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Pharmacoepidemiology and the use of potentially inappropriate drugs in institutionalized and non-institutionalized elderly

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Abstract. Pharmacoepidemiology is a field of study that connects two broad areas: clinical pharmacology, which studies the effects of drugs on humans, and an epidemiology, which studies a distribution and determinants of disease in the population. This study aimed to verify the prevalence of potentially inappropriate drugs in institutionalized and non-institutionalized elderly people, both in the city of Sinop-MT, as well as to describe socio-demographic characteristics, family arrangements, drug use and comorbidities. The sample consisted of 40 elderly people, 26 from a community day center and 14 from the Long Stay Institute (LSI), thus constituting two groups. The results of the study showed that polypharmacy is high among the elderly, and among these polypharmacy Potentially Inappropriate Use Medications (PIM) were detected. With regard to the concomitant diseases, many report epigastralgia, but it is a question of being investigated, since the use of medications induces the use of more and more medications itself. In addition, the drugs are equally distributed among adults and the elderly, and there are physiological modifications in a geriatric individual that lead to drug interactions and/or adverse reactions.
Keywords: Pharmacoepidemiology; Potentially Inappropriate Medications; Elderly; Nursing.

Introduction

The World Health Organization (WHO, 2000) chronologically classifies the elderly as persons older than 65 years of age in developed countries and over 60 years of age in developing countries, thus considered a senior citizen.

The status of the elderly was created on October 1, 2003, under resolution 10.741, which provides for the rights and duties of the elderly, for enjoyment, for the right to life, for food, for the right to health, culture, education, sport and leisure, where it aims to ensure the social rights of the elderly, creating conditions to promote their autonomy, integration and effective participation in society.

The Brazilian population is aging rapidly and it is accompanied by the appearance of multiple diseases, especially the chronic ones, which subjects the elderly population to an increased demand for medicines. This age group consists of the more medicated social stratum, reaching more than 50% of users of multiple medications (CASTELLAR *et al*., 2006).

The average of drugs used among Brazilian elderly people varies between two and five active principles simultaneously. The most commonly used pharmacological groups are those used for the treatment of the most prevalent chronic diseases in the elderly, and antirheumatic drugs, analgesics and cardiovascular drugs (CASTELLAR *et al*., 2006).

The World Health Organization (WHO, 2006) considers that more than 50% of drugs are inadequately prescribed or dispensed and that 50% of patients take medicines incorrectly leading to high morbidity and mortality rates. It was also pointed that the most common types of irrational drug use are related to people using poly-pharmacy, inappropriate use, self-medication, and prescription in disagreement with clinical guidelines (BERTOLDI *et al*., 2004).

Thus, the knowledge and the study of the pattern of use of drugs by the elderly population have fundamental importance for the strategies of rational prescription of drugs in geriatric practice (MOSEGUI, 1999). Although necessary, misuse can trigger aggravating diseases, in addition to increasing the individual and governmental cost (BARROS, 2002).

The complexity of drug regimens coupled with lack of understanding, forgetfulness, decreased visual acuity, and manual dexterity that occur in the elderly contribute to a large number of errors in medication administration. In addition, there is a high rate of illiteracy, which may compromise understanding and lead to misuse of the drug (MARIN *et al*., 2008).

Inappropriate prescriptions for the elderly are now considered a public health problem because of their direct relationship with increased morbidity, mortality, and costs (O'MAHONY, 2008).

In 1991, Mark Beers developed, through a consensus panel, the first list of potentially inappropriate drugs for the elderly, which should be avoided in this population (BEERS, 1991). This list was updated in 1997 and 2003 and has been used in several studies since then (FICK, 2003).

In 2008, Soares *et al*. carried out a study to evaluate the medicines contained in the Beers criteria that were marketed in Portugal. In the same year, Gorzoni *et al*. carried out a similar study, but only analyzed which generic drugs available in Brazil are contained in the Beers criteria.

In 2010, the National Relation of Essential Medicines (RENAME) was updated. This list contains the essential medicines to treat the most common diseases in the population and, based on it, Brazilian states and municipalities elaborate their own list of medicines. RENAME 2010 has 343 drugs, correlates and 33 immunotherapeutics.

The greatest number of diagnoses of pathologies and use of medicines happens among the elderly; thus, the possibility of the emergence of problems related to drugs is superior when compared to that of young people. Therefore, there is a need for health professionals with knowledge about the physiological and pharmacological changes that occur in the elderly, as well as on the use of medications by this group, in order to evaluate the complexity of the prescribed therapy and to be advising them in relation to the medications, since they often do not have the necessary instructions as how they should be administered, the dosage and what adverse effects they may have on the body.

In this way Pharmacoepidemiology could be configured as a tool to minimize such problems pertinent to pharmacotherapy, especially in elderly populations. This is defined as "application of the method and epidemiological reasoning in the study of the beneficial and adverse effects and the use of drugs in human populations." The term Pharmacoepidemiology contains two components: "drug" and "epidemiology". This field of study correlates two major areas: clinical pharmacology, which studies the effects of drugs on human beings, and epidemiology, which studies the distribution and determinants of disease in the population (BRASIL, 1998).

Therefore, the importance of this study is based on the fact that a survey of the use of medication among the elderly population in the municipality of Sinop may characterize it in several aspects (gender, age, comorbidities, schooling, income, family arrangements), especially if the use of drugs is being done properly or not.

In view of that, the aim was to verify the prevalence of potentially inappropriate drugs in institutionalized and non-institutionalized elderly people, both in the city of Sinop, as well as to describe sociodemographic characteristics, family arrangements, drug use and comorbidities.

Methods

This study was a field research with quantitative, descriptive and exploratory approach.

According to Minayo (2010) the quantitative approach brings to light data, indicators and observable trends or production of theoretical models of high abstraction with practical applicability.

In the descriptive research the facts are observed, registered, analyzed, classified and interpreted, without the interference of the researcher, with the use of standardized techniques of data collection (questionnaire and systematic observation) (RODRIGUES, 2007).

In the exploratory research, it is aimed the initial characterization of the problem, its classification and its definition. It is the first stage of all scientific research, providing greater familiarity with the problem, can occur through bibliographical survey or interviews, bibliographic research or case study (RODRIGUES, 2007).

According to the topic addressed, two groups were interviewed, one of institutionalized and the other of non-institutionalized elderly. The elderly in asylums are residents of a long stay institution (LSI) and the non-asylum ones were approached in a community day center, both located in the city of Sinop.

The LSI in Sinop, currently with capacity for 20 elderly people, has a high monthly expenditure. With no fixed income, the nonprofit entity makes many promotions to pay for expenses. The community day center is an institution of associates and it counts on approximately 700 individuals over 60 years and attends the population on totally gratuitous way. The present research was carried out from February, 2013 to March, 2014.

The sample of this research consisted of elderly people over 60 years of age who use any medication, with or without medical prescription, as long as they agree to participate voluntarily in this study. We included both institutionalized and non-institutionalized elderly, of both sexes, who were over 60 years of age and who continued to use medication and we did not consider individuals who were under 60 years of age and who were not chronic users of medications.

Participation in the research was entirely voluntary and should occur after clarification of the objectives and benefits of this study and, subsequently, signing of the Informed Consent Form (ICF).

To reach the proposed objectives, a semi-structured interview was used, combining open and closed questions (MINAYO, 2010b).

Data were analyzed through deductive statistics, part of the statistical that deals with the organization, summary and presentation of data (FERREIRA, 2005).

This research was submitted to the Research Ethics Committee of the Júlio Muller University Hospital - Cuiabá / MT and was approved in accordance with the ethical principles and current legislation, by the number 288.178.

Results and discussion

Forty (40) elderly people were interviewed, 26 of the community day center and 14 of the LSI, thus constituting two groups. Between them the following variables were compared: gender, age, schooling, income, if any medication was being used, if they had any kind of illness, if they were oriented to the use of the medication and to the appearance of concomitant diseases.

The sample consisted of 40 elderly people who were randomized into two groups, one of them being institutionalized, with 14 elderly (Table 1) and the other with 26 non-institutionalized elderly, who were selected in the community day center (Table 2).

The variables: gender, age, schooling, income, medication use (Beers and RENAME criteria), presence of some disease, orientation regarding medication use and the emergence of concomitant diseases, were considered.

Regarding gender, Table 1 shows that 40% of the women lived in a long stay institution for the elderly, while men represent 60%. In the sample that attends the community day center, women represent 80% and men represent 20%.

According to a study by Marin *et al*. (2008) women have a higher survival rate, representing 61.8% of the studied population.

Pavan *et al*. (2008) in a study carried out in a LSI of Rio Grande do Sul, found that out of the 110 elderly residents in the institution, 80% were female. This female predominance is usually explained by the fact that women live longer than men, so they are more likely to experience diseases and disabilities.

Table 1 - Questionnaire applied to elderly residents in the LSI according to information reported by them and the nursing technician. Sinop, 2014.

	Nº	%
Gender		
Female	4	40
Male	10	60
Total	14	100
How long have you been living in the asylum?		
They range from 2 months to 12 years	14	100
How have you came to the asylum?		
Family	6	42.85
Friends	6	42.85
Weak from the hospital	2	14.3
Age		
54-63	4	30.7
64-75	2	15.3
76-85	5	38.7
≥ 86	2	15.3
Schooling		
Illiterate	5	36
Incomplete Elementary School	9	64
Income		
1 minimum wage (678,00)	14	100
Do you have any disease?		
Yes	12	85.7
No	2	14.3
Do you use any medications?		
Yes	14	100
No	0	0
Medications contained in Beers criteria (2002)	7	13.2 (53)
Medications contained in RENAME (2010)	18	5.2 (343)
Total medications	39	100
Have you been oriented on how to use these medications?		
No	0	100
Yes	13	
Ever since you started taking the medications have you had any further symptoms or any new illness?		
Yes	13	100
No	0	0

Source: Prepared by the author

Table 2 - Questionnaire applied to the non-institutionalized elderly in the community day center, according to information reported by them. Sinop, 2014.

Gender	**Nº**	**%**
Female	21	80.77
Male	5	19.23
Total	26	100
Age		
62-71	16	61.5
72-81	10	38.5
Schooling		
Illiterate	5	19.23
Incomplete Elementary School	19	73.07
Incomplete High School	2	7.7
Profession		
Retired	24	92.3
Artisan/Guard	2	7.7
Income		
Less than 1 minimum wage (678,00)	1	3.85
1 minimum wage (678,00)	23	88.4
2 minimum wages (1356,00)	2	7.75
Do you have any disease?		
Yes	24	92,3
No	2	7.7
Who do you live with?		
Spouse	8	30.77
Children/Grandchildren	8	30.77
Alone	10	38.46
Do you use any medications?		
Yes	22	84.6
No	4	15.4
Medications contained in Beers criteria (2002)	6 (53)	11.3
Medications contained in RENAME (2010)	17 (343)	4.9
Total medications	26	100
Have you been oriented on how to use these medications?		
Yes	22	84.6
No	4	15.4
Ever since you started taking the medications have you had any further symptoms or any new illness?		
No	19	86.37
Yes	3	13.63

Analyzing the two groups, 90% of the elderly had diseases typical of aging populations such as chronic non-communicable diseases and osteo-articular diseases. This proves that the elderly are living longer, because the average age of the 2 groups was 70 years, in chronic conditions, since the percentage of age-related diseases between both groups is high.

A study by Alencar *et al*. (2012), among 47 individuals surveyed in a LSI, the majority of the elderly (57.4%, n = 27) reported having at least one chronic disease and 91.5% (n = 43) make use of at least one medication.

The Brazilian population is aging rapidly and it is followed by the appearance of multiple diseases, especially chronic ones, which subject the elderly population to an increased demand for medicines, reaching more than 50% of users of multiple medications (CASTELLAR *et al*., 2006).

Of the two groups interviewed, 90% used any kind of medicines. Observing Table 1, 13.2% of the medicines used met the Beers criteria or Potentially Inappropriate Use Medications (PIM), and 5.2% were listed in the National List of Essential Medicines (RENAME). For Table 2, 11.3% were classified as PIM and 4.9% of these medicines are contained in RENAME.

In a study conducted by Polaro *et al*. (2012) most of the sample was suffering from an overlapping disease or diseases; 71% used medications almost always involved in polypharmacy, similar to other studies of LSIs. On the other hand, a significant sum (29%) of the elderly did not use drugs.

It is noticed that the amount of polypharmacy is very high between both groups. And among this polypharmacy PIM were detected (BEERS, 2002). It is noteworthy that the highest number of these drugs use occurred in the asylum elderly, while the PIM in the asylum elderly represent 13.2%. The elderly of the community day center, 26 people, correspond to 11.3% of this criterion.

Regarding to RENAME, which is the list of essential drugs created for adults without research for the elderly, they represent a significant number between both groups, representing 4.9% in the group of 14 institutionalized elderly and 5.2% in one group of 26 non-institutionalized elderly. It is concluded that with this result, the number of drugs used in the asylum is proportionally higher than in

the group of elderly people who attend the community center.

Prescriptions inappropriate for the elderly are considered a public health problem because of their direct relationship with increased morbidity, mortality, and costs (O'MAHONY D, 2008).

According to Gorzoni *et al*. (2006), the analysis of 100 records of elderly patients seen in the first geriatric outpatient clinic of a hospital in the city of São Paulo between 2000 and 2004, showed that 41% of the elderly patients used one or two PIM.

Marin *et al*. (2008c) states that although some elderly people do not use medication, there are those who consume eight to ten daily, drawing attention to the fact that almost one third of the elderly, 105 (34.8%), ingest four or more medications. In the same study, 79% of pharmaceutical products were not included on the WHO Essential List of Medicines and 72.2% were not part of the National List of Essential Medicines (RENAME).

According to Alencar *et al*. (2012c) in a survey with 47 elderly people, they used, on average, 3.45 (± 1.87) medications, with a variation of one to seven medications.

Among the 40 elderly people surveyed in our study, 38 individuals use at least one medication and are advised to use them appropriately, most of them being for medical reasons.

In relation to concomitant diseases, many report epigastralgia, but it is a question to be investigated, since the use of medications leads to the use of more and more medications, and many times they end up doing harm and the elderly do not even realize that, especially because of their age limitations and lack of caring, making the scenario worse in the long run.

Conclusion

Based on that, it can be concluded that between the two groups, 90% consume drugs and that in the LSI 13.2% of the drugs used fit in the Beers criteria or PIM, and 5.2% were listed in RENAME. In the Community Day Center, 11.3% were classified as PIM and 4.9% of these drugs are contained in RENAME. It demonstrates that in the LSI, there is a greater percentage of the use of PIM according to Beers criteria and medicines contained in the RENAME than in the Community Day Center.

Polypharmacy is high and should be a focus for health professionals, a problem that deserves special attention in public health, since the drugs are distributed equally among adults and the elderly, and there are physiological changes in the geriatric individual that leads to drug interactions and/or adverse reactions.

In fact, what should be valued is the promotion of health, the prevention of diseases from an early age to ensure a healthy old age.

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