

# PHARMACOTHERAPY IN THE OLDER ADULT: CHARACTERIZATION, MEDICATION ADHERENCE AND POTENTIALLY INAPPROPRIATE MEDICATIONS

FARMACOTERAPIA NO IDOSO: CARATERIZAÇÃO, ADESÃO  
À TERAPÊUTICA E MEDICAMENTOS POTENCIALMENTE  
INAPROPRIADOS **PT**

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FARMACOTERAPIA EN ANCIANOS: CARACTERIZACIÓN,  
ADHESIÓN AL TRATAMIENTO Y MEDICAMENTOS  
POTENCIALMENTE INAPROPIADOS **ES**

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## ABSTRACT

Introduction: Aging is a dynamic process in which biochemical and physiological changes are related to a higher frequency of pathological processes, which ultimately lead the human being to death. Part of these alterations and pathologies are improved using medicines, so older adults are great consumers of medicines. Several instruments have been used to evaluate the use of inappropriate medications in older adults, with Beers Criteria frequently used. The concept of medication adherence has undergone changes over time and represents the degree to which the patient's behaviour corresponds and agrees with the recommendations of a doctor or other health professional. Medication non-adherence entails a decrease in the quality of life of the patients and high costs for the health systems. Objectives: To characterize drug therapy in older adult users of a northern Portuguese community pharmacy, as well as to identify the presence of potentially inappropriate medications (PIMs) in the older adult and to assess medication adherence. Methods: Exploratory and descriptive study. The target population was older adult users of a community pharmacy in the municipality of Valpaços, Portugal. The data collection instrument used was a questionnaire applied in the form of a structured interview. The potentially inappropriate medications (PIMs) identification was based on the most recent version of the Beers Criteria published in 2019. The MAT (Measurement of Adherence to Treatments) scale was used to evaluate medication adherence. The statistical treatment included the calculation of absolute and relative frequencies, measures of central tendency and dispersion. Results: 60 older adult people were interviewed, 53.3% of them women. The average age was 78.35 years. Among these, 55.0% were married/had a non-marital partner, 71.7% lived accompanied, 26.7% had primary school education, 40.0% received less than 300 Euros monthly and 95.0% lived in the municipality of Valpaços. Each older adult person consumes on average 6 different types of medication per day. Major polymerization was present in 66.7% of older adults, and 94.2% of the drugs being prescribed by the physician. In 34.7% of the cases, the medication had been used for at least 1 year and only 3.4% reported feeling adverse reactions. Of the total 326 drugs identified, the most prescribed pharmacotherapeutic groups were drugs acting in the cardiovascular system 27.2% and in the digestive system 24.2%. Additionally, 15 drugs classified as potentially inappropriate medication were identified in the older adult. Most of the older adults (76.7%) did not adhere to drug therapy, these being mainly females with primary education, living with a partner and less than 300 euros/month. Conclusion: Polymedication and the use of potentially inappropriate medications are common in older adults. Medication adherence is low.

*Keywords: Older adult, Pharmacotherapy, Medication adherence, Potentially inappropriate medications, MAT scale, Beers criteria.*

## RESUMO

Introdução: O envelhecimento é um processo dinâmico que provoca alterações bioquímicas e fisiológicas, que ocasionam maior incidência de processos patológicos. Parte destas alterações e patologias são melhoradas recorrendo a medicamentos, pelo que os idosos são grandes consumidores de medicamentos. Têm sido criados diversos instrumentos para avaliação do uso de medicamentos inapropriados no idoso, sendo os Critérios de Beers dos mais frequentemente utilizados. O conceito de adesão à terapêutica, que tem sofrido alterações ao longo do tempo, representa o grau em que o comportamento do doente corresponde e concorda com as recomendações de um médico ou outro profissional de saúde. A não adesão à terapêutica acarreta diminuição da qualidade de vida dos doentes e elevados custos para os sistemas de saúde. Objetivos: Caracterizar a terapêutica medicamentosa nos idosos utentes de uma

farmácia comunitária do interior Norte de Portugal, bem como identificar a presença de medicamentos potencialmente inapropriados (MPI) no idoso e avaliar a adesão ao regime terapêutico medicamentoso. Métodos: Estudo do tipo descritivo exploratório. A população alvo foram idosos utentes de uma farmácia comunitária no concelho de Valpaços, Portugal. O instrumento de recolha de dados utilizado foi um questionário aplicado sob a forma de entrevista estruturada. A identificação do uso de medicamentos potencialmente inapropriados (MPI) teve por base a versão mais recente dos Critérios de Beers, publicada em 2019. Foi utilizada a escala MAT (Medida de Adesão aos Tratamentos) para avaliar a adesão ao regime terapêutico medicamentoso. O tratamento estatístico incluiu o cálculo de frequências absolutas e relativas, medidas de tendência central e de dispersão. Resultados: Foram entrevistados 60 idosos, sendo 53,3% mulheres. A idade média foi de 78,4 anos. Verificou-se que 55,0% eram casados/união de facto, 71,7% viviam acompanhados, 26,7% tinham concluído o 1º ciclo, 40,0% recebiam mensalmente menos de 300 euros e 95,0% viviam em Valpaços. Em média, cada idoso consome 6 medicamentos diferentes por dia. A polimedicação maior esteve presente em 66,7%, sendo que 94,2% desses fármacos foram prescritos pelo médico. Em 34,7% dos casos, a medicação já era usada há pelo menos 1 ano e apenas 3,4% referiu sentir alguma reação adversa. Dos 326 fármacos identificados, os grupos farmacoterapêuticos mais prescritos foram medicamentos usados no sistema cardiovascular 27,2% e no sistema digestivo 24,2%. Identificaram-se 15 medicamentos potencialmente inapropriados em idosos. A maioria dos idosos (76,7%) não adere ao regime terapêutico medicamentoso, sendo estes principalmente do sexo feminino, com ensino primário, que viviam com companheiro e menos de 300 euros/mês. Conclusão: A polimedicação e a toma de medicamentos potencialmente inapropriados são frequentes nos idosos. A adesão à terapêutica medicamentosa é baixa.

*Palavras-chave:* Idosos, Farmacoterapia, Adesão à terapêutica, Medicamentos Potencialmente Inapropriados, Escala MAT, Critérios de Beers.

## RESUMEN

Introducción: El envejecimiento es un proceso dinámico que provoca cambios bioquímicos y fisiológicos, que se relacionan con una mayor incidencia de procesos patológicos, que finalmente conducen a la muerte. Algunas de las alteraciones y patologías se mejoran con el uso de medicamentos, lo que lleva a que los ancianos sean grandes consumidores de medicamentos. Se han creado varios instrumentos para evaluar el uso de medicamentos inapropiados en el anciano, siendo los Criterios de Beers de los más utilizados. El concepto de adherencia al tratamiento ha cambiado con el tiempo y representa el grado en el que el comportamiento del paciente corresponde y está de acuerdo con las recomendaciones de un médico u otro profesional de salud. La no adherencia al tratamiento resulta en reducción de la calidad de vida de los pacientes y altos costos para los sistemas de salud. Objetivos: Caracterizar la farmacoterapia en usuarios ancianos de una farmacia comunitaria del norte de Portugal, así como identificar la presencia de medicamentos potencialmente inapropiados (MPI) en ancianos y evaluar la adherencia al régimen terapéutico. Métodos: Estudio descriptivo y exploratorio. La población en estudio fueron ancianos usuarios de una farmacia comunitaria en el municipio de Valpaços, Portugal. Se aplicó un cuestionario en forma de entrevista estructurada. La identificación del uso de medicamentos potencialmente inapropiados (MPI) se basó en la versión más reciente de los Criterios de Beers, publicada en 2019. La escala MAT (Medida de adherencia a los tratamientos) se utilizó para evaluar la adherencia al tratamiento con medicamentos. El tratamiento estadístico incluyó el cálculo de frecuencias absolutas y relativas, medidas de tendencia central y dispersión. Resultados: Se entrevistaron 60 personas mayores, de las cuales 53,3% eran mujeres. La edad media fue de 78,35 años. Se constató que el 55,0% estaba casado/ pareja de

hecho, el 71,7% vivía acompañado, el 26,7% había completado la educación primaria, el 40,0% recibía menos de 300 euros al mes y el 95,0% vivía en Valpaços. Cada anciano consume, en promedio, 6 medicamentos diferentes al día. La polimedición mayor estuvo presente en el 66,7% y el 94,2% de estos fármacos fueron prescritos por el médico. En el 34,7% de los casos, los medicamentos se utilizaban al menos hace 1 año, y solo el 3,4% informó haber experimentado reacciones adversas. De los 326 fármacos diferentes identificados, los grupos farmacoterapéuticos más prescritos fueron los usados para el sistema cardiovascular (27,2%) y para el sistema digestivo (24,2%). Se identificaron 15 medicamentos potencialmente inapropiados en ancianos. La mayoría de las personas mayores (76,7%) no cumple el régimen terapéutico, siendo mayoritariamente mujeres, con estudios primarios, viviendo en pareja y con menos de 300 euros/mes. Conclusión: La polimedición y el uso de medicamentos potencialmente inapropiados son frecuentes en los ancianos. La adherencia a la terapia con medicamentos es baja.

**Palavras-clave:** *Ancianos, Farmacoterapia, Adherencia al tratamiento con medicamentos, Medicamentos Potencialmente Inapropiados, Escala MAT, Criterios de Beers.*



## 1. INTRODUCTION

Aging is a dynamic process that causes biochemical and physiological changes, and related to a higher frequency of pathological processes, which ultimately lead the human being to death (Mosca & Correia, 2012; WHO, 2019; OMS, 2015). The World Health Organization (WHO) considers that older age starts between 60 and 65 years (OMS, 2015). Nowadays, aging is a stage in the course of life and not always is synonymous of being sick (OMS, 2015). Portugal has one of the oldest populations in Europe (OECD, 2021). According to data in the INE (INE, 2018), Portugal maintains the trend of demographic aging as a result of the reduction of the young population (0-14 years old), working age (15-64 years old) and the increase in the number of older adult people (over 65 years old).

Aging leads to progressive changes in pharmacokinetics (factors affecting the concentration and distribution of drugs) and pharmacodynamics (effect of drugs on organs and tissues) (Mosca & Correia, 2012; Santos & Almeida, 2010; Cunha et al., 2018). Pharmacokinetics includes the absorption, distribution, metabolism and excretion of drugs while pharmacodynamic changes contribute to increased sensitivity to drugs (Santos & Almeida, 2010). However, pharmacodynamic changes are less studied than pharmacokinetics given the difficulties in doing so. In the older adult patients, pharmacodynamic changes may be related to the sensitivity of the receptors; changes in homeostasis; nutritional factors and polyopathologies (Mosca & Correia, 2012).

With advancing age the number of chronic diseases and medicines used tends to increase. Although not all older adult people require medicines, the existence of multiple chronic diseases in the same person may involve the prescription of drugs from different therapeutic groups. Polymedication has been defined in a number of ways, including the use of several medicinal products, the use of more medicines than indicated, the therapeutic regimen that includes at least one unnecessary medicine and/or the use of medicinal products that may cause adverse reactions/drug interactions (WHO, 2019; Souto & Pimentel, 2018; Rosa & Camargo, 2014). Polymedication can be classified as minor polymedication, from two to four drugs, and major polymedication when five or more drugs are used (Souto & Pimentel, 2018; Rosa & Camargo, 2014). Overall, these conditions associated with pharmacokinetics and pharmacodynamic changes increase the risks with medications (Delafuente, 2008; WHO, 2019; OMS, 2015). In fact, drug therapy for the older adult patients requires increased care, taking into account its pathophysiological changes and multiple pathologies, which makes them more susceptible to adverse events (Santos & Almeida, 2010). In addition, the presence of different diseases in the older adult leads them to the search for different medical specialties, subjecting themselves to a pharmacological arsenal. Polymedication, lack of medication adherence and pharmacokinetic changes are among the main causes of drug-related problems (Delafuente, 2008; Creaque & Eaton, 2020; Santos & Almeida, 2010; Soares et al., 2011).

Prescription of potentially inappropriate medications occurs when the risk of adverse events outweighs the clinical benefit. It also includes overuse, prescription of multiple drugs with known interactions, indication or incorrect dose, and use for a longer period of time than necessary (Soares et al., 2011).

Several instruments have been created to evaluate and prevent the use of potentially inappropriate medications in the older adult, being the Beers Criteria one of the most frequently used, which was created by Beers and his contributors in 1991 and has already undergone 4 updates, the most recent being in 2019 (Creaque & Eaton, 2020; Fick et al., 2019).

According to the WHO, adherence to therapy can be defined as the degree to which a person's behaviour corresponds and agrees with the recommendations of the doctor or other health professional and include not only the medication intake, but also the following of the established diet or lifestyle changes (WHO, 2003). Drugs are one way to improve quality of life, preservation of cognitive and physical functions, reduction of additional risks of comorbidity and death (Cabral & Silva, 2010; Cima et al., 2011; Remondi et al., 2014), however a high number older adult do not comply with the pharmacological prescription (Monterroso et al., 2015). Medication adherence is extremely important, especially in chronic diseases, due to the impact on the quality of life of patients and expenditures in the health system (Remondi et al., 2014) According to literature (Cabral & Silva, 2010), there are several factors that influence medication adherence and can be grouped into three major dimensions: (a) demographic, social and economic factors; (b) factors relating to the disease itself or the prescribed therapeutic regimen; (c) factors related to the relationship with health professionals and services.

The world population ageing, and associated comorbidities are related to a high consumption of medicines by the older adult resulting in potentially inappropriate medicines use and medication non-adherence. In this sense, being the control of diseases and older adult life quality important concerns of pharmacy professionals, exploratory studies on these phenomena are required, in order to better understand the pharmacotherapeutic profile of the regular users of community pharmacies. The results of studies of this nature can promote a more accurate and consistent communication of information about medication, through therapeutic reconciliation, improving monitoring and counselling of older adult patients, regarding the safer and more effective use of the prescribed therapy. Hence, the reduced drug-related problems and increased medication adherence, improve older adult health and quality of life.

## 2. AIM

The present research study aimed to characterize drug therapy in older adult users of northern portuguese community pharmacy, as well as to identify potentially inappropriate medications in the older adult and evaluate medication adherence.

## 3. METHODOLOGY

The present study is descriptive and exploratory. The sample consisted of 60 older adult users of a community pharmacy located in municipality of Valpaços, Portugal. A non-probabilistic convenience/accidental sampling technique was used (Ribeiro et al., 2010) and the users were recruited taking advantage of the moment when they moved to the pharmacy. In the sampling process, individuals of both sexes aged 65 years or over to take medication were included. Data collection was carried out between September and December 2019, with a participation rate of 98%.

For data collection, a questionnaire in the form of a structured interview performed by an investigator was applied. Participants were informed about the objectives and purpose of the study, as well enlightened when they had doubts about questions. After providing informed consent, data were collected from the older adult who agreed to cooperate with this investigation. All constitutional rights of individuals have been guaranteed, respecting the Helsinki Declaration and the Oviedo Convention (WMA, 2001; DR, 2001). The right to anonymity and confidentiality were maintained in this study. The personal data were not disclosed or shared and the results were presented collectively. Participation in the study was voluntary and individuals could, at any time, refuse or interrupt their participation.

The questionnaire consisted of three parts: Part 1 - Sociodemographic Characterization; Part 2- Pharmacotherapeutic Profile; Part 3 - MAT Scale (Treatment Adhering Measure) (Delgado & Lima, 2001).

The first part, which included questions related to sociodemographic characterization, aimed to characterize the older adult concerning age, residence, gender, marital status, schooling, with whom they live and health problems.

The second part referred to the pharmacotherapeutic profile of the respondents. In addition to identifying each drug in use, they were asked about the purpose for which it is used, who prescribed/advised them, how long they have been taking them and if they have noticed any adverse reactions. The pharmacotherapeutic profile aimed also to identify the PIMs (potentially inappropriate medications) in the older adult. Taking into account the nature of the study, the identification of PIMs was performed according to Table 2 of Beers Criteria (Fick et al., 2019) that includes drugs potentially inappropriate in most older adults, because they are ineffective, entail unnecessary risk or there are safer alternatives. Thus, the Tables 3, 4, 5 and 6 of Beers Criteria were not considered for the study although they include Drugs that should normally be avoided in the elderly with certain diseases or syndromes (Table 3); Drugs that should be used with precautions (Table 4); Drug-drug interactions that can be serious in the elderly (Table 5); Drugs to be avoided or whose dose should be adjusted with reduced renal function (Table 6) (Creaque & Eaton, 2020; Fick et al., 2019). All drugs used by the participants of this study are holders of Marketing Authorization in Portugal.

In the third and final part, the objective was to evaluate the medication adherence. The study of medication adherence can be done through direct or indirect methods. The direct method is based on medical procedures, which allow to detect the properties of the drug in the body, through analysis of the biological fluids of patients and are therefore considered more reliable. The indirect method refers to the collection of information through interviews or questionnaires and are the most used due to their ease of application and reduced cost (Cabral & Silva, 2010). Data collection was made through the application of the Measure Adherence to Treatment (MAT) questionnaire developed by Delgado and Lima (2001). The following criterion was used to convert the Likert scale to dichotomic: from the median of the 7 items, the categories never (6) and rarely (5) of the Likert scale, become adhere (1) to the dichotomic scale, and sometimes (3), frequently (4), almost always (5) and always (6) of the Likert scale, become non-adhere (0) of the dichotomic scale (Delgado & Lima, 2001). So, the classification of the subjects as adherent or as non-adherent will be made according to values close to the median, in which medians  $\geq 5$  correspond to subjects as adherents.

The statistical treatment of the collected data was processed in the Excel computer program, version 16.41 and included the distribution of absolute and relative frequencies, measures of central trend (mean, mode and median) and dispersion measures (standard deviation).

## 4. RESULTS AND DISCUSSION

The 60 older adult who participated in this study were between 66 and 93 years old, with an average age of 78.3 years, and a standard deviation of 7.41, which is justified taking into account the inclusion criteria and average life expectancy of the Portuguese population (INE, 2018; SNS, 2017). The majority of respondents (95,0%) lived in the municipality of Valpaços (Table 1). The distribution by gender shows a predominance of females (53,3%), data corroborated by other studies (Cima, et al., 2011; Soares et al., 2011; Souto & Pimentel, 2018) and corresponding to the expected, since in Portugal the longevity of females is higher than the male, although less healthy (INE, 2018; SNS, 2017).

VARIABLES	CATEGORIES	N	%
Gender	Male	28	46.7
	Female	32	53.3
Age (years)	65-74 (Young older adult)	18	30.0
	75-84 (Older adult)	28	46.7
	85-94 (Very old)	14	23.3
Marital Status	Married/Non-marital partnership	33	55.0
	Divorced/Separated)	1	1.7
	Single	9	15.0
	Widower	17	28.3
With those who live	Accompanied	43	71.7
	Alone	17	28.3
Schooling	Can't read/write	10	16.7
	Attended primary school	15	25.0
	4th Year (1st cycle)	16	26.7
	6th Year (2nd cycle)	12	20.0
	9th Year (3rd cycle)	4	6.7
	12th Grade (Secondary School)	1	1.7
	Higher Education	2	3.3
Residence	Valpaços	57	95.0
	Mirandela	3	5.0
Monthly Income	Less than 300 Euros/month	24	40.0
	Between 300 and 635 Euros/month	18	30.0
	More than 635 Euros/month	18	30.0

TABLE 1: SOCIODEMOGRAPHIC CHARACTERIZATION OF THE OLDER ADULT (N=60)

It was found that 55,0% of the interviewees were married and 28,3% were widowed, and 71,7% lived accompanied, as well as the results of Monterroso et al (2015) and Souto & Pimentel (2018). More than a quarter of respondents (26,7%) had completed primary school, which matches with other studies carried out previously in the same age group (Cima et al., 2011; Serrão et al., 2015). As it's a predominantly female and older adult sample, cannot safely inferred that it's a population with low schooling. Regarding monthly income, 40,0% of the older adult receive less than 300 euros per month, with retirement being the main source of income, also as verified in previous studies (Monterroso et al., 2015; Santos et al., 2013) (Table 1).

Most of used drugs were prescribed by the doctor (94,2%) and 34,7% have been taken for more than 1 year while 28,8% have been taken for more than 5 years. On average, 6 different medications are taken daily (standard deviation of 2,7). Is important highlight that two thirds of the sample was composed by older adult with major polymedication, use of five or more drugs, (Table 2), similar to the described in the study by Souto et al and eventually related to the typical comorbidities of the older adult (Souto & Pimentel, 2018).

VARIABLES	CATEGORIES	N	%
Number of different medications taken per day	2	1	1.7
	3	7	11.7
	4	12	20.0
	5	9	15.0
	6	18	30.0
	7	7	11.7
	8	2	3.3
	9	3	5.0
	10	1	1.7
	Potentially inappropriate medications (PIMs)	Pantoprazole	19
Alprazolam		9	13.4
Omeprazole		8	11.9
Diclofenac		6	9.0
Ibuprofen		6	9.0
Esomeprazole		5	7.5
Etodolac		4	6.0
Digoxin		2	3.0
Zolpidem		2	3.0
Clorazepate dipotassium		1	1.5
Estazolam		1	1.5
Lansoprazole		1	1.5
Lorazepam		1	1.5
Nitrofurantoin		1	1.5
Ketoprofen	1	1.5	

**TABLE 2: NUMBER OF DIFFERENT MEDICATIONS TAKEN PER DAY BY PARTICIPANTS (N= NUMBER OF OLDER ADULTS) AND POTENTIALLY INAPPROPRIATE MEDICATIONS (PIMs)**

Previous studies suggest that the prescription of essential drugs, for the shortest period of time, at the appropriate dose and the regular reassessment of their therapeutic effect through therapeutic reconciliation whenever there are new prescriptions, can contribute to ensuring the safety of polymedicated individuals (Cabral & Silva, 2010; Soares et al., 2011; WHO, 2019).

Despite the high number of medications per day, the large majority of participants (315, 96,6%) did not report experiencing any adverse effects. Bonita et al (2020) showed the exposure (taking the drug), outcome (adverse reaction) and the intrinsic variable aging, as confounding factors (Bonita et al., 2020).

Concerning the pharmacotherapeutic groups of most used drugs, about one third is included in the drugs used in cardiovascular system (28,2%), followed by the central nervous system (24,2%) and digestive tract (11,9%) (Table 3), which are similar to the reported in the Souto et al (Souto & Pimentel, 2018) and Cima et al studies (Cima et al., 2011).

PHARMACOTHERAPEUTIC GROUPS	THERAPEUTIC CLASSES	N	%
1. Anti-infectious medicines	1.1. Antibacterials	1	0.3
2. Central Nervous System	2.3. Muscle relaxers	1	0.3
	2.5. Anti-parkinson drugs	1	0.3
	2.10. Analgesics and antipyretics	9	2.8
	2.12. Narcotic painkillers	13	4.0
	2.13. Other medicines with action on the Central Nervous System	10	3.1
	2.6. Antiepileptics and anticonvulsants	5	1.5
	2.7. Antiemetics and antivertiginous	6	1.8
	2.9. Psycholeptics and psychoanaleptics	35	10.7
	Subtotal	80	24.2
3. Cardiovascular system	3.1. Cardiotonics	2	0.6
	3.4. Anti-hipertensors	53	16.3
	3.5. Vasodilators	3	0.9
	3.6. Venotropics	2	0.6
	3.7. Antidislipidemics	32	9.8
	Subtotal	92	28.2
4. Blood	4.3. Anticoagulants and antithrombotics	20	6.1
	4.1. Antianemics	3	0.9
	Subtotal	23	7.0
5. Respiratory tract	5.1. Antiasthmatics and bronchodilators	9	2.8
	Subtotal	9	2.8
6. Digestive tract	6.2. Antacids and anti-ulcers	34	10.4
	6.3. Modifiers of gastrointestinal motility	1	0.3
	6.6. Enzyme supplements, dairy bacilli and analogues	2	0.6
	6.8 Intestinal anti-inflammatory drugs	2	0.6
	Subtotal	39	11.9
7. Genitourinary system	7.1. Topical medicines in vagina	1	0.3
	7.3. Anti-infectious and urinary antiseptics	1	0.3
	7.4. Other medicines used in genitourinary dysfunctions	20	6.1
	Subtotal	22	6.7
8. Hormones and medicines used to treat endocrine disorders	8.3. Thyroid hormones and antithyroid drugs	4	1.2
	8.4. Insulins, antidiabetics and glucagon	21	6.4
	Subtotal	25	7.6

9. Locomotor apparatus	9.1. Non-steroidal anti-inflammatory drugs	20	6.1
	9.3. Medicines used for the treatment of gout	6	1.8
	Subtotal	26	7.9
10. Antiallergic medication	10.1. Antihistamines	2	0.6
	Subtotal	2	0.6
11. Nutrition	11.3. Vitamins and minerals	4	1.2
	Subtotal	4	1.2
12. Medicines used in skin diseases	13.1. Anti-infectious of skin application	1	0.3
	Subtotal	1	0.3
15. Medicines used in eye disorders	15.4. Medicines used to treat glaucoma	1	0.3
	Subtotal	1	0.3
16. Antineoplastic and immunomodulating agents	16.3. Immunomodulators	1	0.3
	Subtotal	1	0.3
Total		326	100

TABLE 3: PHARMACOTHERAPEUTIC GROUPS OF MEDICINES USED

According to Beers criteria (Creaque & Eaton, 2020; Fick et al., 2019), 15 potentially inappropriate medications (PIMs) in the older adult were found in the present study (Table 2) namely pantoprazole (19), alprazolam (9), omeprazole (8), ibuprofene (6), diclofenac (6), and esomeprazole (5). It is important to note that, in some cases, more than one PIMs were consumed by the same person. Among these drugs, the more prescribed are proton pump inhibitors (pantoprazole, omeprazole, esomeprazole and lansoprazole), in which the decreasing gastric acidity cause by these drugs, increases the risk of gastrointestinal infections by Clostridium difficile and also increases the risk of bone fractures following decreased calcium absorption (INFARMED, 2017; Ribeiro et al., 2014). Non-steroidal anti-inflammatory (NSAID) drugs (ibuprofen and diclofenac) are also among the most widely used drugs, especially to treat rheumatic pain (Laires, et al., 2017), which can increase the risk of gastrointestinal bleeding and peptic ulcers, as well as increased blood pressure and induce kidney damage. Although the consumption of NSAIDs were significant, it was discontinuous, and in some cases of topical use, which minimizes adverse effects and systemic toxicity (Símon, 2020). The consumption of drugs that act on the central nervous system verified in the present study was also high (24,2%) (Table 3) although similar to the observed in previous studies of Souto et al (Souto & Pimentel, 2018). The high consumption of benzodiazepines and other sedatives and hypnotics is a serious public health problem, since the older adult have greater sensitivity to these drugs. Their metabolism was reduced by age, which can cause sedation and motor alterations, whit consequent falls, bone fractures and road accidents (Souto & Pimentel, 2018; ARSLVT, 2017).

PIM NUMBER PER USER	N	%
0	16	27
1	25	42
2	17	28
3	2	3
Total	60	100

TABLE 4: DAILY CONSUMPTION OF PIMS PER USER

Due the high prevalence of PIMs consumption, it would be appropriate to establish prescription parameters that take into account the potential risks in the geriatric patients. In this sense, the Beers Criteria are an important tool for safe and efficient prescribing (Soares, 2011; Souto et al., 2018)

Regarding medication adherence, it was found that 76,7% of the older adult do not adhere to the prescribed medication therapy. The average score obtained was 4,4 points and a median of 4,5 points. As showed in Table 5 the non-adherent older adult were female, between 75 and 84 years, married/ with non-marital partnership, attended or finished primary school who lived accompanied in Valpaços with less than 300 euros/ month. Concerning medication profile, these older adult are polymedicated and use potentially inappropriate medications.

The rates of drug treatment obtained by indirect method usually tend to underestimate non-adhering (Cabral & Silva, 2010) and this study counteracts this trend. It is difficult to define absolutely the predictors of lack of medication adherence because it is a problem with multifactorial etiology (Cabral & Silva, 2010). Some studies show that the low medication adherence may be related to the absence of adverse reactions perceived, with low monthly income and the polymedication (Chin, et al., 2012; Cabral & Silva, 2010; Monterroso et al., 2015).

VARIABLES	CATEGORIES	NON-ADHERENT N (%)	ADHERENT N (%)
Gender	Male	21 (35,0)	7 (11,7)
	Female	25 (41,7)	7 (11,7)
Age (years)	65-74 (Young older adult)	13 (21,7)	5 (8,3)
	75-84 (Older adult)	20 (33,3)	8 (13,3)
	85-94 (Very Old)	13 (21,7)	1 (1,7)
Marital Status	Married/Non-marital partnership	25 (41,7)	8 (13,3)
	Divorced/Separated)	0 (0,0)	1 (1,7)
	Single	6 (10,0)	3(5,0)
	Widower	15 (25,0)	2 (3,3)
With those who live	Accompanied	34 (56,7)	9 (15,0)
	Alone	12 (20,0)	5 (8,3)
Schooling	Can't read/write	9 (15,0)	1 (1,7)
	Attended primary school	13 (21,7)	2 (3,3)
	4th Year (1st cycle)	12 (20,0)	4 (6,7)
	6th Year (2nd cycle)	9 (15,0)	3 (5,0)
	9th Year (3rd cycle)	1 (1,7)	3 (5,0)
	12th Grade (Secondary School)	1 (1,7)	0 (0,0)
	Higher Education	1 (1,7)	1 (1,7)
Monthly Income	Less than 300 Euros/month	21 (35,0)	3 (5,0)
	Between 300 and 635 Euros/month	14 (23,3)	4 (6,7)
	More than 635 Euros/month	11 (18,3)	7 (11,7)
Polymedication	Yes	32 (53,3)	8 (13,3)
	No	14 (23,3)	6 (10,0)
Potentially inappropriate medications	Yes	34 (56,7)	10 (16,7)
	No	12 (20,0)	4 (6,7)

TABLE 5: CHARACTERIZATION OF MEDICATION ADHERENCE, SOCIODEMOGRAPHIC VARIABLES AND MEDICATION

## 4. CONCLUSION

The sample of the present study was mostly consisted of married females, with primary school education and monthly income below 300 euros.

The most used drugs were those who act on the cardiovascular system and central nervous system following the digestive system. Overall, the three most prevalent drugs in this study were pantoprazole, alprazolam and simvastatin. It is important highlighted that major polymedication was verified in the older adult.

Moreover, the study identified 15 PIMs in the older adult, with a higher frequency in proton pump inhibitors, non-steroidal anti-inflammatory drugs and psychotropic drugs, and in some cases, more than one PIMs per person was used.

Medication adherence in these older adult is low, what does not correspond to the expected result and verified in other studies performed in older adult people. The non-adherent older adult were female, between 75 and 84 years, married/ with non-marital partnership, attended or finished primary school who lived accompanied in Valpaços with less than 300 euros/ month, polymedicated and use potentially inappropriate medications.

Despite the important contributions of the present study, this also presents some limitations. More specifically, the non-probabilistic sampling technique does not allow and measure the accuracy of the results and its extrapolation to the older adult Portuguese population can't be done. In addition, since it is an exploratory study the results cannot be accurately interpreted for the generalized population.

The prevalence of PIMs use may have been underestimated, because the potential drug-drug and drug-disease interactions have not been considered, drugs that should be avoided or should have their dose adjusted according to the renal function of the older adult and drugs with strong anticholinergic properties.

However, the results contributed to evidence the high consumption of PIMs and that therapeutic non-compliance is one of the main challenges for patient safety associated with medication.

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