

Polypharmacy, chronic diseases and nutritional markers in community-dwelling older

Polifarmácia, doenças crônicas e marcadores nutricionais em idosos

Erika Aparecida Silveira^I, Luana Dalastra^{II}, Valéria Pagotto^{III}

ABSTRACT: Polypharmacy is a common practice among the elderly, but few studies have evaluated its association with nutritional markers. The aim of this study was to estimate the prevalence of polypharmacy and its association with nutritional markers, chronic diseases, sociodemographic and health variables. This research is part of the Study Elderly/Goiânia, which evaluated 418 elderly community in a cross-sectional design. Polypharmacy was defined as the use of five or more concomitant medications. The following nutritional markers were investigated: BMI, waist circumference, percentage body fat, weight gain and loss, use of diet, daily consumption of fruits, vegetables, skimmed and whole milk. Multivariate analysis was performed using hierarchical Poisson regression, with significance level set at 5%. The prevalence of polypharmacy was 28% (95%CI 23.1 – 32.5), with a significant association with feminine gender, age range 75 – 79 years, eutrophic nutritional status and obesity, use of diet, poor self-rated health and presence of two, three or more chronic diseases. The high prevalence of polypharmacy and its association with nutritional markers and chronic diseases call the attention for the need of nutritional surveillance and monitoring in the elderly.

Keywords: Aged. Polypharmacy. Nutritional Status. Diet. Chronic diseases. Self-assessment.

^ISchool of Medicine, Postgraduate Program in Health Sciences, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.

^{II}School of Nutrition, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.

^{III}School of Nursing, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.

Corresponding author: Valéria Pagotto. Universidade Federal de Goiás. Faculdade de Enfermagem. Rua 227, Qd.68 s/n, Setor Leste Universitário. CEP: 74605-080, Goiânia, GO, Brasil. E-mail: valeriapagotto@gmail.com

Conflict of interests: nothing to declare – **Financial support:** National Counsel of Technological and Scientific Development (CNPq), Universal Public Notice 014/2008.

RESUMO: A polifarmácia configura-se como uma prática frequente entre os idosos, mas poucos estudos já avaliaram sua associação com marcadores nutricionais. O objetivo deste estudo foi estimar a prevalência de polifarmácia e sua associação com marcadores nutricionais, doenças crônicas, variáveis sociodemográficas e de saúde. Esta pesquisa integra o Projeto Idosos/Goiania, que avaliou 418 idosos da comunidade em estudo transversal. Definiu-se polifarmácia como o uso de cinco ou mais medicamentos concomitantes. Os marcadores nutricionais coletados foram: IMC, circunferência da cintura, percentual de gordura corporal, ganho e perda de peso, uso de dieta, consumo diário de frutas, hortaliças, leite desnatado e integral. Realizou-se Regressão de Poisson multivariada por modelo hierarquizado com nível de significância de 5%. A prevalência de polifarmácia foi de 28% (IC95% 23,1 – 32,5), observando-se associação significativa com sexo feminino, faixa etária 75 – 79 anos, estado nutricional eutrófico e obeso, uso de dieta, percepção de saúde péssima, presença de duas, três ou mais doenças crônicas. A elevada prevalência de polifarmácia e sua associação com marcadores nutricionais e doenças crônicas demonstra a necessidade de vigilância e monitoramento nutricional em idosos.

Palavras-chave: Idosos. Polifarmácia. Estado nutricional. Dieta. Doenças crônicas. Autoavaliação.

INTRODUCTION

The demographic and epidemiological scenario in Brazil, characterized by a progressive increase in life expectancy¹ and the high prevalence of Chronic Non-Communicable Diseases (NCDs)², many of them concurrent³, entailed the use of various medications.

Polypharmacy (consumption of five or more concomitant medications) constitutes a common practice among the elderly, whose prevalence in Brazilian studies ranges from 5% to 27%⁶⁻¹³. Among the factors associated with this practice are: being female^{6,7,9,12,13}, aged ≥ 80 years^{6,7,9,10}, presenting a regular self-assessment of health¹⁴, chronic diseases^{6,7,9,11} and number of medical visits in the previous year^{7,8}. The growth of the pharmaceutical industry and the marketing of medications can also contribute to increased prescription by health professionals, enabling the use of multiple medications by the elderly^{4,5}.

Among these factors that contribute to polypharmacy, chronic diseases have greater relevance and association. Although pharmacological treatment is important for the control of chronic diseases, non-pharmacological treatment such as changes in lifestyle, especially diet therapy, it is essential for treating adults and older adults with such illnesses^{15,16}. However, few studies have examined the relationship between polypharmacy and nutritional markers in the elderly, such as nutritional status, body fat, food intake and diet therapy^{17,18}. The high prevalence of chronic diseases³ in the elderly may require

nutritional treatment with the prescription of a diet and of some specific foods^{15,16}, being relevant to study their association with polypharmacy. Therefore, the aim of this study was to investigate the association of nutritional markers, presence of chronic diseases, sociodemographic and health variables with polypharmacy in community-dwelling elderly, and to estimate their prevalence.

METHODOLOGY

This is a cross-sectional study, from a matrix project called The Seniors Project/Goiania, which evaluated health and nutrition in elderly users of the Unified Health System (SUS) in Goiânia (GO)^{3,19,20,21}. This study was approved by the Research Ethics Committee of Universidade Federal de Goiás (CEP/UFG) and everyone who agreed to participate signed an informed consent form (ICF).

In total, 418 seniors were included through a probabilistic sampling, which was proportional to the nine health districts in the city of Goiânia. This sample size was defined by the following parameters: 13% prevalence of diabetes mellitus (outcome of lower prevalence in the matrix study); power of 80%, confidence level of 95%; and ratio of exposed to unexposed 1:2; prevalence ratio of 2. As the prevalence of polypharmacy is superior to the outcome used in the calculation, the sample of The Senior Project/Goiania is sufficient to ensure the validity of the study, in addition to providing greater statistical power.

Data collection was conducted in the homes of the elderly between November 2008 and March 2009. Sampling procedures in multiple stages, pilot study, staff training, data collection instruments, standardization of anthropometrists, anthropometric techniques²² and other methodological information are already described in other publications^{3,19,20}.

At the end of data collection, the checking and coding of questionnaires was carried out, followed by a double entry for internal consistency analysis in the software Epi Data version 3.1.

The outcome variable in this study was polypharmacy, defined as the concomitant use of five or more drugs^{4,6,7}. The variable was dichotomized as yes (use of 5 or more medications) and no (use of 0 – 4 medications). Medication use was assessed by the response of the elderly to the question: “What drugs do you usually take every day?” Furthermore, the elderly were asked to show the recipe and packaging of the drug used, and 100% of them presented both to the interviewer. In the questionnaire, the interviewer would take note of the active ingredient to further classify them according to the reference of the Anatomical-Therapeutic-Chemical Classification System (ATC), a method for classification of pharmaceutical substances (active ingredient) developed by the WHO Collaborating Centre for Drug Statistics Methodology²³.

The following exposure variables were studied: sociodemographic variables (gender, age, skin color, living with a partner, years of education, and socioeconomic status), nutritional markers (nutritional status, waist circumference, body fat percentage, weight gain and loss, being on a diet, daily consumption of fruits, intake of vegetables, daily intake of skimmed and whole milk), chronic diseases and other health conditions (self-assessed health, hospitalization in the previous year).

The economy class variable was categorized as A/B, C, D/E, according to the Brazilian Association of Population Studies (ABEP)²⁴, whose classification takes into consideration durable items of household and level of education of household head.

Nutritional status was defined by the Body Mass Index (BMI) from weight and height measured. The elderly were classified as underweight (BMI < 22.0 kg/m²) normal weight (BMI 22.0 to 27.0 kg/m²) and obese (BMI > 27.0 kg/m²)^{25,26}. Waist circumference (WC) was classified according to the cutoff points proposed by the World Health Organization (WHO): increased WC (between 80 – 88 cm for women and 94 – 102 cm for men); greatly increased WC (> 102 cm for men and > 88 cm for women)²⁷.

The percentage of body fat was assessed using the protocol of the sum of four skin folds. We used the equation of body density of Durnin and Womersley²⁸ (1974): $D \text{ (g/cm}^3\text{)} = 1.1339 - 0.0648 \times \log(\sum 4DC)$ and, for conversion of body density in body fat percentage, the Siri equation²⁹ (1961) was applied: $\%G = (495/D) - 450$. To sort the percentage of fat in excessive adiposity, the Gallagher proposition was used³⁰, whose cutoff points for seniors are 42% for women and 30% for men.

For the classification of the daily consumption of fruits, vegetables, skim and whole milk, we analyzed the consumption once a day item from the Food Frequency Questionnaire (FFQ). These variables were classified as yes (consumption at least 1 time a day) and no (does not consume at least 1 time a day). Being on a diet was assessed through the question: "Do you follow a diet or any other food recommendation?"

Chronic diseases were identified through the responses to the question: "Which diseases the doctor has said that you have?" Later, they were classified as chronic or not and categorized numerically: 0 – 1; 2; > 3. Self-assessment of health was assessed by the question: "What do you think of your health in the past month", whose response options were: "very good", "good", "fair", "poor", "terrible"¹⁹.

Data were analyzed using STATA 8.0[®] software. A descriptive analysis of the types and classes of most commonly prescribed drugs was carried out. To evaluate the association between polypharmacy and the exposure variables, simple Poisson regression was performed with their respective confidence intervals (95%CI). The χ^2 test for linear trend was also applied. Multivariate analysis was performed hierarchically in three levels: Level 1 – sociodemographic variables; Level 2 – nutritional markers; Level 3 – chronic diseases and other health variables. All variables that showed p-values lower than 0.20 in the bivariate analysis were included in the model.

RESULTS

The final sample of The Senior Project/ Goiânia consisted of 418 elderly, 66% females, 48.5% aged 60 – 69 years and 46.9% belonged to class C. The prevalence of polypharmacy was 28.0% (95%CI 23.1 – 32.5) and was significantly higher in eutrophic and obese females (32.7%), aged 75 – 79 years, in the presence of 2 chronic diseases and/or 3 chronic diseases and terrible self-assessed health (Figure 1). The average intake of medications was of 3.7 (\pm 2.4), with a maximum of 12 drugs per individual. Most used drug classes were: cardiovascular (49.2%), alimentary tract and metabolism (18.0%) and central nervous system (12.2%) (Figure 2).

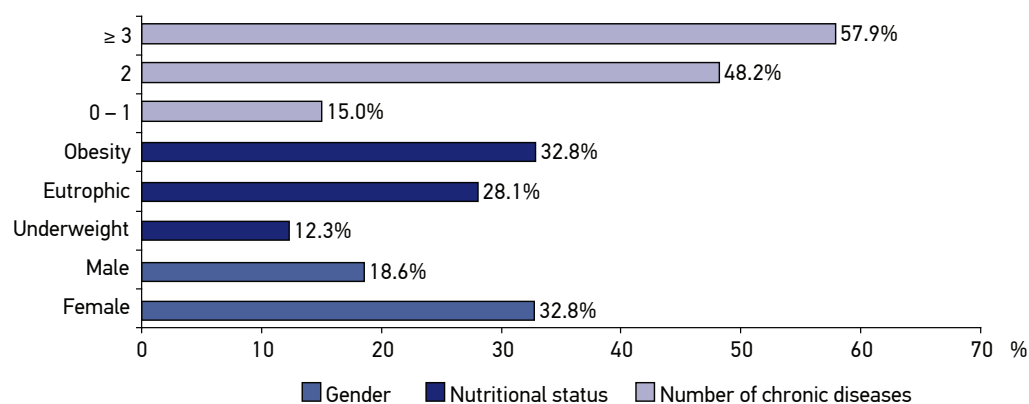


Figure 1. Prevalence of polypharmacy in elderly users of Primary Care according to gender, nutritional status and number of chronic diseases, Goiânia, GO, 2009.

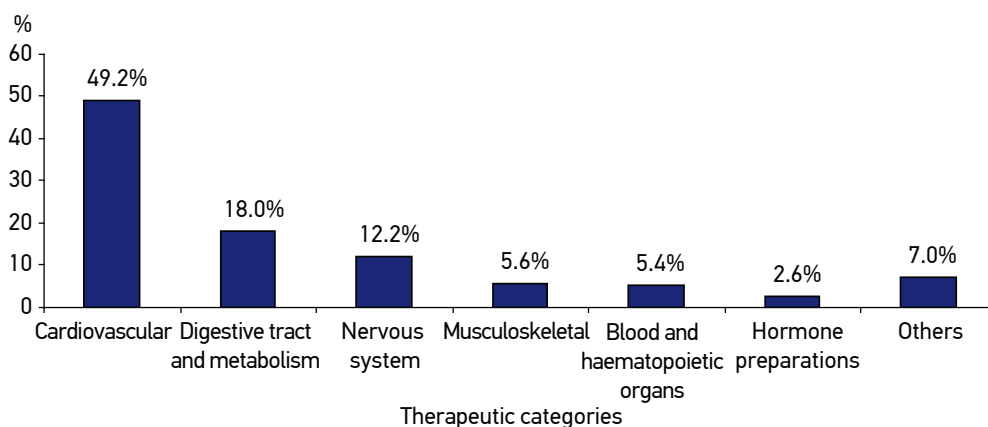


Figure 2. Distribution of therapeutic categories in community-dwelling elderly, Goiânia, GO, 2009.

The variables that were associated with polypharmacy in the bivariate analysis were: female gender (OR = 1.76; 95%CI 1.14 – 2.73) (Table 1), terrible self-assessed health (OR = 2.86; 95%CI 1.63 – 5.08), hospitalization in the previous year (OR = 1.57; 95%CI 1.07 – 2.31), presence of two chronic diseases (OR = 3.20; 95%CI 2.12 – 4.83) and three or more chronic diseases (OR = 3.85; 95%CI 2.29 – 6.48) (Table 2).

Regarding nutritional markers, the bivariate analysis also showed an association between polypharmacy and nutritional status in the eutrophic (OR = 2.28; 95%CI 1.07 – 4.86) and obese (OR = 2.67; 95%CI 1.28 – 5.55) categories; greatly increased waist circumference (OR = 2.24; 95%CI 1.29 – 3.89); being on a diet (OR = 2.19; 95%CI 1.48 – 3.23); daily intake of skimmed milk (OR = 1.70; 95%CI 1.10 – 2.63) (Table 2).

After hierarchical multivariate analysis (Table 3), the following factors remained associated with polypharmacy: being female (OR = 1.76; 95%CI 1.21 – 2.65), aged 75 – 79 years (OR = 1.98; 95%CI 1.03 – 3.79), being eutrophic (OR = 2.17; 95%CI 1.11 – 4.27) and obese (OR = 2.41; 95%CI 1.24 – 4.70), being on a diet (OR = 2.09;

Table 1. Prevalence and association between polypharmacy and sociodemographic variables in community-dwelling elderly, Goiânia, GO, 2009 (n = 418).

Variables	n (%)	Polypharmacy Prevalence n (%)	OR (95%CI)	p-value
Gender				0,002
Female	276 (66.0)	90 (32.8)	1.76 (1.14 – 2.73)	
Male	142 (34.0)	26 (18.6)	1.00	
Age (years)				0.144
60 – 64	86 (20.6)	19 (22.1)	1.15 (0.52 – 2.55)	
65 – 69	117 (28.0)	35 (30.4)	1.59 (0.76 – 3.31)	
70 – 74	101 (24.2)	28 (27.7)	1.45 (0.68 – 3.07)	
75 – 79	67 (16.0)	25 (37.8)	1.98 (0.92 – 4.24)	
≥ 80	47 (11.2)	9 (19.1)	1.00	
Skin color				0.068
White	194 (46.4)	62 (32.2)	1.33 (0.92 – 1.92)	
Brown/Black	224 (53.6)	54 (24.2)	1.00	
Living with partner				0.328
Yes	229 (54.8)	59 (26.0)	1.00	
No	189 (45.2)	57 (30.3)	1.17 (0.81 – 1.68)	
Years of education				0.132
Did not study	112 (30.0)	27 (24.3)	1.04 (0.60 – 1.79)	
1 to 4 years	154 (41.2)	51 (33.3)	1.42 (0.88 – 2.30)	
5 years or more	108 (28.8)	25 (23.3)	1.00	
Social class				0.406*
A/B	63(15.1)	19 (30.6)	1.21 (0.70 – 2.09)	
C	196 (46.9)	57 (29.2)	1.15 (0.77 – 1.73)	
D/E	159 (38.0)	40 (25.3)	1.00	

*Linear χ^2 .

Table 2. Prevalence and association between polypharmacy and nutritional markers, chronic diseases and others health variables in community-dwelling elderly, Goiânia, GO, 2009 (n = 418).

Variables	n (%)	Polypharmacy Prevalence (%)	OR (95%CI)	p-value
Nutritional status				0.003*
Underweight	66 (15.8)	8 (12.3)	1.00	
Eutrophic	147 (35.2)	41 (28.1)	2.28 (1.07 – 4.86)	
Obesity	205 (49.0)	67 (32.8)	2.67 (1.28 – 5.55)	
Waist circumference				0.000*
Normal	99 (23.8)	15 (15.4)	1.00	
Increased	88 (21.1)	21 (23.9)	1.54 (0.79 – 2.99)	
Greatly increased	229 (55.1)	79 (34.6)	2.24 (1.29 – 3.89)	
Body fat percentage				0.776
Normal adiposity	206 (49.3)	56 (27.3)	1.00	
Excess adiposity	212 (50.7)	60 (28.5)	1.04 (0.73 – 1.50)	
Is on a diet				
No	211(50.5)	37(17.6)	1.00	0.000
Yes	207(49.5)	79(38.5)	2.19(1.48 – 3.23)	
Daily consumption of fruits				0.311
No	233 (56.0)	60 (26.1)	1.17 (0.81 – 1.69)	
Yes	183 (44.0)	56 (30.6)	1.00	
Daily intake of vegetables				0.181
No	216 (51.9)	54 (25.2)	1.00	
Yes	200 (48.1)	62 (31.2)	1.23 (0.86 – 1.78)	
Daily consumption of whole milk				0.314
No	215 (51.6)	64 (30.2)	1.17 (0.81 – 1.69)	
Yes	202 (41.4)	52 (25.7)	1.00	
Daily intake of skimmed milk				0.004
No	357 (85.6)	90 (25.4)	1.00	
Yes	60 (14.4)	26 (43.3)	1.70 (1.10 – 2.63)	
Weight Gain				0.778
No	319 (78.7)	87 (27.5)	1.00	
Yes	86 (21.3)	25 (29.1)	1.05 (0.68 – 1.65)	
Weight loss				0.079
No	264 (64.9)	66 (25.1)	1.00	
Yes	143 (35.1)	47 (33.3)	1.33 (0.91 – 1.93)	
Self-assessment of health				0.000*
Very good/Good	127 (30.9)	22 (17.4)	1.00	
Regular	173 (41.0)	48 (27.9)	1.60 (0.96 – 2.65)	
Poor	57 (13.8)	17 (29.8)	1.71 (0.91 – 3.22)	
Terrible	55 (13.3)	27 (50.0)	2.86 (1.63 – 5.08)	
Hospitalization in the previous year				0.006
No	316 (75.6)	77 (24.5)	1.00	
Yes	102 (24.4)	39 (38.6)	1.57 (1.07 – 2.31)	
Number of chronic diseases				0.000*
0 – 1	268 (64.3)	40 (15.0)	1.00	
2	111 (26.6)	53 (48.2)	3.20 (2.12 – 4.83)	
> 3	38 (9.1)	22 (57.9)	3.85 (2.29 – 6.48)	

*Linear χ^2 .

95%CI 1.49 – 2.92), terrible self-assessed health (OR = 1.96; 95%CI 1.25 – 3.09), presence of two chronic diseases (OR = 2.76; 95%CI 1.92 – 3.96) and three or more chronic diseases (OR = 2.73; 95%CI 1.77 – 4.20).

DISCUSSION

The use of medicine is a common practice among the elderly, given that, in this study, 72% used one or more drugs and the prevalence of polypharmacy was 28%. These findings are superior to studies already developed in Brazil^{6,10}, but similar to the results of

Table 3. Adjusted prevalence ratios for the association between polypharmacy and sociodemographic variables, nutritional markers and health conditions in community-dwelling elderly, Goiânia, GO, 2009.

Variables	Adjusted OR (95%CI)	p-value*
1st Level		
Gender		
Female	1.76 (1.21 – 2.65)	0.004
Male	1.00	
Age group		
60 – 64	1.15 (0.57 – 2.31)	0.693
65 – 69	1.60 (0.85 – 3.00)	0.144
70 – 74	1.50 (0.79 – 2.85)	0.219
75 – 79	1.98 (1.03 – 3.79)	0.040
≥ 80	1.00	
2nd Level		
Nutritional status		
Underweight	1.00	
Eutrophic	2.17 (1.11 – 4.27)	0.024
Obesity	2.41 (1.24 – 4.70)	0.010
Is on a diet		
No	1.00	
Yes	2.09 (1.49 – 2.92)	0.000
3rd Level		
Self-assessment of health		
Very Good/Good	1.00	
Regular	1.45 (0.95 – 2.23)	0.085
Poor	1.37 (0.79 – 2.37)	0.255
Terrible	1.96 (1.25 – 3.09)	0.003
Chronic diseases		
0 – 1	1.00	
2	2.76 (1.92 – 3.96)	0.000
> 3	2.73(1.77 – 4.20)	0.000

*Wald test.

BambuÍ Project⁹ and Porto Alegre⁷. Some factors may contribute to the high consumption of drugs, such as low frequency of use of non-pharmacological treatments for chronic diseases and/or other health problems, as well as easy access to medications⁷. In addition to these factors, in some cases, in an attempt to alleviate symptoms or have faster response compared to non-pharmacological therapies, practitioners prescribe drugs in a distorted or impulsive manner, which can contribute to the unnecessary use of drugs and increase the number of drugs consumed by the elderly⁵. One of the consequences of the use of multiple drugs is the increased risk of Adverse Drug Reactions (ADR), which in turn, increases the morbidity and mortality among the elderly⁴.

The most frequently used medications were the ones that act on the cardiovascular system, followed by those that act on the digestive system, metabolism and central nervous system, which is consistent with findings of previous studies^{6-11,19}. These findings are consistent with the epidemiological profile of Chronic Noncommunicable Diseases (NCDs) in Brazil² and the high prevalence of cardiovascular risk factors among the elderly in this study, as discussed above³. Older people commonly complain of insomnia, anxiety and confusional states, contributing to high rates of prescription drugs acting on the central nervous system⁶. The consumption of drugs that act on the digestive tract observed in this and other studies^{7,8} may be related to the need to alleviate symptoms in the gastric mucosa caused by excessive use of drugs as a result of polypharmacy itself. It is noteworthy that some drugs can cause gastric symptoms, such as anti-inflammatory drugs, which cause irritation and gastric ulcer, and anticholinergics, which reduce the motility of the gastrointestinal tract⁴. In this study, the profile of chronic disease and the predominant drug classes demonstrate that polypharmacy in the elderly may be related to long-term treatments, suggesting a continuity of practice in later years, which requires attention and continuous monitoring by health professionals.

Women had 1.76 times higher prevalence of polypharmacy than men, corroborating results from other studies^{6,7,9,12}. Considering the current demographic and epidemiological scenario, women have a high prevalence of diseases, longer life expectancy than men¹ and a different attitude towards the disease, as they report signals and symptoms with higher frequency and use more health services, being, therefore, more subject to medicalization^{7,9}.

This study also supports the majority of epidemiological studies that demonstrate significant increase in the use of drugs with advancing age^{6,7,9,10}, with a higher prevalence of polypharmacy in the 75 – 79 years age group. However, a low prevalence of polypharmacy was observed in the 80 years or older age group. With increasing life expectancy, the 80 years or more age group, has been considered a distinct age group. It is suggested that future research investigate the medicinal practices in this age group.

Among the variables related to health status, a terrible health self-assessment and the presence of two or more chronic diseases had statistically significant associations with polypharmacy, as described in previous studies^{6,7,9,11,14,19}. This is an expected result, given that the elderly who have multiple illnesses can use multiple drugs and consequently self-assess their health as poor/terrible. Self-assessment of health expresses the perception of the subject based on interpretations of physical, cognitive and emotional health, as well as their

expectations and their references for comparison¹⁹. Thus, the routine use of medications, including timetables, route of administration, drug and correct dose and the amount of medications consumed can contribute to a feeling of lack of health and consequent poor/terrible health self-assessment. The presence of multiple diseases, potential drug interactions or adverse effects may enhance the self-reported poor/terrible health. These findings reaffirm the need for health professionals to use non-pharmacological treatments and in health education activities, which, in turn, may contribute to the reduction of polypharmacy and to a better health perception.

As for nutritional markers, it was observed that, with increasing BMI, the prevalence of polypharmacy also increases. A review study¹⁸ demonstrated the existence of association between polypharmacy and nutritional status, but with controversy, because, in some studies, polypharmacy was associated with weight loss and, in others, with obesity. However, studies¹⁸ show greater consistency in the association between polypharmacy and obesity, corroborating the findings of this research. The hypothesis for this association is based on the knowledge that obesity is a risk factor for the occurrence of comorbidities such as diabetes and hypertension, as well as hampering the control of blood glucose and blood pressure levels³, and therefore, the use of medications is necessary^{15,16}.

The reduction in BMI, regardless of the use of drugs, leads to the lowering of blood pressure and blood glucose. Thus, the non-pharmacological treatment including diet therapy (or nutritional treatment) is an important therapeutic approach to control these chronic diseases^{15,16}. In this research, there was an association between diet and use of polypharmacy, which may indicate that the elderly received dietotherapeutic prescription due to the presence of chronic diseases, that is, received pharmacological and non-pharmacological treatment. It is noteworthy that the elderly were not asked about the dietotherapeutic prescription, therefore, this was a self-reported information. It is noteworthy that the elderly who participated in this research are the users of the Unified Health System (SUS), and the primary health care network in the municipality is composed of a multidisciplinary team, including nutritionists, who perform individual consultations and health and nutrition education groups. This may have facilitated the access of seniors to information about the importance of using diet to treat diseases.

The dietary intake variables did not remain significantly associated with polypharmacy after adjustments in the final multivariate regression. It is, however, relevant information that this research presents, because other data that evaluated the association between dietary intake and polypharmacy were not located.

Due to the cross-sectional design, this study is not adequate to test relationships between causes and effects, since they presuppose guarantee that selected variables precede the outcome in time. However, it can be observed that there is an association between polypharmacy and the variables described above, which in itself reflects important links between the patient characteristics and use of medications. On the other hand, some measures were taken to ensure the quality of information: training and standardization of evaluators, pilot study

and calibration of equipment. Data on medications were also carefully collected to ensure the accuracy and validity of results.

CONCLUSION

This study showed an association between polypharmacy and eutrophic and obese females in the 75 – 79 years age range, who were on a diet, had a poor health self-assessment, and presented two, three or more chronic diseases.

Studies like this are important because they signal reflections on the need for reorientation of pharmaceutical care and the adoption of non-pharmacological treatments among the elderly population. In addition, they guide the actions of all health professionals to make drug therapy more efficient in internal and external contexts of SUS. Nutritional guidelines aimed at improving eating habits for the control of diseases, education for the family, carers and the elderly themselves about the effects of polypharmacy and the qualification of the professionals as to prescription are possibilities of prevention of polypharmacy and hence of possible drug interactions.

It is recommended that further studies on polypharmacy are developed with an emphasis on nutritional aspects, mainly cohort, to advance and enhance non-pharmacological strategies that are effective and accessible to the elderly.

REFERENCES

1. Veras R. Envelhecimento populacional e as informações de saúde do PNAD: Demandas e Desafios Contemporâneos. *Cad Saúde Pública* 2007; 23(10): 2463-6.
2. Schmidt MI, Duncan BB, Silva GA, Menezes AM, Monteiro CA, Barreto SM et al. Doenças crônicas não transmissíveis no Brasil: carga e desafios atuais. In: Victora CG et al. *Saúde no Brasil: a série The Lancet*. Rio de Janeiro: Fiocruz; 2011. p. 61-74.
3. Ferreira CCC, Peixoto MRG, Barbosa MA, Silveira EA. Prevalência de Fatores de Risco Cardiovascular em Idosos Usuários do Sistema Único de Saúde de Goiânia. *Arq Bras Cardiol* 2010; 95(5): 621-8.
4. Secoli SR. Polifarmácia: interações e reações adversas no uso de medicamentos por idosos. *Rev Bras Enferm* 2010; 63(1): 136-40.
5. Rozenfeld S. Prevalência, fatores associados e mau uso de medicamentos entre os idosos: uma revisão. *Cad Saúde Pública* 2003; 19(3): 717-24.
6. Coelho-Filho JM, Marcopito LF, Castelo A. Perfil de utilização de medicamentos por idosos em área urbana do Nordeste do Brasil. *Rev Saúde Pública* 2004; 38(4): 557-64.
7. Flores LM, Mengue SS. Drug use by the elderly in Southern Brazil. *Rev Saúde Pública* 2005; 39(6): 924-9.
8. Flores VB, Benvegnú LA. Perfil de utilização de medicamentos em idosos da zona urbana de Santa Rosa, Rio Grande do Sul, Brasil. *Cad Saúde Pública* 2008; 24(6): 1439-46.
9. Loyola-Filho AI, Uchôa E, Firmo JOA. Estudo de base populacional sobre o consumo de medicamentos entre idosos: Projeto Bambuí. *Cad Saúde Pública* 2005; 21(2): 545-53.
10. Loyola-Filho AI, Uchôa E, Lima-Costa MF. Estudo epidemiológico de base populacional sobre uso de medicamentos entre idosos na Região Metropolitana de Belo Horizonte, Minas Gerais, Brasil. *Cad Saúde Pública* 2006; 22(12): 2657-67.

11. Carvalho MFC. A polifarmácia em idosos do Município de São Paulo: Estudo SABE – Saúde, Bem-estar e Envelhecimento (dissertação de mestrado). São Paulo (SP): Faculdade de Saúde Pública da USP; 2007.
12. Marin MJS, Cecílio LCO, Perez AEWVF, Santella F, Silva CBA, Roceti LC. Caracterização do uso de medicamentos entre idosos de uma unidade do Programa Saúde da Família. *Cad Saúde Pública* 2008; 24(7): 1545-55.
13. Duarte LR, Gianini RJ, Ferreira LR, Camargo MAS, Galhardo SD. Hábitos de consumo de medicamentos entre idosos usuários do SUS e de plano de saúde. *Cad Saúde Colet* 2012; 20(1): 64-71.
14. Lima-Costa MF, Firmo JOA, Uchoa EA. A estrutura da autoavaliação da saúde entre idosos: projeto Bambuí. *Rev Saúde Pública* 2004; 38(6): 827-34.
15. Sociedade Brasileira de Cardiologia. Departamento de aterosclerose da Sociedade Brasileira de Cardiologia. IV Diretrizes Brasileiras sobre Dislipidemias e Prevenção da Aterosclerose. *Arq Bras Cardiol*; 2007; 88(Suppl.1): 1-19.
16. Sociedade Brasileira de Cardiologia. VI Diretrizes Brasileiras de Hipertensão. *Arq Bras Cardiol* 2010; 95(Suppl.1): 1-51
17. Jyrkkä J, Mursu J, Enlund H, Lönnroos E. Polypharmacy and nutritional status in elderly people. *Curr Opin Clin Nutr Metab Care*. 2012; 15(1): 1-6.
18. Heuberger RA, Caudell K. Polypharmacy and nutritional status in older adults: a cross-sectional study. *Drugs Aging*. 2011; 28(4): 315-23.
19. Pagotto V, Nakatani AYE, Silveira EA. Fatores associados à autoavaliação de saúde ruim em idosos usuários do Sistema Único de Saúde. *Cad Saúde Pública* 2011; 27(8): 1593-602.
20. Pagotto V, Silveira EA, Velasco WD. Perfil das hospitalizações e fatores associados em idosos usuários do SUS. *Ciênc Saúde Coletiva* 2013; 18(10): 3061-70.
21. Pagotto V, Silveira EA. Applicability and agreement of different diagnostic criteria for sarcopenia estimation in the elderly. *Arch Gerontol Geriatr* 2014; 59: 288–294.
22. Lohman TG, Roache, AF. Anthropometric standardization reference manual. Illinois: Human Kinetics Books; 1992.
23. WHO Collaborating Center for drug statistics methodology. Guidelines for ATC classification and DDD assignment. Oslo: World Health Organization; 2007.
24. Associação Brasileira das Empresas de Pesquisa (ABEP). Critério de Classificação Econômica Brasil. 2008. Disponível em: <http://www.abep.org/novo/Utils/FileGenerateashx?id=12> (Acessado em março de 2009).
25. Lipschitz DA. Screening for nutritional status in the elderly. *Prim Care* 1994; 21(1): 55-67.
26. Silveira EA, Kac G, Barbosa LS. Prevalência e fatores associados à obesidade em idosos residentes em Pelotas, Rio Grande do Sul, Brasil: classificação da obesidade segundo dois pontos de corte do índice de massa corporal. *Cad Saúde Pública* 2009; 25(7): 1569-77.
27. World Health Organization Technical Report Series. Obesity: preventing and managing the global epidemic. Geneva: World Health Organization; 2000. p. 9-11.
28. Durnin JGA, Womersley J. Body fat assessed from total body density and its estimation from skinfold thickness: measurements on 481 men and women age from 16 to 72 years. *Br J Nutr* 1974; 32(1): 77-97.
29. Siri SE. Body composition from fluid spaces and density: analysis of methods. In: Brozek J, Henschel A. *Techniques for Measuring Body Composition*. Washington: National Academy of Sciences-National Research Council; 1961. p. 223-44.
30. Gallagher D, Heymsfield SB, Heo M, Jebb SA, Murgatroyd PR, Sakamoto Y. Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. *Am J Clin Nutr* 2000; 72(3): 694-701.

Received on: 02/18/2013

Final version presented on: 04/02/2014

Accepted on: 04/28/2014