

Potentially Inappropriate Psychotropic Drug Prescriptions and Polypharmacy among Geriatric Home Healthcare Patients: A Cross-Sectional Study

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ABSTRACT

Introduction: Comorbidities, psychotropic drug use and polypharmacy are common in elderly individuals. Research evaluating the psychotropic drug prescriptions among geriatric patients in a homecare health setting is limited. This study aimed to examine the medications of geriatric home healthcare patients regarding psychotropic drugs and polypharmacy and to assess their potential inappropriateness. **Materials and Methods:** Sociodemographic, clinical, drug prescription and home health service-specific data of patients who were 65 or older and registered in a home healthcare unit were collected from the electronic files. Comorbidities were scored according to the Charlson Comorbidity Index and the safety of psychotropic drugs was evaluated with the 2023 version of the American Geriatric Society's Beers Criteria. **Results:** Of the 229 patients included, 69.9% ($n=160$) were women and the mean age was 83 ± 7.97 . 2 out of every 3 patients were considered severely ill. Polypharmacy was 78.6% ($n=180$) and at least 1 psychotropic drug was prescribed for half of the sample. The average of prescribed psychotropic drugs was 2.01 ± 1.18 and potentially inappropriate psychotropic drug prescriptions were 46% ($n=52$). The most frequently prescribed antidepressants and antipsychotic were escitalopram (50.7%) and quetiapine (65.3%). Polypharmacy and psychotropic drug prescriptions were associated with age ($OR: 0.93, 95\% CI: 0.89-0.97, p=.004; OR: 4.13, 95\% CI: 1.03-16.59, p=.045$) while potentially inappropriate psychotropic drug prescriptions were associated with antipsychotic medication ($OR: 15.90, 95\% CI: 3.46-72.96, p<.001$). **Conclusion:** Potentially inappropriate psychotropic medication seems frequent among geriatric patients. Considering the aging population, it will be of great importance for clinicians and pharmacists to carefully evaluate psychotropic prescriptions and polypharmacy.

Keywords: Beer's criteria, Clinical pharmacy, Geriatric cases, Home healthcare services, Polypharmacy, Psychotropic drugs.

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INTRODUCTION

The aging population is a global phenomenon; 1 of every 6 people will be 65 or older by 2050.¹ Chronic diseases, psychiatric disorders and associated multiple drug use are common in elderly individuals. The use of 5 or more drugs is called polypharmacy and its frequency in older people is reported to be between 40-90%.² On the other hand, the term "potentially inappropriate drug use" goes beyond the number of drugs and includes the use of medication that has no benefit or increased risk among older adults.³ The Beers Criteria is the American Geriatrics Society's (AGS) guide to current recommendations regarding the safety of

pharmacotherapy in older adults. It has been widely applied as a screening tool to help ensure safe medication use.⁴

Mental health is an integral aspect of general health and well-being. Mental disorders are common in all countries and the health services provided to meet the ever-increasing need for psychiatric treatments may be insufficient.⁵ This situation poses a significant problem, especially in the elderly population, for whom many psychiatric conditions, such as sleep disturbances, anxiety and depression throughout aging, are prevalent. In this context, the importance of approaches such as Home Healthcare (HH) services provided for individuals who have problems accessing health institutions is substantially emphasized.⁶

Home healthcare services provide examination, treatment and rehabilitation services in the patients' home environment by a professional healthcare team to bedridden patients or patients who have difficulties accessing any healthcare institution and receiving qualified medical assistance due to various chronic



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diseases, malignancies and post-operative needs. HH services have been implemented in Türkiye since 2005 as a component of community-based health services and most of the patients receiving HH are 65 years or older.⁷ Although research in this field focuses primarily on the cost and quality of home healthcare services,⁸ studies examining mental disorders and psychiatric drug use in this population are limited.

While access to mental health services may be difficult for the elderly, there are some limitations of the psychotropic medication recommended for treating mental disorders. Drug metabolism changes are observed because of normal aging and many secondary factors due to cardiac problems and renal or hepatic dysfunction, which may be more common in older adults.⁹ Various comorbidities and common polypharmacy can initiate many side effects and drug interactions. Elderly HH patients are especially vulnerable to adverse events from medication errors; they often take multiple drugs for various comorbidities prescribed by more than 1 provider.¹⁰ Therefore, defining the frequency and adequacy of psychotropic medication in this group will provide data that will pave the way for future implementations.

This study aimed to examine the current psychotropic drug prescriptions of patients aged 65 and over who are registered in an HH unit and to evaluate rates of polypharmacy and the Potentially Inappropriate Psychotropic (PIP) drug prescriptions among this geriatric population.

MATERIALS AND METHODS

Participants and Sampling

This cross-sectional and analytical study was conducted at a public hospital's HH unit covering four rural regions and the center of a city in Türkiye. The electronic files of 275 patients followed up in the HH unit were examined. Inclusion criteria were being 65 years or older and registered in the HH unit. The study's patient recruitment process was conducted between January and April 2023. Informed written consent was obtained from the patients and their legal representatives to use their data. The Declaration of Helsinki principles were followed and ethical approval for the study was obtained from the local ethics committee (Registration Number: 29.12.2022/372).

Clinical Evaluation and Data Collection Tools

Sociodemographic, chronic disease, psychiatric diagnosis, psychotropic drug prescription and HH service-specific data were collected from patients' electronic files. The following variables were investigated: age, gender, habitation, application request and type for HH services, duration of HH services received, caregiver information, income situation, living space adequacy, bedridden state, use of auxiliary tools, personal care maintenance, status and type of nutrition, Braden Scale for pressure ulcer risk scores,¹¹ Itaki Scale for fall risk scores,¹² chronic diseases, presence of dementia, presence of other psychiatric disorders, presence of insomnia

symptoms, total number of prescribed drugs and psychotropic medication prescriptions (antipsychotics, antidepressants, mood stabilizers, benzodiazepines and anti-dementia). The patients' last 6 months' prescriptions were screened by the time the electronic file assessments were conducted and medications prescribed more than once in this timeframe were included in the analysis. Polypharmacy was defined as having five or more drugs prescribed, while psychotropic polypharmacy was described as having three or more psychotropic drugs prescribed.¹³

The severity of comorbid chronic diseases in each case was scored according to the Charlson Comorbidity Index (CCI). Patients were divided into three groups: mild, with CCI scores of 1-2; moderate, with CCI scores of 3-4; and severe, with CCI scores of ≥ 5 . The CCI is a validated index often considered the gold standard for assessing comorbidity in clinical research.¹⁴

The convenience of psychotropic drug prescriptions was evaluated according to the Beers Criteria for Potentially Inappropriate Medication Use in Older Adults. The Beers Criteria are guidelines established by the AGS for healthcare professionals to help improve the safety of prescribing medications for adults 65 years and older.⁴ In this study, psychotropic drug prescriptions were assessed regarding the first category of the Beers Criteria, which implies "medications considered as potentially inappropriate".

Statistical Analysis

IBM-SPSS-25 was used to analyze data. The statistical significance threshold value was determined as $p < .05$. Numerical data with normal distribution were presented with mean and Standard Deviation (SD) values and skewed distribution was presented with median and Inter-Quartile Range (IQR) values. The Kolmogorov-Smirnov test was used to test normality. Customarily distributed numerical data were analyzed with the student's t-test and Pearson correlation. Numerical data that failed the normality tests were assessed with the Mann Whitney U test and Spearman correlation. Categorical data were analyzed with the Chi-square test. Univariate and multivariate logistic regression analyses were conducted to determine the predictive factors of polypharmacy, psychotropic drug prescriptions, psychotropic polypharmacy and PIP medication.

RESULTS

Sociodemographic Characteristics

The study included 229 patients (83.2% of the HH cases) aged 65 or older. The mean age of the sample was 83 ± 7.97 years. In addition, 51.1% of the sample were oldest-old (85 years or older), 69.9% were female and 54.1% lived in a rural area.

Clinical Characteristics

Of the patients, 97.8% were diagnosed with a chronic disease. The mean CCI scores were 5.30 ± 1.11 and two out of every three patients were considered severely ill (Table 1).

HH service-related features of the sample according to age groups are indicated in Table 2.

Psychotropic Drug Prescriptions and Polypharmacy

Polypharmacy was detected in 78.6% of the sample and at least 1 psychotropic drug was prescribed for half of the patients. The total average of prescribed medications in total was 6.84 ± 3.16 . The mean number of prescribed psychotropic drugs was 2.01 ± 1.18 , while psychotropic medication polypharmacy was present in 34.5% among psychotropic drug users. Psychotropic drug prescriptions included antidepressants (31.1%), antipsychotics (21.5%), antidementia (21.5%) and benzodiazepines (5.3%). The most frequently prescribed antidepressant was escitalopram (50.7%), while the most prescribed antipsychotic was quetiapine

(65.3%). According to the Beers Criteria, PIP prescriptions in elderly patients were 46% among patients with psychotropic prescriptions and 22.7% in the whole sample (Table 3).

The total number of prescribed drugs decreased significantly as age increased ($r = -0.184, p = 0.006$) and was considerably higher in the middle-old group than in the oldest-old ($H = 6.806, p = 0.033$). Polypharmacy was less frequent among the oldest-old than the middle- and youngest-old ($X^2 = 5.04, p = 0.025$). Meanwhile, psychotropic drug prescriptions were less appropriate in the oldest-old ($X^2 = 4.46, p = 0.035$). Antipsychotic prescriptions, particularly quetiapine, were significantly higher as age increased ($t = -2.270, p = 0.023$). Higher rates of dementia and insomnia were present among older patients ($t = -2.784, p = 0.005$; $t = -3.416, p = 0.001$, respectively).

Table 1: Sociodemographic and Clinical Characteristics.

		Sample (n, %) 229 (100) (median, IQR)	Youngest-old 34 (14.8) (median, IQR)	Middle-old 78 (34.1) (median, IQR)	Oldest-old 117 (51.1) (median, IQR)
Sociodemographic Characteristics					
Age (mean ±SD)		83±7.97 (86, 10.75)	70±3.12 (70, 6.25)	79±2.82 (79, 5.00)	89±3.48 (90, 5.50)
Gender (n, %)	Female	160 (69.9)	22 (64.7)	58 (74.4)	80 (68.4)
	Male	69 (31.1)	12 (35.3)	20 (25.6)	37 (31.6)
Habitation (n, %)	Urban	105 (45.9)	11 (32.4)	32 (41)	62 (47)
	Rural	124 (54.1)	23 (67.6)	46 (59)	55 (47)
Clinical Characteristics					
Diagnosis of a Chronic Disease (n, %)	Yes	224 (97.8)	33 (97.1)	77 (98.7)	114 (98.3)
	No	5 (2.2)	1 (2.9)	1 (1.3)	2 (1.7)
Dementia Diagnosis (n, %)	yes	73 (32)	3 (8.8)	23 (29.5)	47 (40.5)
	No	156 (68)	31 (91.2)	55 (70.5)	69 (59.5)
Charlson Comorbidity Index (CCI) Scores (mean±SD)		5.30±1.11 (5.50, 1.00)	4.76±1.57 (5.00, 2.25)	5.38±1.08 (5.00, 1.00)	5.41±0.93 (5.00, 1.00)
CCI Scores (n, %)	Mild	2 (0.9)	2 (5.9)	--	--
	Moderate	49 (21.5)	13 (38.1)	16 (20.5)	20 (17.2)
	Severe	177 (77.6)	19 (55.9)	62 (79.5)	96 (82.8)
Psychiatric Disorder Diagnosis Other Than Dementia (n, %)	Yes	51 (22.4)	9 (26.5)	20 (25.6)	22 (19)
	No	177 (77.6)	25 (73.5)	58 (74.4)	94 (81)
Diagnosis of Depressive Disorders (n, %)	Yes	11 (4.8)	4 (11.8)	3 (3.8)	4 (3.4)
	No	217 (95.2)	30 (88.2)	75 (96.2)	112 (96.6)
Diagnosis of Anxiety Disorders (n, %)	Yes	33 (14.5)	6 (17.6)	15 (19.2)	12 (10.3)
	No	195 (85.5)	28 (82.4)	63 (80.8)	104 (89.7)
Presence of Insomnia Symptoms (n, %)	Yes	62 (27.2)	4 (11.8)	15 (19.2)	43 (37.1)
	No	166 (72.8)	30 (88.2)	63 (80.8)	73 (62.9)

IQR: Inter-quartile Range, SD: Standard Deviation

Table 2: Home Healthcare Service-Related Characteristics.

		Sample (n, %) 229 (100) (median, IQR)	Youngest-old 34 (14.8) (median, IQR)	Middle-old 78 (34.1) (median, IQR)	Oldest-old 117 (51.1) (median, IQR)
Application Request for Home Health Services (n, %)	Medical Examination Drug and Medical Equipment	88 (38.4)	13 (38.2)	26 (33.3)	49 (41.8)
	Prescription	74 (32.3)	10 (29.4)	31 (39.7)	33 (28.2)
	Home Care, Treatment, and Laboratory Analysis	92 (40.1)	13 (38.2)	32 (41)	47 (40.1)
	Transport to A Healthcare Facility	2 (0.8)	1 (2.9)	--	1 (0.8)
Application Type for Home Health Services (n, %)	Central Coordination Center	208 (96.7)	30 (93.8)	73 (97.3)	105 (97.2)
	Hospital Home Health Services Unit	6 (2.8)	2 (6.3)	2 (2.7)	2 (1.9)
	Referral from Physician	1 (0.5)	--	--	1 (0.9)
Duration of Home Health Services Received (months, mean±SD)		19.92±21.71 (11, 26.00)	26.38±27.40 (13.50, 39.00)	16.85±19.08 (9.50, 22.50)	20.04±21.24 (10.50, 27.25)
Caregiver (n, %)	First Degree Relative	186 (84.2)	29 (90.6)	62 (81.6)	95 (84.1)
	Second Degree Relative	29 (13.1)	3 (9.4)	12 (15.8)	14 (12.4)
	Paid Caretaker	6 (2.7)	--	2 (2.6)	4 (3.5)
Income Situation (n, %)	None	4 (2.2)	--	--	4 (4.1)
	Pension	132 (72.9)	16 (66.7)	46 (76.7)	70 (72.2)
	Family's Income	39 (21.5)	6 (25)	12 (20)	21 (21.6)
	Long-term Care Allowance	6 (2.6)	2 (8.3)	2 (3.3)	2 (2.1)
Living Space (n, %)	Adequate	211 (99.1)	32 (100)	71 (98.6)	108 (99.1)
	Not Adequate	2 (0.9)	--	1 (1.4)	1 (0.9)
Bedridden State (n, %)	Complete	60 (27)	14 (43.8)	18 (23.7)	28 (24.6)
	Partial	154 (69.4)	16 (50)	54 (71.1)	84 (73.7)
	Independent	8 (3.6)	2 (6.3)	4 (5.3)	2 (1.8)
Auxiliary Tools (n, %)	Wheelchair	14 (6.1)	4 (11.7)	2 (2.5)	8 (6.8)
	Walker	65 (28.3)	8 (23.5)	23 (29.4)	34 (29)
	Pressure Mattress	14 (6.1)	4 (11.7)	5 (6.4)	5 (4.2)
	Denture	2 (0.8)	--	1 (1.3)	1 (0.8)
	Toilet Seat Riser	5 (2.1)	1 (2.9)	2 (2.5)	2 (1.6)
	Walking Stick/Crutches	17 (7.4)	1 (2.9)	8 (10.2)	8 (6.8)
Personal Care Maintenance (n, %)	Autonomous	3 (1.4)	2 (6.3)	1 (1.4)	--
	Assisted	208 (98.6)	30 (93.8)	72 (98.6)	106 (100)

Nutrition (n, %)	Status:				
	Autonomous	85 (42.5)	18 (64.3)	34 (50.7)	33 (31.4)
	Assisted	115 (57.5)	10 (35.7)	33 (49.3)	72 (68.6)
	Type:				
	Perorally	197 (99.5)	28 (96.6)	64 (100)	105 (100)
	Nasogastric Tube Feeding	1 (0.5)	1 (3.4)	--	--
Braden Scale Scores (mean±SD)		17.84±2.14	17.34±2.72	17.78±2.36	18.01±1.78
Itaki Scale Scores (mean±SD)		10.08±3.88	11.03±4.14	10.20±3.57	9.74±3.99
Fall Risk (n, %)	High	215 (97.7)	31 (96.9)	73 (98.6)	111 (97.4)
	Low	5 (2.3)	1 (3.1)	1 (1.4)	3 (2.6)

IQR: Inter-quartile Range, SD: Standard Deviation.

The number of prescribed drugs was significantly lower among females ($Z=-2.048, p=0.041$). Patients living in urban areas showed substantially higher rates of depression ($X^2=5.95, p=0.015$), insomnia ($X^2=4.94, p=0.026$), psychotropic drug prescriptions ($X^2=5.10, p=0.024$) and antidepressant prescriptions ($X^2=4.39, p=0.036$).

Psychotropic drug and antipsychotic prescriptions were significantly increased among completely bedridden patients ($X^2=6.35, p=0.042; X^2=11.38, p=0.003, respectively$). Insomnia rates were also higher in this group ($X^2=13.73, p=0.001$). Patients who had assisted nutrition were significantly older ($Z=-3.126, p=0.002$) and had higher CCI scores ($Z=-2.813, p=0.005$) and psychotropic drug prescriptions ($Z=-2.073, p=0.038$).

CCI scores significantly correlated with the number of prescribed drugs ($r=.221, p=0.001$). Patients diagnosed with dementia demonstrated more severe levels of CCI ($X^2=27.27, p<0.001$) as expected, while other psychiatric disorders and insomnia presence also showed significant relationships with higher CCI scores ($X^2=4.34, p=0.003; Z=-2.349, p=0.019$).

Polypharmacy was significantly associated with chronic diseases ($X^2=7.12, p=0.008$) and psychiatric disorders ($X^2=5.00, p=0.025$) as well as antidepressant ($X^2=5.94, p=0.015$) and antedementia ($X^2=4.42, p=0.036$) prescriptions. Psychotropic drug prescriptions were significantly related to higher CCI ($Z=-3.082, p=0.002$) and Itaki fall risk ($Z=-2.338, p=0.019$) scores. PIP prescriptions were significantly associated with antipsychotics ($X^2=54.88, p<0.001$), particularly quetiapine ($X^2=35.75, p<0.001$). Quetiapine prescriptions were significantly increased in patients with dementia ($X^2=46.88, p<0.001$) and insomnia ($X^2=91.29, p<0.001$). Antidepressant prescriptions were less frequent in patients with PIP medication ($X^2=4.95, p=0.026$).

Factors Associated with Polypharmacy, Psychotropic Drug Prescriptions, Psychotropic Drug Polypharmacy and PIP Prescriptions

Younger age was significantly associated with polypharmacy while being in the middle-old group and having assisted nutrition were

mainly related to psychotropic drug prescriptions. Psychotropic drug polypharmacy was predicted by younger age, dementia diagnosis and insomnia symptoms. PIP prescriptions were significantly associated with insomnia symptoms, antipsychotic medications and the absence of antidepressant prescriptions (Table 4).

DISCUSSION

The primary aim of this study was to examine the psychotropic drug prescriptions of geriatric cases followed in an HH unit and to evaluate the compliance of the prescribed psychotropic drugs with the Beers Criteria. Considering that half of the sample consisted of the oldest-old patients, it is essential that 1 in every 2 patients was prescribed psychotropic drugs and half of these prescriptions were found to be inappropriate.

Polypharmacy is often considered the regular use of five or more drugs and is closely associated with inappropriate drug use, side effects and drug interactions.¹⁵ It is also related to the development and worsening of geriatric syndromes, including cognitive impairment, delirium, weight loss, frailty and urinary incontinence.¹⁶ In this study, most patients (78.6%) had polypharmacy, 1-3rd (34.5%) had psychotropic polypharmacy and the average of prescribed drugs was 6.84 per patient, while the average of psychotropic medications was two. These data are similar to the results of previous studies. In the survey conducted by Arun *et al.*, with 228 elderly patients in a geriatric outpatient clinic, polypharmacy was reported as 64% and the average number of medications was 6.¹⁷ Another study reported the percentage of psychotropic polypharmacy in the geriatric population as 47%.¹⁸ Considering that polypharmacy rates are generally reported between 40% and 90%,² the rates found in this study are close to the upper limits of the scale. At this point, the oldest-old being half of the cases, being followed up by HH services and health system-specific characteristics may have played a role in the results.

Being older than 85 is a significant risk factor for polypharmacy and drug-drug interactions.¹⁹ In this study, the oldest-old had fewer drug prescriptions than the other groups, but the exact

difference was not found for psychotropic drug prescriptions. On the other hand, although polypharmacy rates were significantly lower in the oldest-old, prescribed psychotropic drugs were considered substantially more inappropriate. Based on this finding, there seems to be a need to assess psychotropic drug prescribing patterns to minimize the adverse events related to these drugs. In contrast to existing literature, the total prescribed number of drugs was significantly lower in female patients. Although gender did not stand out as a predictive factor for

polypharmacy in our study, there might be gender-related difficulties in reaching adequate healthcare services, which might be a potential area for further research.

Studies evaluating the suitability of psychotropics prescribed in the geriatric population according to standardized guidelines are limited and no similar research conducted in Türkiye has been found. A study from Spain reported the rate of PIPs to be 22.7% among geriatric patients and 73.9% among senior

Table 3: Psychotropic Drug Prescriptions and Polypharmacy.

		Sample (n, %) 229 (100) (median, IQR)	Youngest-old 34 (14.8) (median, IQR)	Middle-old 78 (34.1) (median, IQR)	Oldest-old 117 (51.1) (median, IQR)
Polypharmacy† (n, %)	Yes	180 (78.6)	30 (88.2)	65 (83.3)	85 (72.6)
	No	49 (21.4)	4 (11.8)	13 (16.7)	32 (27.4)
Total Number of Prescribed Drugs (mean±SD)		6.84±3.16 (7, 4.00)	6.97±3.26 (7, 4.00)	7.56±3.44 (7, 5.00)	6.30±2.85 (6, 4.00)
Psychotropic Drug Prescriptions (n, %)	Yes	114 (50)	10 (29.4)	40 (51.3)	64 (55.2)
	No	114 (50)	24 (70.6)	38 (48.7)	52 (44.8)
Prescribed Psychotropic Drugs (mean ±SD)		2.01±1.18 (2, 2.00)	2.00±1.05 (2, 2.00)	2.00±1.23 (2, 2.00)	2.03±1.19 (2, 2.00)
Anti-dementia (n, %)		49 (21.5)	2 (5.9)	20 (25.6)	27 (23.3)
<i>Donepezil</i>		45 (91.8)	2 (100)	18 (90)	25 (92.6)
<i>Memantine</i>		25 (51)	2 (100)	9 (45)	14 (51.9)
Antidepressants (n, %)		71 (31.1)	6 (17.6)	28 (35.9)	37 (31.9)
<i>Escitalopram</i>		36 (50.7)	2 (33.3)	16 (57.1)	18 (48.6)
<i>Sertraline</i>		14 (19.7)	3 (50)	5 (17.9)	6 (16.2)
<i>Mirtazapine</i>		6 (8.5)	--	3 (10.7)	3 (8.1)
<i>Trazodone</i>		9 (12.7)	--	--	9 (24.3)
<i>Paroxetine</i>		1 (1.4)	--	1 (1.4)	--
Antipsychotics (n, %)		49 (21.5)	5 (14.7)	11 (14.1)	33 (28.4)
<i>Quetiapine</i>		32 (65.3)	2 (40)	7 (63.6)	23 (69.7)
<i>Olanzapine</i>		7 (14.3)	2 (40)	2 (18.2)	3 (9.1)
<i>Risperidone</i>		8 (16.3)	1 (20)	2 (27.3)	4 (12.1)
<i>Haloperidol</i>		8 (16.3)	--	--	8 (24.2)
Mood Stabilizers (n, %)		4 (1.8)	--	2 (2.6)	2 (1.7)
Benzodiazepines (n, %)		12 (5.3)	3 (8.8)	3 (3.8)	6 (5.2)
Psychotropic Medication Polypharmacy‡ (n, %)	Yes	39 (34.5)	5 (50)	14 (35.9)	4 (6.3)
	No	74 (65.5)	5 (50)	25 (97.4)	60 (93.7)
Potentially Inappropriate Psychotropic Drug Prescriptions (n, %)	Yes	52 (46)	5 (50)	12 (30.8)	20 (31.3)
	No	61 (54)	5 (50)	27 (64.1)	44 (68.8)

Potentially Inappropriate Psychotropic Drug Prescriptions* (n,%)	Antidepressants (TCAs, <i>paroxetine</i>)	1 (1.4)	--	1 (1.4)	--
	Antipsychotics (<i>Chlorpromazine,</i> <i>haloperidol,</i> <i>aripiprazole,</i> <i>olanzapine,</i> <i>quetiapine,</i> <i>risperidone</i>)	49 (21.5)	5 (14.7)	11 (14.1)	33 (28.4)
	Benzodiazepines (<i>Alprazolam,</i> <i>diazepam,</i> <i>lorazepam</i>)	12 (5.3)	3 (8.8)	3 (3.8)	6 (5.2)

IQR: Inter-quartile Range, SD: Standard Deviation, TCA: Tricyclic Antidepressants, †Polypharmacy, ≥ 5 drugs. ‡Psychotropic Drug Polypharmacy, ≥ 3 drugs. *AGS Beers Criteria Category 1.

psychotropic drug users.²⁰ In another study from France, the rate of psychotropic drug prescriptions in older adults was reported to be 77.5% and antidepressants, especially paroxetine, were leading the PIPs.²¹ In the current study, psychotropic prescription rates were 50% and PIP prescription rates were 22.7% and 46% in the entire sample and among those with psychotropic medication, respectively.

Patients receiving HH are more susceptible to polypharmacy and potentially harmful drug effects. Most older HH patients routinely take more than five drugs and many patients deviate from their prescribed medication regime.⁶ For the elderly, some of the many reasons related to this condition are having multiple medical problems with treatment by different specialists, obtaining drugs from different pharmacies and lack of communication between medical providers and pharmacists, which may lead to duplication of therapy or the concurrent use of medications with drug interactions. This is also a potential problem when there is a lack of coordinated care when patients transition between different levels of care (such as hospitals, post-acute care and HH services). On the other hand, the fact that HH patients' medications are given by a single physician in some health systems may reduce the risk of polypharmacy. In Japan, a study conducted with 153 geriatric patients monitored within the scope of HH services reported a polypharmacy rate of 52.3%, 5.9 medications per patient and the rate of potentially inappropriate medication use as 69.9%. Polypharmacy was prevalent among this study's HH patients with a high CCI score, receiving potentially inappropriate medication and among those with a relatively preserved nutritional state and the authors discussed the possibility of these complicated background factors' effects on polypharmacy rather than being an HH service patient.²² In our study, no significant relationship was found between polypharmacy and these variables and the cases receiving assistance for nutrition had a higher rate of psychotropic prescriptions. Since the HH services do not obligate the patients to take prescriptions from a single physician in

Türkiye, other factors might be related to the health systems on polypharmacy among geriatric patients. In this respect, there is a need for studies that will also evaluate the functioning of health systems in the HH field, which is reported to be particularly risky.

A subsequent factor in psychotropic medication in the geriatric population is habitation. It has been reported that geriatric patients living in rural areas have fewer psychotropic drug prescriptions.²³ In our study, psychotropic prescriptions were higher in patients living in urban areas. Although this situation might be related to less stressful lifestyle characteristics, people living in rural areas may also have difficulties accessing the healthcare system even while receiving HH services.

Another important finding of this research is the high antipsychotic prescription rates. The use of antipsychotic drugs in older people is increasing. Although off-label prescription rates of antipsychotics in the elderly vary between 22% and 86%, they are most frequently prescribed in cases of dementia, behavioral problems, depression and insomnia.²⁴ Antipsychotic use undergoes a shift in indications with age. However, older adults are more vulnerable to antipsychotic drug side effects and the potential adverse effects of possible treatments that can be applied to prevent them. For example, anticholinergic agents may be prescribed for the treatment of extrapyramidal side effects associated with antipsychotics and this may increase the risk of polypharmacy and drug interactions, which is called a *prescribing cascade*.²⁵ In our study, antipsychotic prescriptions were a predictive factor for PIP prescriptions. Based on the relationship we found between insomnia symptoms and antipsychotic prescriptions; it can be argued that it is crucial for clinicians to review their indication-shifted antipsychotic prescription preferences in terms of drug safety in elderly patients.

On the other hand, antidepressant drugs were less frequently prescribed in patients with PIP medication prescriptions. This finding might be interpreted as clinicians were particularly

Table 4: Factors Associated with Polypharmacy, Psychotropic Drug Prescriptions, Psychotropic Drug Polypharmacy, and Potentially Inappropriate Psychotropic Drug Prescriptions.

Characteristic Crude OR ^a (95% CI)		Polypharmacy [†]		Polypharmacy	
		p-value	Adjusted OR ^b (95% CI)	p-value	
Age		0.94 (0.90-0.98)	0.009	0.93 (0.89-0.97)	0.004
	<i>Youngest-old (65-74)</i>	1.00			
	<i>Middle-old (75-84)</i>	0.66 (0.20-2.21)	0.508		
	<i>Oldest-old (85≤)</i>	0.35 (0.11-1.08)	0.069		
Gender	<i>Female</i>	1.00			
	<i>Male</i>	1.25 (0.61-2.54)	0.536		
Habitation	<i>Rural</i>	1.00			
	<i>Urban</i>	0.95 (0.50-1.79)	0.880		
Diagnosis of a Chronic Disease		11.93 (1.21-117.44)	0.034	16.56 (0.97-281.79)	0.052
CCI		1.28 (0.96-1.71)	0.090		
	<i>Mild (1-2)</i>	1.00			
	<i>Moderate (3-4)</i>	2.26 (0.13-38.70)	0.572		
	<i>Severe (5≤)</i>	4.53 (0.27-74.37)	0.290		
Psychiatric Disorder Diagnosis Other Than Dementia		2.95 (1.10-7.90)	0.031	1.66 (0.42-6.58)	0.466
Psychotropic Drug Prescriptions		0.29 (0.14-0.58)	0.001	0.36 (0.10-1.20)	0.098
Number of Psychotropic Drugs		1.35 (0.76-2.38)	0.298		
Potentially Inappropriate Psychotropic Drug Prescriptions		1.00 (0.31-3.20)	0.992		
Antipsychotic Drug Prescriptions		1.78 (0.74-4.26)	0.194		
Antidepressant Drug Prescriptions		2.69 (1.18-6.10)	0.018	.92 (0.27-3.10)	0.893
Anti-dementia Drug Prescriptions		2.78 (1.03-7.46)	0.042	1.66 (0.44-0.23)	0.451
Crude OR ^a (95% CI)		Psychotropic Drug Prescriptions		Psychotropic Drug Prescriptions	
		p-value	Adjusted OR ^b (95% CI)	p-value	
Age		1.03 (0.99-1.06)	0.065	0.95 (0.86-1.04)	0.290

	<i>Youngest-old (65-74)</i>	1.00		1.00	
	<i>Middle-old (75-84)</i>	2.52 (1.06-5.97)	0.035	4.13 (1.03-16.59)	0.045
	<i>Oldest-old (85≤)</i>	2.95 (1.29-6.73)	0.010	6.42 (0.72-56.76)	0.094
Habitation	<i>Rural</i>	1.00		1.00	
	<i>Urban</i>	1.83 (1.08-3.10)	0.024	1.79 (0.97-3.31)	0.061
CCI		1.39 (1.09-1.78)	0.007	1.22 (0.92-1.63)	0.160
	<i>Mild (1-2)</i>				
	<i>Moderate (3-4)</i>	--	--		
	<i>Severe (5≤)</i>				
Bedridden Status	<i>Complete</i>	0.79 (0.19-3.27)	0.746		
	<i>Partial</i>	1.72 (0.39-7.60)	0.470		
	<i>Independent</i>	1.00			
Nutrition Status	<i>Autonomous</i>	1.00		1.00	
	<i>Assisted</i>	0.47 (0.27-0.84)	0.011	0.39 (0.18-0.86)	0.021
Itaki Fall Risk Scores		1.04 (0.97-1.12)	0.171		
Crude OR^a (95% CI)		Psychotropic Drug Polypharmacy[‡]		Psychotropic Drug Polypharmacy	
		p-value	Adjusted OR^b (95% CI)	p-value	
Age		0.97 (0.92-1.03)	0.4110	0.83 (0.75-0.92)	0.001
	<i>Youngest-old (65-74)</i>	1.000	0		
	<i>Middle-old (75-84)</i>	0.56 (0.13-2.22)	0.417		
	<i>Oldest-old (85≤)</i>	0.45 (0.11-1.74)	0.251		
Habitation	<i>Rural</i>	1.00			
	<i>Urban</i>	0.99 (0.45-2.15)	0.983		
CCI		1.08 (0.76-1.53)	0.644		
	<i>Mild (1-2)</i>				
	<i>Moderate (3-4)</i>	--	--		
	<i>Severe (5≤)</i>				
Dementia Diagnosis		13.57 (4.36-42.23)	<0.001	56.11 (7.90-398.15)	<0.001
Presence of Insomnia		11.17 (3.91-31.91)	<0.001	34.04 (5.38-215.43)	<0.001
Polypharmacy		0.82 (0.23-2.87)	0.763		

Potentially Inappropriate Psychotropic Drug Prescriptions		7.87 (3.21-19.30)	<0.001	1.46 (0.34-6.20)	0.606
Bedridden Status	<i>Complete</i>	0.14 (0.01-1.44)	0.099		
	<i>Partial</i>	0.21 (0.02-2.29)	0.204		
	<i>Independent</i>	1.00			
Nutrition Status	<i>Autonomous</i>	1.00			
	<i>Assisted</i>	1.36 (0.56-3.34)	0.490		
Itaki Fall Risk Scores		0.98 (0.87-1.09)	0.742		
Crude OR^a (95% CI)		Potentially Inappropriate Psychotropic Drug Prescriptions		Potentially Inappropriate Psychotropic Drug Prescriptions	
		p-value	Adjusted OR^b (95% CI)	p-value	
Age		1.04 (0.99-1.10)	0.112	0.98 (0.90-1.07)	0.755
	<i>Youngest-old (65-74)</i>	1.00			
	<i>Middle-old (75-84)</i>	0.44 (0.10-1.82)	0.261		
	<i>Oldest-old (85≤)</i>	1.20 (0.31-4.58)	0.782		
Habitation	<i>Rural</i>	1.00			
	<i>Urban</i>	0.74 (0.35-1.56)	0.433		
CCI		1.29 (0.91-1.81)	0.144		
	<i>Mild (1-2)</i>	1.00		1.00	
	<i>Moderate (3-4)</i>	--	--	--	--
	<i>Severe (5≤)</i>	0.24 (0.06-0.90)	0.035	--	--
Dementia Diagnosis		4.32 (1.92-9.70)	<0.001	2.46 (0.32-18.79)	0.383
Presence of Insomnia		16.63 (6.28-44.03)	<0.001	5.19 (1.02-26.27)	0.046
Polypharmacy		0.99 (0.31-3.16)	0.992		
Number of Psychotropic Drugs		2.48 (1.65-3.73)	<0.001	1.56 (0.59-4.16)	0.368
Antipsychotic Drug Prescriptions		32.40 (11.37-92.28)	<0.001	15.90 (3.46-72.96)	<0.001
Antidepressant Drug Prescriptions		0.41 (0.19-0.90)	0.027	0.13 (0.02-0.65)	0.013
Anti-dementia Drug Prescriptions		2.39 (1.11-5.13)	0.025	0.27 (0.03-2.08)	0.212

OR: Odds Ratio, CI: Confidence Interval, CCI: Charlson Comorbidity Index, †Polypharmacy, ≥5 drugs. ‡Psychotropic Drug Polypharmacy, ≥3 drugs. ^aCrude OR by univariate logistic regression, ^bAdjusted OR by multivariate logistic regression.

careful while assessing the side effect profiles of antidepressant prescriptions. According to the Beers Criteria, agents with potential anticholinergic effects, such as paroxetine, are not recommended for older adults. Considering the increasing prescription rates of psycho pharmaceuticals and the elderly being the most vulnerable group to the adverse effects of antidepressants, clinicians should be aware of the importance of re-evaluating the indications of prescribing these medications.

The limitations of our study should be considered. The study is cross-sectional; all the data were collected by reviewing patients' medical records and electronic prescriptions. The present results must be interpreted with caution, considering the background factors. They might not be generalized to other clinical settings than HH services and the sample size is relatively limited.

Given our results, further investigations in HH patients should focus on antipsychotic drug prescriptions. It is mandatory to develop sound clinical practice protocols and integrate standardized guidelines such as the Beers Criteria to prevent prescription inconveniences and find a balance between providing the appropriate medication for disorders and avoiding adverse effects from using multiple drugs.

CONCLUSION

Since psychotropic drug prescriptions tend to increase with age, PIP drug prescriptions being half of the total psychotropic prescriptions is significant. Given the results of this study, further investigations in home healthcare patients should focus on antipsychotic drug prescriptions. Considering the aging population, it will be necessary for clinicians and pharmacists to evaluate psychotropic drug prescriptions and polypharmacy carefully.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

AGS: American Geriatrics Society, **HH:** Home Healthcare, **PIP:** Potentially Inappropriate Psychotropic, **CCI:** Charlson Comorbidity Index.

ETHICAL STATEMENTS

Ethical approval for this study was obtained from the local ethics committee with approval number 29.12.2022/372. All procedures performed in studies involving human participants were under the ethical standards of the local institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all adult participants and their legal representatives in the study. Patient anonymity was strictly preserved.

SUMMARY

This study investigated the medications of geriatric home healthcare patients regarding psychotropic drugs and polypharmacy, by assessing their potential inappropriateness. Of the 229 patients included, almost 80% had polypharmacy and half were prescribed at least 1 psychotropic drug. Among those, potentially inappropriate psychotropic drug prescriptions were 46%. The most frequently prescribed antidepressant was escitalopram, while the most common antipsychotic was quetiapine. Polypharmacy and psychotropic drug prescriptions were associated with younger age ($OR:0.93$, 95% $CI:0.89-0.97$, $p=.004$; $OR:4.13$, 95% $CI:1.03-16.59$, $p=.045$) while potentially inappropriate psychotropic drug prescriptions were associated with antipsychotic medication ($OR:15.90$, 95% $CI:3.46-72.96$, $p<.001$). Potentially inappropriate psychotropic medication, which seems highly common among geriatric individuals, needs to be taken into consideration by clinicians and pharmacists while prescribing and supplying drugs.

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