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Original Articles

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Use of potentially inappropriate medications by old people in a retiree's association

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Abstract

Objective: to verify the prevalence of the use of potentially inappropriate medications and polypharmacy by old people. *Methods*: observational, cross-sectional, analytical, quantitative, population-based study in a retirees association. The data were collected from a questionnaire structured and created by the researchers and applied to the household. The association has 2,902 associates and underwent a stratified proportional sampling by gender, delimiting a sample of 203 old people, being 129 women and 76 men. *Results*: the mean age of study participants was 73.1+8.13 years (90%CI:72.2-74.0), ranging from 60 to 95 years. The majority declared being married 110 (54.2%), with elementary education 145 (71.4%) and family income between 2 and 4 minimum wages 100 (49.3%). The most frequent comorbidities were: diabetes *mellitus* 33 (16.26%), systemic arterial hypertension 137 (67.49%), hypercholesterolemia 24 (11.8%), arthritis/arthrosis 62 (30.54%), osteoporosis 41 (20.2%), depression 27 (13.3%), among others with non-significant values. When analyzing the use of continuous and occasional medications, a median of 6 drugs used by participants was found, with 1 being the minimum number and 18 being the maximum number. The use of polypharmacy was identified in 131 (64.5%) old people and the use of potentially inappropriate medications in 160 (78.8%). Regarding the use of polypharmacy, a significant association was found with: female gender (*p*=0.004); and having low education (*p*=0.017), and single marital status (0.027). *Conclusions*: in the context of pharmacoepidemiology, knowledge of the factors associated with the use of medicines may be useful to alert health professionals to the importance of identifying and monitoring the most vulnerable groups of old people in order to avoid the use of potentially inappropriate medications for the age group.

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INTRODUCTION

Although necessary, some medications have their use problems superior to their benefit and, in some cases, due to changes in pharmacokinetic and pharmacodynamic responses resulting from the physiology of the older person. Thus, some medications are considered inappropriate for this age group, either due to lack of evidence about therapeutic efficacy, whose risk is greater than the clinical benefits provided, while safer and more effective alternatives are available, or when the use of the medication may aggravate preexisting diseases[1].

It was thinking about the clinical improvement of older patients and with the objective of increasing safety in the prescription of medicines that the American geriatrician Mark Beers (1991), published the list of Potentially Inappropriate Medicines for the Older Person (PIMs), initially focused on the practice of medicalization in institutionalized old people[2]. This list was drawn up and established by experts who determined which drugs should be avoided and which should be prescribed with caution, or in reduced doses, and their use constantly monitored[3].

New updates to the Beers criteria were made in 1997 and 2003, which now include all levels of geriatric care. More recently, the American Geriatric Society (AGS) updated the criteria in 2012, also in 2015, which added two topics: a) medications that require dose adjustment, according to the patient's renal function; b) medication interactions that should be avoided in the older person due to the increased risk of adverse reactions[4].

The prevalence of inappropriate medication in old people depends on the year the criterion was used and the place where the study was carried out. For example, in a hospital environment, prevalence rates tend to be very high, such as 81.9% in a medium and high complexity hospital in western Paraná[2]. However, in Ribeirão Preto (SP), in interviews with old people in pharmacies in Basic Health Units, the prevalence was 59.2% using the 2012 criterion, while using the Beers criterion of 2003 it was 48%[5]. Following the Beers criteria of 2012, in the municipality of Viçosa (MG), with non-institutionalized old people approached by home interviews, a prevalence of 43.8% was observed[6].

The presence of polypharmacy among old people is very common due to the different pathologies that they present. A recently published study, part of the fragility research in Brazilian Old People (FIBRA), carried out in seven Brazilian municipalities, found a prevalence of polypharmacy in 18.4% of people over 65 years of age[7]. Also in nationwide research, PNAUM (national research on use and promotion of rational use) the prevalence of polypharmacy was 18.0%[8]. Some studies, such as the SABE study, in São Paulo (SP), found use of five or more medications in 36% of old people[9].

Following the list of criteria by Beers (2015)[4], the present study aimed to verify the prevalence of the use of potentially inappropriate medications and polypharmacy by old people.

METHOD

This is an observational, cross-sectional, analytical, quantitative, population-based study.

Considering the inclusion criteria, individuals aged 60 years or over, both sexes, participating in a retiree association, located in the municipality of Santo Ângelo, state of Rio Grande do Sul, Brazil, participated in the research. All participants signed the Free and Informed Consent Form. Bedridden patients, without physical and psychological capacity, who had a caregiver for more than 30 days were also included in the survey, but the interview was conducted with the caregiver.

The sample size was estimated through a sample calculation that defined a tolerable sample error of 5% and a confidence interval of 90%, considering a frequency of inappropriate medications of 30%, based on the study by Santos et al. (2013)[10]. Considering that the number of active members was 2,902 people, of which 1,724 are women and 1,178 are men, a sample size of 211 old people was determined, representing close to 7% of the number of members.

The selection of the old people was carried out using the stratified sampling technique proportional to sex. Thus, the number of 125 women and 86 men was obtained, but with some negatives of participation and substitutions, the final sample was 203 participants,

being 129 women and 74 men. The study sample was taken from the population, as the associates are identified and numbered in a list, so the selection of respondents was carried out by means of a simple online drawing of a number, using the site "sorteador.com", from the list provided by the association.

The research data were collected during home visits, through interviews, using a research instrument composed of a questionnaire of the sociodemographic profile (age, sex, marital status, education and income) and a questionnaire, modified from the Dáder[11] method, to characterize the pharmacotherapeutic profile of the study population. Comorbidities were computed based on self-reported diseases and reconciliation by the medications used in the review of the therapy used by the patient. During the interview, the patient's medication box or bag was requested and each medication present in the bag was reviewed, in addition to the medical prescriptions available at home.

For the purposes of analysis, some independent variables were grouped, among them: marital status was grouped in such a way that all individuals who had a partner were considered married and those who were separated/widowed were considered single; education was grouped into high and low education, and those with low education comprise individuals who have education ranging from illiterate to complete elementary school, and high education includes individuals who have incomplete high school education onwards.

For the classification of medications, Anatomical Therapeutic Chemical (ATC) was used in its first and second level[12]. And for potentially inappropriate medications, the Beers criteria updated by the American Geriatrics Society (AGS), version 2015[4] were used. The polypharmacy variable was defined as the use of five or more medications. Polypharmacy was determined based on the question: Could you show me the medicines you are currently using or taking?, as carried out in the Health, Wellness and Aging study (SABE)[9].

For statistical analysis of the intergroup data, the chi-square test was used, and Odds Ratio (OR) was used to calculate the risk. To test the association of dependent and independent variables, the analysis of the Poisson regression model was used. Prevalence ratios (PR) were estimated with their respective 95% confidence intervals (95% CI). The inclusion criterion was p <0.20 in the adjusted analysis and the variables with a final model of p <0.05 were considered maintenance, as having a statistically significant association.

In accordance with resolution 466/2012 of the National Health Council, this study was approved by the Ethics and Research Committee of the Integrated Regional University of Alto Uruguai e das Missões (URI), Santo Ângelo Campus (RS), under substantiated opinion no. 2,550,745. The research participants were informed about the work and the questionnaire, and signed the free and informed consent form.

RESULTS

The average age of the study participants was 73.1 + 8.13 years (CI90%: 72.2-74.0). Most were female (63.5%), married (54.2%), with elementary education (71.4%) and family income between two and four minimum wages (49.3%). Table 1 shows these characteristics.

As for the existing comorbidities, 94.6% (192/203) of the interviewees reported having at least one health problem diagnosed by the doctor. Among which, the most present were: systemic arterial hypertension 67.5% (137/203), arthritis/arthrosis 30.5% (62/203), osteoporosis 20.2% (41/203), diabetes mellitus 16.3% (33/203), among others with lower proportional values.

When analyzing the use of continuous and occasional medications, a median of six medications used by the participants was found, with 1 being the minimum number and 18 being the maximum number. The use of polypharmacy was identified in 64.5% (131/203) of the old people and the use of potentially inappropriate medications in 78.8% (160/203). Table 1 shows these characteristics.

Regarding the use of polypharmacy, a statistically significant association was found with: female gender (p=0.004); married (p=0.027) and having low education (p=0.017). It was also possible to identify that female individuals are 2.4 times more likely to

be polymedicated, as well as those who have low education are 2.3 times more likely to use five or more medications, characterizing polypharmacy, whereas the married marital status reduced polypharmacy with 0.5 PR (0.3-0.9). As noted in table 2.

Still, when doing the multivariate analysis by analyzing variable by variable, and what is its impact on the dependent variable. It is observed that the variable "use of potentially inappropriate medication" for old people is associated with polypharmacy, as described in table 3.

Table 4 shows the association between sociodemographic characteristics and the use of inappropriate medications, with no statistically significant association between them.

More than half of the sample uses medications considered potentially inappropriate, with 30.0% (61/203) of these individuals using at least one inappropriate medication and 48.8% (99/203) using two or more inappropriate medications, reaching the maximum number of six inappropriate medications used by a single person.

Table 1. Profile of patients (n=203) from a group of members of a retiree association in the municipality of Santo Ângelo, RS.

Variables	Total n (%)
Sex	
Female	129 (63.5)
Male	74 (36.5)
Marital status	
Married	102 (50.2)
Widower	55 (27.1)
Single	24(11.8)
Divorced	14 (6.9)
Stable union	8 (3.9)
Education	
Ensino Fundamental Incompleto	64.8 (359)
Incomplete Elementary School	129 (63.5)
Complete high school	31 (15.3)
Complete primary education	16 (7.9)
Incomplete high school	9 (4.4)
Illiterate	8 (3.9)
Complete Higher Education	6 (3)
Incomplete Higher Education	4 (2)
Family Arrangement	
Companion	81 (39.9)
Alone	39 (19.2)
Companion and Children	31 (15.3)
Children	27 (13.3)
Others	25 (12.3)
Income (in minimum wage)	
Cônjuge	63.4 (351)
2 to 4	100 (49.3)
< 2	81 (39.9)
4 to 10	21 (10.3)
>10	1 (0.5)

Table 2. Relationship between sociodemographic characteristics and the occurrence of polypharmacy among old people in a retiree association in the municipality of Santo Ângelo, RS.

Variable	Polypharmacy		p	OR (95%CI)
	Yes	No		
	n (%)	n (%)		
Sex				
Female	93 (72.1)	36 (27.9)	0.004	2.4 (1.3 - 4.4)
Male	38 (51.4)	36 (48.6)		
Marital Status				
Married*	63 (57.3)	47 (42.7)	0.027	0.5 (0.3 – 0.9)
Single **	68 (73.1)	25 (26.9)		
Education				
Low***	106 (69.3)	47 (30.7)	0.017	2.3 (1.2 – 4.3)
High****	25 (50)	25 (50)		
Family Arrangement				
Alone	29 (74.4)	10 (25.6)	1.000	1.7 (0.8 – 3.7)
With companion	101 (63.1)	59 (36.9)		
Income (in minimum wage)				
≤ 4	117 (64.6)	64 (35.4)	0.260	1.0 (0.4 – 2.6)
> 4	14 (63.6)	8 (36.4)		
Inappropriate Medications				
Yes	118 (90.1)	13 (9.9)	0.00	6.5 (3.1 – 13.6)
No	13 (30.2)	30 (69.8)		

*Married groups all those individuals who have a partner regardless of marital status; **Single groups all those individuals who are single, widowed or separated; ***Low education comprises individuals who have education ranging from illiterate to complete elementary school; ****High education comprises individuals who have incomplete high school education onwards.

Table 3. Multivariate analysis between sociodemographic characteristics and the use of inappropriate medications and the occurrence of polypharmacy among old people in a retiree association in the municipality of Santo Ângelo.

Variable	Wald's chi-square	df	p
(Interception)	2.140	1	0.143
Sex	0.554	1	0.457
marital status	0.611	4	0.962
Education	1.429	6	0.964
Family arrangement	0.679	7	0.998
Income	0.920	3	0.820
Has inappropriate	4.611	1	0.032
Age	0.553	1	0.457

Dependent variable: polypharmacy; model: (interception), sex, marital status, education, family arrangement, income, have inappropriate, age.

Table 4. Relationship between sociodemographic characteristics and the use of potentially inappropriate medications by old people in a retiree association in the municipality of Santo Ângelo, RS.

Variable	Inappropriate Medications		*p*	OR (95%CI)
	Yes n (%)	No n (%)		
Sex				
Female	99 (76.7)	30 (23.2)	0.377	0.7 (0.3 – 1.5)
Male	61 (82.4)	13 (21.3)		
Marital status				
Married*	84 (76.4)	26 (23.6)	0.392	0.7 (0.3 – 1.4)
Single**	76 (81.7)	17 (18.3)		
Education				
Low***	123 (80.4)	30 (29.6)	0.328	1.4 (0.7 – 3.0)
High****	37(74.0)	13 (26.0)		
Family Arrangement				
Alone	32 (82.1)	7 (17.9)	0.666	1.3 (0.5 – 3.3)
With companion	124 (77.5)	36 (22.5)		
Income (minimum wage)				
<or equal to 4	143 (79.0)	38 (21.0)	0.789	1.1 (0.4 – 3.2)
> 4	17 (77.3)	5 (22.7)		

*Married groups all those individuals who have a partner regardless of marital status; **Single groups all those individuals who are single, widowed or separated; ***Low education comprises individuals who have education ranging from illiterate to complete elementary school; ****High education comprises individuals who have incomplete high school education onwards.

Table 5 describes and quantifies the inappropriate medications reported most frequently by the study population. In which the most found were those who work on the musculoskeletal system (76.1%), followed by those who work on the central nervous system (36.2%). Among the medications that act on the musculoskeletal system, there was a greater frequency in the use of the medication orphenadrine (20.3%). In addition, 26.6% of patients use proton pump inhibitors, with more than 90% of these, omeprazole.

Table 5. Proportional distribution of potentially inappropriate medications according to the anatomical group of the Anatomical Therapeutic Clinical (ATC) system used by the old people interviewed.

Potentially inappropriate system/medications	n (%)
Musculoskeletal	*155 (76.1)*
Orphenadrine, Citrate	41 (20.3)
Diclofenac	37 (18.2)
Carisoprodol	28 (13.8)
Ibuprofen	19 (9.3)
Cyclobenzaprine	8 (4.0)
Ketorolac	5 (2.5)
Etodolac	5 (2.5)
Central Nervous	*74 (36.2)*
Benzodiazepines	*32 (13.9)*
Acetyl salicylic acid> 325mg	12 (5.9)

Continuation of Table 5

Potentially inappropriate system/medications	n (%)
2nd generation antipsychotics	9 (4.4)
Paroxetine	7 (3.5)
Zolpidem	7 (3.5)
Amitriptyline	7 (3.5)
Digestive and Metabolism	*69 (34.1)*
Proton pump inhibitors	54 (26.6)
Glibenclamide	6 (3.0)
Cardiovascular	*23 (11.5)*
Doxazosin	6 (3.0)
Amiodarone	5 (2.5)
Digoxin	5 (2.5)
Respiratory	17 (8.5)
Promethazine	6 (3.0)
Antibacterials for systemic use–Nitrofurantoin	*1 (0.5)*

DISCUSSION

The results of the present study point to the predominance of female participants, because in addition to the association having a much higher percentage of female members, some male members were not receptive to home visits, nor to the application of previously structured questionnaires.

In a study by Cassoni et al.[3], in São Paulo, the prevalence of female individuals was also observed, totaling 62.6% among the interviewees, thus showing that aging is female, which is related to higher life expectancy of the female population. One of the causes of this prevalence, possibly occurs due to the concern with health and the demand for medical assistance on the part of women, which leads to greater survival in relation to men[7,13,14].

In the study in São Paulo, the authors observed a predominance of participants with low education[3], and among the 1,254 respondents, 1,043 studied only up to the 7th grade, the present study identified that most participants had only elementary education, both complete and incomplete, characterizing low education among the old people. Regarding marital status, there was a predominance of married individuals. This data is frequent in the most developed regions of the country, as mentioned in the research by Neri et al[15].

As for the health condition of the participants, there was a predominance of systemic arterial hypertension, followed by arthritis/arthrosis, osteoporosis and diabetes mellitus. The prevalence of systemic arterial hypertension can also be observed in a study by Lopes et al.[16] in the city of Belo Horizonte (MG) that among 190 old people participating in the research, 65.8% reported being hypertensive, while 25.8% reported having diabetes mellitus.

With the biological aging process, there is also a greater vulnerability of old people, which generates a tendency to a higher frequency of medical interventions and, consequently, they become the age group that uses more pharmacological treatment as a therapeutic option[8,17].

It was estimated that 23% of the Brazilian population consumes approximately 60% of the medications available on the market[17], with old people being the main users of these medications. In the present study, we found a median use of six drugs per interviewee, which differs in comparison to the study carried out by Lopes et al.[16], in which a median of four medications was found. Possibly because Lopes et al.[16] analyzed hospital records of medications used at home, unlike the present study, a home visit was carried out including non-prescribed medications, which may have increased the detection of medication use. Another study carried out in São

Paulo found an average of 3.5 medications by old person belonging to a private plan[18], however the count was based only on the prescribed medications, unlike the current study.

To improve therapy, the use of multiple medications is commonplace, and many older people use five or more medications, which characterizes polypharmacy. In the present study, polymedication is an alarming data, which was found in most of the participants, which justifies the fact that many have potentially inappropriate medications.

Studies have observed polypharmacy in 27% of outpatients living in the South Region[19] and 33% in old people (over 60 years) in the city of São Paulo (SP)[3], and 36% in individuals over 65 years also in São Paulo[6]. However, some studies, such as the one conducted by Hanlon et al.[20], demonstrated up to 74% of polypharmacy, which is compatible with the present study.

In the present study, variables such as: female gender, single marital status and low education are directly associated with the use of polypharmacy. A study by Carvalho et al.[9], in the city of São Paulo (SP), also showed a strong relationship between the variable female gender and polypharmacy, as well as another study conducted in the city of Aiquara (Bahia)[13]. Low education has been presented in some studies as a criterion for polypharmacy and may also be associated with socioeconomic status[7,10,17].

The use of polypharmacy was statistically associated with the use of inappropriate medications, since polymedicated individuals are more likely to use medications whose harm is greater than the benefits. Some studies have already obtained results that demonstrate a strong relationship between polypharmacy and use of inappropriate medications[3,5].

The use of potentially inappropriate medications following the criteria of Beers (2015)[4] was evidenced in most cases, being a very worrying fact, since the use of these medications causes considerable damage to the health of the old person.

The prevalence of inappropriate medications is higher than that found in some studies using the 2003 Beers criteria as performed in Goiânia, which found a prevalence of 24.6%[10]. Other Brazilian studies using the 2012 updated criteria have shown higher prevalences. In one of them, carried out in Ribeirão Preto (SP), the prevalence found was 59.2% using the 2012 criteria, but when using the 2003 Beers criteria the same study found 48%[5]. Another study carried out by Martins et al.[6], following also the 2012 Beers' criteria, with 621 non-institutionalized old people, approached by home interviews, in the municipality of Viçosa (MG) showed a prevalence of 43.8%. What appeals to us in the variation of these cases presented is that the Beers list of 2003 and 2012 were taken into consideration, while the present research is based on the 2015 Beers criteria[4], which included the class of pump inhibitors. protons, a therapeutic class widely used by old people. The difference in prevalence can also be explained due to the choice of samples and the type of design used in each study, as some studies used patients from hospitals or outpatient clinics, only prescription medications, in addition to the number of research participants.

The inappropriate medication most used by the population of the present study was orphenadrine, a muscle relaxant belonging to the class of the musculoskeletal system, used in combination with dipyrone and caffeine. The presence of this medication, together with others belonging to the group of medications that act on the musculoskeletal system, may explain the fact of the second highest prevalence of individuals with arthritis/arthrosis, followed by the third highest prevalence, osteoporosis. Old people with these conditions tend to look for more medications that act to relieve pain immediately. Most muscle relaxants are poorly tolerated by old people because some have adverse anticholinergic effects, sedation, increased risk of fractures, and efficacy in doses tolerated by old people is still questionable[4]. These medications are marketed in Brazil without the need for a prescription, which allows their use by self-medication[3].

A survey carried out by Manso et al.[18] with 2,500 older patients linked to a private health plan, all with chronic degenerative diseases and accompanied by doctors of different specialties, in the city of São Paulo, during the years 2012 and 2013, obtained the prevalence of potentially inappropriate medications was 33.4%, and the most

prescribed inappropriate medications were those related to the musculoskeletal system, a fact that is similar to the present study.

The second class of medications most found among respondents were benzodiazepines, medications that act on the Central Nervous System. It is known that older people have increased sensitivity to benzodiazepines and decreased metabolism for long-acting agents. In general, all benzodiazepines increase the risk of cognitive loss, delirium, falls, leading to fractures[4], which consequently lead to hospitalization, leading to clinical complications that lead to death. Other studies[1,22] identified benzodiazepines as the most used among the interviewed participants.

The list of medications potentially inappropriate for old people is a strategy to reduce the number of adverse effects related to the patient's age, such as mental confusion, frailty and mortality. It is also a way of causing fewer medication interactions to occur that can cause long-term damage[4].

The main limitation of this study was the design that did not allow the participants to be monitored, in order to assess and study possible clinical outcomes related to the use of polypharmacy and inappropriate medications for old people, the interview in a single moment, ends up bringing limitations to greater knowledge of the patient's reality and symptoms, in addition to not creating a bond.

Since then, several studies have been developed based on these criteria, taking into account that the frequency of inappropriate medication prescription can serve as quality indicators of the services offered in establishments focused on the health of older patients[6,7].

Based on the realization of this study, it is extremely important to highlight that professionals are aware of the possible consequences of the use of inappropriate medicines in the old people age group, in view of the aging process of the population that has become increasingly evident in recent years. We also lack the elaboration of national prescription criteria that include the medications available in Brazil. Special attention should be paid to old people who use polypharmacy. We also highlight the need to include in the RENAME (National List of Essential Medicines) specific lists of medicines more suitable for use in old people in SUS, as well as expanding the availability of such medications for SUS users[17].

CONCLUSION

Potentially inappropriate medications are widely used by the old people people studied. There is an association between polypharmacy and the use of inappropriate medications. Polypharmacy, in turn, is associated with females, low education and single people, however, the use of potentially inappropriate medications did not show any relationship.

The need for further studies related to factors related to the use of polypharmacy and medications potentially inappropriate for old people in other populations is suggested, as well as follow-up studies (longitudinal), in order to assist professionals about the care for old people.

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