸⁰

The WC is an important indicator of abdominal fat distribution and total body fat changes related to visceral or subcutaneous fat accumulation associated with the ageing process. It takes place differently between older men and older women because some genetic characteristics also contribute to these changes.⁸¹ Thus, the results of this study suggest a high predisposition of this population to develop chronic noncommunicable diseases, mainly older women. Because, the accumulation of abdominal fat is associated with cardiovascular diseases, which compromises the health and quality of life of these older women, avoiding their engagement in the activities of the Living Center. Increased waist circumference represents a risk for the development of chronic noncommunicable diseases, especially cardiovascular diseases.⁸⁰

Regarding the waist/hip ratio (WC/HC), the older people have been classified according to sex and a higher prevalence of gynoid fat and/or android fat. Gynoid fat is considered to be concentrated in the hip region and presents less risk associated with overweight and

android fat is concentrated in the abdominal region and presents a higher risk for diseases associated with overweight. It was observed in this study that the highest prevalence of android fat was in older women (86.2%) while in older men the predominance of gynoid fat was 53.8%. In the study of Silveira et al.⁸² more prevalence of android fat was observed in older women (65.5%) and aged older people as an all (63.6%). Fogaça et al.⁸³ study with Brazilian cardiopaths older people showed high WC/HC values in 73.3 % of the older people. As age progresses, there is a decrease in height and weight in both sexes, favouring an increase in WC/HC in older women.⁸⁴

The WC/HC is one of the main measures utilized in population studies for the diagnosis of central obesity. It is also a predictor of cardiovascular disease risks.^{85,86} Values are variable depending on the measurement techniques, sex and age. The cut-off points used for the general population fat type classification are: <0.8 (gynoid) and 0.8 (android) for women; <1 (gynoid) and 1 (android) for men. The lack of specific cut points for the older people population is one of the main limitations of the WC/HC. The criteria proposed for the general population are used so far.^{87,88,86}

In the evaluated group, the predominance of older women with android fat was to be expected since, since with advancing age fat tends to be located in the abdomen. It is different from the population of young adult women who usually accumulate fat in the hip. However, the high number of older women with android fat is a matter of concern, since it represents a strong association with cardiovascular diseases and it may increase the number of morbidities and mortality if specific attention is not given to this population.

Final remarks

Concerning nutritional status, this study pointed out the high prevalence of overweight in the older people group and the aggravating factors were associated with a very high risk in older women for diseases associated with overweight diagnosed by measuring the waist circumference. Despite being a minority in the group, the older men were considered at no risk for diseases associated with overweight. This high prevalence in older women is of concern since increased waist circumference represents a risk for the development of chronic non-communicable diseases especially cardiovascular diseases. The waist circumference/hip circumference (WC/HC) detected that older women had mostly the android type of fat, while in older men the predominance was the gynoid type fat which confirms that older women were at risk for cardiovascular diseases. Hence the importance of investigating the body composition of the older people and the effects on their health since if specific attention is not given to this population segment the number of older people with morbidities may increase having an impact on the health system with dependence on these services for long periods.

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Conflicts of interest

The author declares there is no conflict of interest.

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