



Original Research / Orijinal Araştırma

Evaluation of Inappropriate Medication Use and Activities of Daily Living in 65 Years and Older Home Care Patients

65 Yaş ve Üstü Evde Sağlık Hastalarında Uygunsuz İlaç Kullanımının ve Günlük Yaşam Aktivitelerinin Değerlendirilmesi

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Abstract

Introduction: This study aims to evaluate potentially inappropriate medication (PIM) use, the association of PIM use, and activities of daily living in 65 years and older home care patients. **Method:** The study included 322 patients aged 65 and over who applied to Home Care Unit. Consent was obtained from those who agreed to participate in the study. A questionnaire containing demographic data, drug use information, and Katz Daily Living Activities Index was used which was prepared by the researcher in this study. The drugs used by the patients were evaluated according to the 2015 Beers criteria and inappropriate active substances were detected. The data were defined by statistical analyzes such as mean, percentage, standard deviation, and frequency. Chi-squared test and Student's t-test were used in the analysis. The significance level was accepted as $p < 0.05$. **Results:** The mean age of the patients was 80.2 ± 8.2 years, and 63.4% ($n=204$) were female. 70.5% ($n=227$) of the elderly have three or more chronic diseases. The most common diseases were hypertension (56.2%), diabetes (30.0%), and heart failure (29.8%). 79.2% ($n=255$) of the group uses four or more drugs. 83.3% ($n=260$) of the patients get help to use the drugs. 51.6% ($n=166$) of the patients were fully dependent on activities of daily living and 3.4% ($n=11$) were fully independent, the level of dependency increases with age ($p < 0.05$). The PIM rate was 61.5% in patients. PIM use was found to be significantly higher in those with more disease, in those who used more drugs, and in females ($p < 0.05$). No relationship was found between inappropriate medication use and addiction level. **Conclusion:** In this study, it was found that more than half of home care patients aged 65 and over had inappropriate drug use. It was determined that inappropriate medication use increased with polypharmacy, and polymorbidity, and there was no correlation between addiction levels.

Key words: home care, inappropriate medication use, Beers criteria.

Özet

Giriş: Çalışmamızda evde sağlık birimine kayıtlı 65 yaş ve üstü hastalarda uygunsuz ilaç kullanım durumunun belirlenmesini, uygunsuz ilaç kullanımı ile günlük yaşam aktiviteleri arasında ilişki olup olmadığının belirlenmesini amaçladık. **Yöntem:** Çalışmaya, Evde Sağlık Hizmetleri birimine başvuran 65 yaş ve üzeri 322 hasta dahil edilmiştir. Çalışmaya katılmayı kabul edenlerden onam alınmıştır. Hastalara araştırmacı tarafından hazırlanan demografik verileri, ilaç kullanım bilgilerini içeren anket formu ve Katz Günlük Yaşam Aktiviteleri ölçeği uygulanmıştır. Hastaların kullandığı ilaçlar 2015 Beers kriterlerine göre değerlendirilip uygunsuz etken maddeler saptanmıştır. Ortalama, yüzde, standart sapma, frekans gibi istatistiksel analizler ile veriler tanımlanmıştır. Analizde ki-kare ve students-t testi kullanılmıştır. Anlamlılık düzeyi $p < 0,05$ olarak kabul edilmiştir. **Bulgular:** Hastaların yaş ortalaması $80,2 \pm 8,2$ yıl olup, %63,4'ü ($n=204$) kadındır. Yaşlıların %70,5'inin ($n=227$) üç ve üzerinde kronik hastalığı vardır. En sık bildirilen kronik hastalıklar hipertansiyon (%56,2), diyabet (%30,0) ve kalp yetmezliğidir (%29,8). Grubun %79,2'si ($n=255$) dört ve üzerinde ilaç kullanmakta, %83,3'ü ($n=260$) ilaçları kullanmak için yardım almaktadır. Hastaların %51,6'sı ($n=166$) tam bağımlı, %3,4'ü ($n=11$) tam bağımsızdır. Yaşla birlikte bağımlılık düzeyi artmaktadır ($p < 0,05$). Hastalarda uygunsuz ilaç kullanım oranı %61,5 saptanmıştır. Uygunsuz ilaç kullanımı daha fazla hastalığı olanlarda, daha çok ilaç kullananlarda, kadın cinsiyette anlamlı olarak fazla saptanmıştır ($p < 0,05$). Uygunsuz ilaç kullanımı ile bağımlılık düzeyi arasında ilişki saptanmamıştır. **Sonuç:** Bu çalışmada 65 yaş ve üzerindeki evde sağlık hastalarının yarısından fazlasında uygunsuz ilaç kullanımının olduğu görülmüştür. Uygunsuz ilaç kullanımının polifarmasi ve polimorbidite ile arttığı, bağımlılık düzeyi ile arasında ilişki olmadığı görülmüştür. **Anahtar Kelimeler:** evde sağlık, uygunsuz ilaç kullanımı, Beers kriterleri.

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Introduction

Although polypharmacy can be seen at any age, its frequency is higher in elderly patients. Elderly patients with a large number of comorbid diseases are prescribed a larger number of medications, and it becomes difficult to avoid polypharmacy.¹ As the number of co-morbidities increase, the number of hospital admissions, hospitalization rates, examinations by specialist physicians, and the number of prescribed medications are increasing accordingly.² The number of chronic diseases, age, gender, and the environment in which the patient lives, contribute to the development of polypharmacy.¹ With physiological changes in the elderly, drug side effects is more common.²

Rational drug use is "the use of appropriate drugs according to the clinical needs and individual characteristics of patients at doses that meet their requirements, at sufficient times, and the least cost to society and themselves".^{3,4} Due to the pharmacokinetic and pharmacodynamic changes observed in the elderly patient group and the reduced patient adherence to treatment, rational drug use makes it mandatory to apply it more rigorously and in accordance with its principles in this age group. In addition to the excess of comorbid diseases in the elderly, polypharmacy caused by complaints such as pain is a common problem. Nevertheless, polypharmacy can be prevented by the rational use of medications, reviewing the treatment of the patient, and reorganizing their treatment. This problem can be solved by organizing treatments for the cause and disease instead of symptomatic treatment, ensuring effective communication with the patient, and applying the principles of rational drug use, such as an understandable and clear explanation of side effects and instructions for use.⁵

Guidelines have been prepared to guide us in rational drug use in elderly patients and to prevent inappropriate drug use, one of the most common is the Beers criteria which was first published in 1991 to evaluate the drugs used by elderly people living in nursing homes. The criteria are updated regularly since 2011, by the American Geriatrics Society.⁶

Home health services in Turkey constitute the examination, diagnosis, treatment, medical care, follow-up, and rehabilitation services, covering the social and psychological counseling services provided to individuals in their homes and family environments who need a combination of health and social services together, including preventive, therapeutic, and rehabilitative health services at home due to various diseases.^{7,8} The majority of patients who benefit from home health services are elderly patients.

The early detection of functional losses in the elderly is important to prevent life-threatening risks and healthcare costs. With the Katz Daily Living Activities Index, the patient's ability to perform each function independently or with assistance is evaluated, and their level of dependence on activities of daily living is determined. These indices are widely used in Turkey and the rest of the world, and their validity and reliability levels are high.⁹

This study aims to determine the frequency of inappropriate drug use in patients aged 65 years and over registered in the home health unit and determine the relationship between inappropriate drug use and activities of daily living.

Methods

This is a monocentric, descriptive cross-sectional study. In the study, it was calculated that at least 322 participants can provide the power of representation of the universe with a sample account whose universe is unclear by taking the frequency of inappropriate drug use as 30%.¹⁰ Ethical approval for the study was obtained from the hospital's Clinical Research Ethics Committee (Approval date: October 7, 2020, and Approval number: 02). The study included 322 patients aged 65 and over who presented to the home care unit between 20 October 2020 and 20 February 2021. Informed consent was obtained from those who agreed to participate in the study in accordance with the World Medical Association Declaration of Helsinki. Information was obtained from the relatives of the patients whose cognitive functions were not suitable for answering the questions.

A questionnaire containing demographic data and drug use information prepared by the researcher was applied. The questionnaire used in the study was obtained by scanning the literature, and in the beginning part, it consists of questions about gender, age, education, marital status, and the number of children. In the continuation of the questionnaire, the reason for application, number of home health clinic applications in the last year, hospitalization history, number of emergency applications in the last year, and chronic diseases were questioned. There are questions about the questionnaire about the number of drugs, and active substances, whether they use non-prescription drugs, whether they are informed about the side effects of drugs, and their regular use of drugs. At the end of the questionnaire, the Katz Daily Life Activities scale was applied to the patients. The scale consists of six subsections. The patient is assessed for his ability to independently perform functions related to bathing, dressing, toiletries, transportation, intestinal and bladder control, and feeding. The level of dependency/independence in the scale is determined by assessing the ability of the patient to perform each function independently or with help.⁹ If the patient is independent, they 1 point, if they are dependent, they get 0 points. The total score of the scale varies in the range of 0-6. Six points indicate a fully independent patient, while 0 points

indicate complete dependency. Scores of 2 and below are considered severely dependent, and scores of 3-4-5 are considered moderately dependent.^{11,12}

There are 5 sections in the Beers criteria. These are listed as potentially inappropriate medication use in older adults, potentially inappropriate medication use in older adults due to drug–disease or drug–syndrome interactions (that may exacerbate the disease or syndrome), potentially inappropriate medications to be used with caution in older adults, potentially clinically important non-anti-infective drug–drug interactions that should be avoided in older adults, and non-anti-infective medications that should be avoided or have their dosage reduced with varying levels of kidney function in older adults. The drugs used by the patients were evaluated according to the 2015 Beers criteria, and inappropriate active ingredients were determined.¹³

Data Analyses: The SPSS (Statistical Package for the Social Sciences) program was used in the analysis of the data collected in the study. Descriptive statistics were calculated, including mean, percentage, standard deviation, and frequency values. Chi-squared test and Student's t-test were used in the analysis. The significance level was accepted as $p < 0.05$.

Results

In the study, 63.4% (n=204) of the patients were female, the mean age of all patients was 80.2 ± 8.2 years, and the patients were aged between 65 and 102. Among the patients, 27.6% (n=89) were aged between 65 and 75, 44.1% (n=142) were between 76 and 85, and 28.3% (n=91) were 86 years old or older. The proportion of those who stated that they were widowed was 64.6% (n=208). It was found that 41.3% (n=133) of the patients were illiterate. In the last year, the mean number of home health applications made by the patients was 6.4, 30.4% (n=98) of the patients who applied were hospitalized within a year, and 44.1% (n=142) were admitted to the emergency room at least once. Those with 3 or more diseases constituted 70.5% (n=227) of the sample. The sociodemographic information of the patients is summarized in Table 1.

		n	%
Gender	Female	204	63.4
	Male	118	36.6
Age	65-75	89	27.6
	76-85	142	44.1
	86 and older	91	28.3
Education	Illiterate	133	41.3
	Literate	98	30.5
	Primary school	67	20.8
	Middle school and higher	24	7.4
Marital Status	Single	7	2.2
	Married	107	33.2
	Widowed	208	64.6
Person(s) living with	Alone	15	4.6
	Wife/husband	62	19.3
	Daughter, son or relative	215	66.8
	Wife/husband and children	17	5.3
	Paid caregiver	12	3.7
	Other	1	0.3
Number of chronic diseases	1 and no chronic disease	31	9.6
	2	64	19.9
	3 and more	227	70.5
Total		322	100.0

The three most commonly reported diseases were hypertension (56.2%), diabetes (37.0%), and heart failure (29.8%). The most common reasons for applying were a diaper prescription or report, printing a prescription, getting a COVID (Coronavirus Disease) vaccine, consulting with a specialist, and getting a blood test, respectively. The mean number of drugs used by the patients was 6.2 ± 3.1 per person. While the number of patients who were not using any drug was 10 (3.1%), 255 patients (79.2%) were using 4 or more drugs. The most used group of drugs were antihypertensives (63.9%), anticoagulants and antiplatelets (56.2%), and gastrointestinal tract drugs (50.6%). Among the patients, 17.1% (n=55) used an over-the-counter drug. Fourteen people (4.3%) were receiving alternative non-pharmaceutical treatment. Among the patients, 74.2% (n=239) were cared for by their daughters, sons, or relatives. The educational levels of 76.6% (n=235) of their caregivers were in primary school or below. The rate of the patients who received assistance in using medications was 83.3% (n=260).

It was determined that 51.6% (n=166) of the patients were fully dependent, and 3.4% (n=11) were fully independent. While the proportion of the fully dependent patients aged 86 or older was 61.5%, it was 40.4% in the patients aged 75 or younger, and there was a significant relationship between age and dependency levels ($p = 0.152$). The dependency levels of the patients are shown in Table 2.

In this study, it was determined that 61.5% (n=198) of the patients were using drugs with inappropriate active substances. Details of the number of inappropriate drugs per person and level of dependence can be followed in Table 2.

Total KATZ score of patients	n	%
Fully dependent (0 point)	166	51.5
Severely dependent (1-2 points)	92	28.6
Moderately dependent (3-4-5 points)	53	16.5
Fully independent (6 points)	11	3.4
Inappropriate drug use		
Yes	198	61.5
No	124	38.5
Number of inappropriate drugs		
0	124	38.5
1	95	29.5
2	66	20.5
3 and higher	37	11.5
Total	322	100.0

There was no significant relationship between age, marital status, number of children, number of home care clinic applications, hospitalization, emergency room application history, and inappropriate drug use. Inappropriate drug use was significantly higher in women ($p=0.012$). Inappropriate drug use in patients with four or more different diseases is 72.0% and the relationship is significant ($p=0.003$). As the number of drugs used increases, inappropriate drug use increases ($p<0.001$). Although inappropriate drug use was more common in over-the-counter drug users, the relationship between them was not significant. Inappropriate drug use was observed the least in those who live with a paid caregiver. It was higher in patients for whom there was no one interested in their care (Table 3). As the level of independence increased, the frequency of inappropriate drug use increased, but the relationship between them was not statistically significant (Table 3).

Table 3. The relation between inappropriate drug use and the level of dependence and other variables								
		Inappropriate drug use				Total	Chi-squared	p
		Yes		No				
		n	%	n	%			
Age	65-75	50	56.2	39	43.8	89	1.468 ^a	0.480
	76-85	90	63.4	52	36.6	142		
	86 and older	58	63.7	33	36.3	91		
Gender	Male	62	52.5	56	47.5	118	6.298 ^a	0.012
	Female	136	66.7	68	33.3	204		
Number of chronic diseases	0-3	113	55.4	91	44.6	204	8.743 ^a	0.003
	4 and higher	85	72.0	33	28.0	118		
Number of drugs used	0-5	61	46.6	70	53.4	131	26.084 ^a	<0.001
	6-7	54	62.8	32	37.2	86		
	8-9	47	78.3	13	21.7	60		
	10 and higher	36	80.0	9	20.0	45		
Caregiver	None	11	73.3	4	26.7	15	10.530 ^a	0.032
	Wife/husband	27	57.4	20	42.6	47		
	Daughter, son, or relative	153	64.0	86	36.0	239		
	Paid caregiver	5	27.8	13	72.2	18		
	Other	2	66.7	1	33.3	3		
Dependence	Fully dependent	99	59.6	67	40.4	166	8.018 ^a	0.046
	Severely dependent	51	55.4	41	44.6	92		
	Moderately dependent	38	71.7	15	28.3	53		
	Fully independent	10	90.9	1	9.1	11		
Total		198	61.5	124	38.5	322		

Discussion

In the study, 322 patients aged between 65 and older were included. The mean age of the patients was 80.2±8.2 years. In a study conducted in the Balıkesir Home Health Unit, the mean age of the participants was reported as 80.09±7.3 years.¹⁴ In this study, 63.4% of the patients were female and inappropriate drug use was significantly higher in females. In a study, it was stated that the female gender was among the independent predictors of potentially inappropriate prescribing.¹⁵ According to the World Health Organization, females make up a large proportion of the elderly population.¹⁴ The majority of patients receiving home health services are female.^{14,16} The number of comorbid diseases, and accordingly the number of drugs used, increases with age.² This situation made us think that inappropriateness may be higher in females depending on the number of drugs used. In this study, 41.3% of the patients were illiterate. Considering that the average age of the patients was 80.0 years, it is expected that the literacy rate would be low due to the lack and accessibility of educational institutions in the years of these patients' education times. The sociodemographic characteristics of the patients had similar characteristics compared to that of the previous studies.^{14,16-18}

When patients were evaluated according to the Katz scale of Daily Life Activities, 51.6% were fully dependent, 28.6% were severely dependent, and only 3.4% were fully independent. The level of dependency increased with age. The most dependent part where the patients were dependent was bathing. The study by Çubukçu et al. found that 61.2% of the patients were fully confined to bed.¹⁹ The study by Çayır et al. included patients among whom 65% were fully dependent, and 35% were semi-dependent.¹⁷ It was expected that the dependency rate would be high since the patients who benefit from home health services have a history of cerebrovascular and cardiovascular diseases, they are fragile due to advanced age, and they include patient groups such as terminal cancer patients.

In this study, 61.5% of the patients had inappropriate active substance use. In studies conducted around the world, according to the Beers and STOPP criteria, the prevalence of potentially inappropriate medication (PIM) use

was reported to be 13-35%.¹⁰ In a study conducted in a tertiary teaching hospital in India, 87.3% and 31.0% of patients were prescribed at least one inappropriate drug when examined according to the 2012 Beers criteria and the 2010 PRISCUS list, respectively.²⁰ Inappropriate drug use in elderly people staying in nursing homes in Malaysia was at a rate of 23.7% according to the STOPP criteria and 32.7% according to the Beers criteria.¹⁰ In this study, the frequency of inappropriate drug use was found to be more common than in studies conducted in the population over the age of 65, and it was found to be similar in frequency to studies conducted with patients over the age of 65 connected to a home care unit. As the number of diseases increases, the number of drugs used increases. Considering many comorbidities, our patient population is only over the age of 65 and is largely bed-dependent, it is expected to be high.

Each section of the Beers criteria includes the grounds for non-compliance, the degree/quality of the evidence, and the strength of the recommendation. The first section includes medications that are potentially inappropriate for elderly patients. The second section contains potentially inappropriate medications for use in the elderly due to drug-disease or drug-syndrome interactions (the risk of exacerbating the disease or syndrome). In the third section, some PIMs should be used with caution in older adults. In the fourth section, there are potentially clinically important non-anti-infective drug-drug interactions that should be avoided in older adults. In the fifth section, there are non-anti-infective medications that should be avoided or have their dosage reduced with varying levels of kidney function in older adults.¹³

The study according to the sections of the Beers criteria was compared in detail with studies involving similar populations. In our study, PIMs according to the first, second, and fourth sections of the Beers criteria were like the studies of Sargin and Kocadağ. The patients in this study had higher rates of inappropriate drug use according to the third section, and more attention should be paid while prescribing drugs that are included in this section.^{21,22} Most of the recommendations in the third section concern patients aged 75 years of age or older. The high rate of inappropriate drug use in this section can be explained by the mean age of the patients was 80 years. According to the fifth section, the rate of inappropriate drug use was 2.2% in the patients who participated in this study. Sarı reported the frequency of inappropriate drug use as 7.0% based on this section. It was pleasing that the patients in this study also had a low rate.²³

In this study, inappropriate drug use in patients with four or more different diseases is 72.0% and the relationship is significant. In this study, 79.2% of the patients were using four or more drugs. Önal et al. reported the frequency of using 5 or more drugs as 36.5%, Şayir et al. found that 69% of the participants used 4 or more drugs.^{24,25} Although the frequency of polypharmacy was found to be different in our study and other samples, the striking thing is that the rate is very high. As the number of drugs that were being used by the patients in our study increased, their inappropriate drug use rates also increased significantly. A lot of studies have found that polymorbidity and polypharmacy are risk factors for the possibility of using inappropriate drugs.^{18,22,23} In Sayın's study, having a higher number of PIMs was associated with older age, more complex drug regimens, and more drugs and chronic diseases.²⁶ An Irish study showed that polypharmacy was strongly associated with potentially inappropriate prescribing.²⁷ In one study, it was emphasized that polypharmacy has a major effect on potentially inappropriate prescribing.²⁸ Similarly, in this study, morbidity and use of multiple drugs were found to be risk factors for inappropriate drug use.

This study had some limitations. One of the limitations was that it was conducted in a single center, multicenter studies can contribute more. Another limitation was that it was not possible to distinguish exactly for which indications the patients use some drugs, and the duration of use could not be exactly known. Since it is considered the use of inappropriate drugs even though it is necessary to use some drugs, excessive non-compliance may have been overlooked. The latest sodium, potassium, glomerular filtration rate, and ejection fraction values of the patients were taken into consideration. Patients without up-to-date values were included in the study. Patients with no recently checked values were also included in the study. For this reason, discrepancies may be observed.

Conclusions

The results of this study revealed that inappropriate drug use was more common in female patients, those with more chronic diseases, and those who used more drugs. Inappropriate drug use is at a higher rate in home health patients than in the public. Dependency increases with increasing age in the population aged 65 years and older. There was no correlation between the dependency levels of the patients in this study and their inappropriate drug use rates. Drug-drug interactions should be kept in mind, and unnecessary drug use should be avoided. Guidelines have been developed all over the world to prevent inappropriate drug use. Most countries have created their guides. In Turkey, guidelines that are appropriate for the Turkish elderly population should also be created, rational drug use should be integrated into Turkey's prescription systems if necessary, and inappropriate drug use should be minimized.

Conflict of interests: The authors declare that there is no conflict of interest.

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