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RESEARCH

POLYPHARMACY AND POTENTIALLY INAPPROPRIATE MEDICATION USE IN GERIATRIC PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT

Abstract

Introduction: A potentially inappropriate medication is defined as a drug that has higher adverse effects when compared with the clinical benefit, although a safer or more efficient alternative treatment exists given the same situation. This cross-sectional study aimed to assess the presence of polypharmacy (use of five or more drugs) in older patients aged ≥65 years.

Materials and Method: Geriatric patients presenting to the emergency department between January and March 2018 who had been prescribed five or more drugs were evaluated with a questionnaire for potentially inappropriate medication and polypharmacy. The questionnaire comprised demographic data, chronic diseases affecting elderly patients, and chronic drugs used according to the Beers criteria (2015 version) for elderly adults.

Results: The study cohort consisted of 144 patients (56 males, 88 females). The mean age of participants was 77.23±7.94 years. The most common chronic diseases were hypertension (22.5%), coronary artery disease (15.1%), and diabetes (10.7%). The three most commonly prescribed drugs were aspirin (10.8%), an angiotensin receptor blocker + thiazide (9.8%), and beta blockers (9.8%). The average number of medications used was 5.22±2.56. Polypharmacy was found in 80 patients (55.6%) whereas potentially inappropriate medication use was determined in 78 (54.2%) patients.

Conclusions: Both polypharmacy and potentially inappropriate medication use were found to have a high frequency in our study group. We found the use of potentially inappropriate medication to be significantly higher in patients with polypharmacy. The most used potentially inappropriate medications were proton pump inhibitors and non-steroidal anti-inflammatory drugs.

Keywords: Polypharmacy; Geriatrics; Potentially inappropriate medication

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ARAŞTIRMA

ACİL SERVİSE BAŞVURAN GERİATRİ YAŞ GRUBUNDAKİ HASTALARDA POLİFARMASİ VE POTANSİYEL UYGUN OLMAYAN İLAÇ KULLANIMI

Öz

Giriş: Potansiyel olarak uygun olmayan bir ilaç, aynı durum göz önüne alındığında daha güvenli veya daha etkili bir alternatif tedavi mevcut olmasına rağmen, klinik fayda ile tartıldığında daha yüksek yan etkileri olan bir ilaç olarak tanımlanmaktadır. Bu kesitsel çalışma, 65 yaş üstü yaşlı hastalarda polifarmasinin (beş veya daha fazla ilacın kullanımı) varlığını değerlendirmeyi amaçlamıştır.

Gereç ve Yöntem: Ocak ve Mart 2018 tarihleri arasında acil servise başvuran geriatri yaş grubundaki hastaların polifarmasi durumu ve potansiyel olarak uygun olmayan ilaç kullanımı durumu oluşturulan anket form ile değerlendirildi. Anket formda demografik veriler, kronik hastalıklar ve yaşlılar için Beers kriterlerine göre (2015 versiyon) kronik ilaç kullanımı yer almaktadır.

Bulgular: Çalışma grubu, 144 hastadan oluşmaktaydı (56 erkek, 88 kadın). Katılımcıların yaş ortalaması 77.23±7.94 yıldı. En sık görülen kronik hastalıklar hipertansiyon (%22,5), koroner arter hastalığı (%15.1) ve diyabet (%10.7) idi. En sık kullanılan üç ilaç, aspirin (%10.8), anjiyotensin reseptör bloker + tiyazid (%9.8) ve beta blokerleridir (%9.8). Kullanılan ilaç sayısı ortalaması 5.22±2.56 idi. 80 hastada polifarmasi (%55,6) bulunurken, 78 (%54.2) hastada potansiyel olarak uygun olmayan ilaç kullanımı saptandı.

Sonuç: Hem polifarmasi hem de potansiyel olarak uygun olmayan ilaç kullanımının çalışma grubumuzda yüksek sıklığa sahip olduğu bulundu. En çok kullanılan potansiyel uygun olmayan ilaç, proton pompası inhibitörleri ve non-steroidal antiinflamatuar ilaçlar idi.

Anahtar sözcükler: Çoklu ilaç kullanımı; Geriatri; Potansiyel uygunsuz ilaç kullanımı

INTRODUCTION

The high prevalence of comorbidities among elderly adults has led to the prescription of multiple medications. Although there is no unanimously accepted definition of polypharmacy, it is widely regarded as the use of ≥5 drug types (1,2). The use of numerous medications is also known to increase the risk of side effects, which is also an independent risk factor for improper drug use (3). A potential inappropriate medication (PIM) is defined as "a drug that has higher adverse effects when compared with the clinical benefit, although a safer or more efficient alternative treatment exists given the same situation" (4). The elderly population is at a higher risk for developing drug side effects, and given the definition of PIM, such prescriptions also cause increases in health care costs, hospitalization rates, and both morbidity and mortality (5, 6). Despite many suggestions to prevent the use of PIM in the elderly, there is still a high incidence in some studies. The prevalence of PIM usage in the global sense is reported to vary between 14% and 43% (7). Some tools have been developed to determine PIMs, the most commonly used being the Beers criteria, which was first released in 1991 and was last updated in 2015. The Beers criteria are derived from expert opinions, compiled publications, and consensus techniques, requiring no clinical judgment in its implementation (8,9). These criteria have led health professionals to increase the safety of prescription drugs for the elderly population by reducing the risk associated with unnecessary polypharmacy, drug interactions, and unwanted side effects (9). Today, the emergence of drug-related problems in the elderly because of PIM use coupled with increasing patient safety concerns is quickly becoming the focal point of researchers in this field (10). In this study, we aimed to determine the frequency of polypharmacy and PIM use according to the 2015 version of the Beers criteria among geriatric patients admitted to the emergency department.

MATERIALS AND METHOD

This cross-sectional study was conducted in Bolu Izzet Baysal State Hospital where geriatric patients were admitted to the Emergency Department and were analyzed between January and March 2018. The study included those who were 65 years of age and older and consented to take part in the study. Individuals were excluded from the study if they did not agree to participate, were under the age of 65 years old, and were patients whose data collection was incomplete for reasons such as transfer to other wards. A total of 144 patients comprised the final study group. The study was approved by the local ethics committee. The study was conducted through a questionnaire, which assessed the demographic characteristics of participants, inquired about chronic diseases that are common in the elderly population, and evaluated chronic drug use in two sections according to the Beers criteria for elderly adults (1) '*potentially inappropriate medications for elderly adults (Beers Table 2)*' and (2) '*potentially inappropriate drug use criteria due to the severity of illness or symptoms for elderly adults (Beer's Table 3)*' (8). The questionnaire was completed by the patient's doctor. Polypharmacy was defined as the use of ≥5 different medications.

Statistical analysis

All study data were evaluated with the SPSS V20 program. The variables were given in mean±standard deviation or frequency (as percentage). Chi-squared analysis was used to evaluate categorical variables. Statistically significant levels were accepted as $p \le .05$.

RESULTS

The study group consisted of 56 (38.9%) males and 88 (61.1%) females, with a total of 144 patients. The age of the study group ranged from 65 to 95 years, with the average being 77.23±7.94 years. The most common three chronic diseases were hypertension (22.5%), coronary artery disease (15.1%), and diabetes (10.7%). The three most commonly prescribed drugs were aspirin (10.8%), an angiotensin receptor blocker + thiazide (9.8%), and beta blockers (9.8%) (Table 1). The average number of chronic diseases in the study group was 3.15±1.59. Of the 144 patients included in the study, a total of 499 drugs were being used with the mean number of medications being 5.22±2.56. In the study, 80 patients (55.6%) were found to have polypharmacy as they used five or more medications. There was no significant difference for age and sex among patients with or without polypharmacy ($p > .05$ for both). It was determined that both the use of PIM

and the presence of PIM-related disease symptoms were significantly higher in patients with polypharmacy ($p<.001$ and $p=0.021$, respectively) (Table 2). According to the Beers 2015 criteria, the number of patients using PIM was 78 (54.2%). The use of PIM was most common in those with gastrointestinal tract diseases (44.0%) and those with pain (27.2%). The most commonly used drug was the proton pump inhibitor (PPI) (36.1%), followed by non-steroidal anti-inflammatory drugs (NSAIDs) (26.2%) (Table 3). The most frequent PIM-related problems were congestive heart failure (39.6%), followed by falls and fractures (25.0%).

Table 1. Specifications of the study group and their distribution.

Characteristics	n	%
Sex		
Male	56	38.9
Female	88	61.1
Age (years)		
65–74	54	37.5
75–84	59	41.0
85+	31	21.5
Chronic disease		
Hypertension	103	22.6
Coronary artery disease	69	15.2
Diabetes	49	10.8
COPD[1]	44	9.6
Congestive heart failure	36	7.6
Muscle-joint disease	33	7.2
Arrhythmia	32	7.0
Gastritis	19	4.3
Other	72	15.7
Chronic drug usage		
Aspirin	54	10.8
Beta blockers	49	9.8
ARB[2]+Thiazide	49	9.8
Anti-arrhythmic	47	9.4
Proton pump inhibitors	42	8.4
Oral anti-diabetics/Insulin	36	7.2
NSAIDs[3]	35	7.0
ACEİ[4]-ARB	33	6.6
Furosemide	27	5.4
Beta agonists	25	5.0
Antiplatelet-Anti-coagulants	25	5.0
Anti-depressants	23	4.6
Other	54	11.0

1: Chronic Obstructive Pulmonary Disease, 2: Angiotensin Receptor Blocker, 3: Non-Steroidal Anti-Inflammatory Drugs, 4: Angiotensin Converting Enzyme Inhibitors

Table 2. Distribution according to specific variables in polypharmacy.

Characteristics	No polypharmacy n (%)	Polypharmacy n (%)	p
Sex			
Male	30 (53.5)	26 (46.5)	.079
Female	34 (38.6)	54 (61.4)	
Age (years)			
65-74	24 (44.4)	30 (55.6)	
75-84	26 (44.0)	33 (56.0)	.995
85+	14 (45.1)	17 (54.9)	
PIM			
No	42 (65.6)	24 (34.4)	**<.001**
Yes	22 (30.0)	56 (70.0)	
Disease present			
No	52 (50.4)	51 (49.6)	.021
Yes	12 (29.3)	29 (70.7)	

Table 3. Drugs used as PIMs.

Characteristics	n	%
PPI[1]	44	36.1
NSAIDs[2]	32	26.2
Metoclopramide	10	8.2
İnsulin	10	8.2
Digoxin	7	5.7
Quetiapine	6	4.9
Doxazosin	4	3.3
Dimenhydrinate	4	3.3
Amitriptyline	2	1.6
Abizole	1	0.8
Chlorzoxazone	1	0.8

1: Proton Pump Inhibitor, 2: Non-Steroidal Anti-Inflammatory Drugs

DISCUSSION

In our study, we evaluated the frequency of polypharmacy and PIM usage and their relationship in light of the effects they have on particular variables. Although there is no generally accepted specific definition of polypharmacy, in most studies polypharmacy is defined as the use of five or more drugs (1,2). In the present study, the frequency of polypharmacy was 55.6%. In addition, the mean number of chronic medications used was 5.22±2.56 in the study group. In a recent study, the frequency of polypharmacy (5 and over) was reported to be 62.3% and this result was similar to our study (11).

In another study published in our country, reported the polypharmacy rate as being 41.7% (12). In that study, the frequency of polypharmacy was low when compared with our study. However, it should be noted that in this study, usage of 10 or more drugs was considered as advanced polypharmacy, which was evaluated separately. If advanced polypharmacy rates were adjusted according to this definition and then were stratified accordingly in these studies, the rates of polypharmacy obtained would be similar to ours presented here.

In a study involving 2500 people in the United States, the rate of polypharmacy and advanced polypharmacy was reported as 35% (13). In a further study with a high cohort number of participants in the United States, polypharmacy frequency was reported to be between 35% and 40% (14). Both studies have stated that the prevalence of polypharmacy was lower when compared with studies conducted in our country. Results of a study by Lai et al. were similar to our work and showed the frequency of polypharmacy to be 55.4%. However, in this study the elderly age group was defined as being 85 years and older. In light of these results, we can state with confidence that the elderly tend to be prescribed more medications in our country. Although studies have shown a relationship between polypharmacy and negative clinical outcomes, there are other issues, which still need to be discussed, as there is still no clarity in the definition of polypharmacy. For instance, another study suggested that the use of five or more medications is necessary for some patients, as these patients require these drugs to preserve wellbeing. They argued that it would be erroneous to consider these patients within the definition of polypharmacy. In the same study, the author stated that polypharmacy is only present if the drugs prescribed are not used for the correct indication (2). Hence, it is argued that the use of unnecessary drugs should be defined as polypharmacy rather than the number of drugs used. In a systematic review, it was suggested that the use of one or more unnecessary drugs was reported to be around 50% (15).

Interestingly, this frequency matches that of polypharmacy. The adverse clinical outcomes expressed in the emergence of polypharmacy should also be evaluated in this respect. The Beers criterion is and has been a commonly used method to assess PIM use (9, 16). In our study, the use of PIM was evaluated according to the latest 2015 version of the Beers criteria. As per this evaluation, 54.2% of our study group was considered to use PIM. The most commonly used PIMs were PPIs and NSAIDs. In addition, there was a meaningful relationship between polypharmacy and PIM in our study. The use of PIM was found to be higher in patients with polypharmacy. In studies based on the 2003 version of the Beers criteria, the use of PIM was reported to vary between 13.0% and 40.7% (17-19). Based on the 2012 version of the Beers criteria, reports have been shown to vary between 42.7% and 59.2% (9,20,21). According to the 2015 Beers criteria, it was found to be 33.2%–60.0%; which are on par with the PIM frequency detected in our study (22,23).

In addition to the current increasing incidence of PIM usage, reported incidences are also likely to increase because of the broadened scope of the 2015 version of the Beers criteria when compared with older versions. Most studies conducted according to the Beers 2012 criteria have reported benzodiazepines as the most common PIM. According to the Beers 2015 criteria consensus group, the use of the PPI was related to common complications in elderly adults. The 2015 version of the Beers criteria added PPIs

based on this evidence (8). The most common PIM in our study was PPI suggests that this addition was extremely accurate. Also, this addition is supported by another study, which compared the Beers 2012 version with the 2015 version, and found that the 2012 version showed benzodiazepines as the most common PIM. However, according to the 2015 Beers criteria, the position of benzodiazepines was overtaken by PPIs; which is consistent with the findings of our study (22). In a study performed by Nawas et al. it was noted that inappropriate PPI prescriptions constituted 40% to 80% of all PPI prescriptions (24). By focusing on the results of prolonged PPI use, reduction of inappropriate PPI usage can be attained by careful review during repeat prescriptions of patients who truly require PPIs. Studies evaluating the use of both polypharmacy and PIM are usually evaluated retrospectively and include a high number of participants. However, it should be noted that, in the current study, the records of patients were not evaluated and the patients were evaluated immediately after admittance to the emergency department. Because of this study design, our findings were dependent on patients' statements and recollection of drug use; however, the design also conferred several advantages: first, our results were not affected by errors in medical records, and second, patients could state if they had intentionally

discontinued some of their prescribed medications. Nevertheless, the number of participants in the current study was relatively low when compared with other studies on this topic.

In conclusion, the use of polypharmacy and PIM was found to be very common among elderly patients in our study group. We determined that the use of PIM to be significantly higher in patients with polypharmacy. The most used drug as PIM was the PPI, which was followed by NSAIDs. We believe that our results accurately depict the extent of both polypharmacy and PIM use in the geriatric population in Turkey, and could provide support to elucidate the reasons for PIM usage in the elderly population. Moreover, we believe that a prescription system designed according to a protocol involving PIM should be created. Although the prevention of both polypharmacy and prescribing inappropriate drugs is difficult, remedying the prescription of PIMs through such a protocol could greatly contribute to the wellbeing of patients as well as reduce health costs.

Conflict of interest

The authors declare that they have no conflicts of interest. The authors have indicated they have no financial relationships relevant to this article to disclose.

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