Psychoactive drug use and falls among community-dwelling Turkish older people

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ABSTRACT

OBJECTIVE: Data on the relationship between falls and psychoactive drug use among Turkish older people are limited. The study aims to determine the prevalence of falls and the associations between psychoactive drug use and falls in community-dwelling Turkish older people.

METHODS: This single center study was performed using the medical records of subjects aged over 65 years admitted to the geriatric care unit. Demographic and lifestyle factors, clinical characteristics, medications, and data on mood, cognitive status, and functional performance were obtained from the comprehensive geriatric assessment records. Based on a fall history in the last 12 months, subjects were grouped as fallers and non-fallers. Subjects treated with a psychoactive drug were identified.

RESULTS: Among the total of 429 subjects, there were 184 (42.9%) fallers and 245 (57.1%) non-fallers. Of those, 33.3% were on psychoactive drug treatment. The proportion of psychoactive drug users was higher in the fallers group compared to non-fallers (45.1% vs. 24.5%, p<0.001). Multivariable logistic regression analysis showed age ≥75 years (OR=1.83; CI: 1.09–3.09; p=0.023), female gender (OR=2.70; CI: 1.6–4.50; p<0.001), and psychoactive drug use (OR=2.14; CI: 1.32–3.48; p=0.002) as independent predictors of falls.

CONCLUSION: We found that about one-third of geriatric outpatients were on psychoactive drug treatment in Turkey that was independently associated with the risk of falls

Keywords: Aged; falls; psychoactive drugs.

Falls are a significant common problem in older adults, reducing function and quality of life, increasing the risk for fear of falling syndrome, and causing morbidity and mortality. One-third of community-dwelling people aged over 65 years fall one or more times each year and repeated falls occur in half of those [1]. Brain trauma, hip fractures, hospitalization, and death are worst outcomes of falls. Accidents are the seventh cause of deaths in older people and the majority are associated with falls [2]. Most falls are caused by one or more combination risk factors, including advanced age, impaired cognitive function, comorbidities, sensory factors, and environmental hazards.

Drugs are another major modifiable risk factor for falls. Of those, psychoactive drugs are the most common cause associated with falls, with sedation, im-

paired balance, and coordination that result in gait problems. Psychoactive drugs can be defined broadly as drugs that cross the blood-brain barrier and effect on the central nervous system. The susceptibility to drug related adverse outcomes increases due to the pharmacodynamic changes with age and up to 20% of all drug-related hospitalizations in older people is related to those [3]. These drugs are frequently used in older people to treat anxiety, sleep disorders, and neuropsychiatric symptoms of dementia [4, 5]. However, psychoactive drug use is associated with a 50–70 % increased risk of falls among older people [6]. A recent meta-analysis has shown a relationship between falls and all classes of psychoactive drugs, including antidepressants, neuroleptics, anxiolytics, and hypnotics [7]. Furthermore, the risk of falls increases with higher dosage and longer duration of psychoactive drug use, which is more likely in the first weeks after the initiation of treatment [8].

In literature, there are many studies about the relationships between psychoactive drug use and falls in community-dwelling older people [6–13], however this relationship has not been examined enough in outpatients in Turkey. Older outpatients with severe health problems, multi-morbidities, and complicated diseases are at high risk of fall. Therefore, psychoactive drug use may need to be more carefully evaluated by health care providers. Identifying falls and risk factors for falls is an essential issue in the medical care management for those people.

In this study, we aimed to determine the prevalence of falls, the relationships between psychoactive drug use and falls, and clinical and demographic characteristics in community-dwelling Turkish older people.

MATERIALS AND METHODS

We used the data from the Geriatric Outpatient Clinic of the University of Health Sciences which is linked with a tertiary referral care hospital and also provides a consultant service for inpatients and home care patients. This database includes anonymous patient identifiers (stored securely), demographic factors, chronic diseases, geriatric syndromes, screening tests for cognition, function, mood, and nutrition, laboratory results, and currently used drugs which were obtained during the comprehensive geriatric assessment of an interdisciplinary medical team led by a geriatrician. The local ethics committee approved the study.

Exclusion criteria were the history of dementia, presence of delirium determined by the confusion assessment method [14], being terminally ill, bedridden or in a wheelchair, inability to stand or walk without help, and patients with incomplete data.

Fall screening

Subjects were questioned whether they had a history of one or more falls (an unplanned trip to the floor) in the last 12 months. Additionally, the number of falls, fall-related injuries, and fractures were also recorded. Then, subjects were grouped into those with a history of fall (fallers) and those without a history of fall (non-fallers).

Demographics and clinical characteristics

Demographics were questioned for each subject of the following components: gender, age (65–74 and 75+ years), and education (≤8 years and ≥9 years). Weight and height of the participants were measured using a standard scale in light clothing. The body mass index (BMI) was calculated as kg/m^2 and subdivided into two groups: <30.0 and ≥30.0.

Comorbidities including hypertension, diabetes mellitus, ischemic heart disease, chronic obstructive pulmonary disease, osteoporosis, and insomnia and the use of relevant drugs were identified. Men with hemoglobin <13.0 g/dL and women with <12.0 g/were diagnosed with anemia. Renal function was assessed by the Cockcroft-Gault equation corrected for gender which estimates glomerular filtration rate (GFR). A GFR <60.0 mL/min was categorized as chronic renal failure.

Active medications were noted for each subject. Psychoactive drugs with sedative activity (antidepressants, anxiolytics, and antipsychotics) were screened. The classes of antidepressants recorded were the selective serotonin reuptake inhibitors (SSRIs), serotonin-norepinephrine reuptake inhibitors (SNRIs), tricyclic antidepressants (TCAs), and atypical antidepressants. Using two or more different psychoactive drugs concomitantly was defined as combination treatment. Polypharmacy was defined as ≥5 drugs.

Geriatric assessment

Mental status was assessed by the Mini-Mental State Examination (MMSE) and a lower MMSE score was defined as ≤24 [15]. Nutritional status was assessed by the Mini Nutritional Assessment (MNA) and scores

≤11 was defined as malnutrition [16]. Presence of depressive symptoms was evaluated by the Geriatric depression scale short form (GDS-15) and scores >5 was defined as depression [17]. Fall risk was assessed by the Tinetti Performance–Oriented.

Mobility Assessment (Tinetti-POMA) and scores ≤18 indicated higher risk of fall [18].

The associations between categorical variables were tested by the chi-square test. The relationship of the variables on falls was evaluated by calculating odds ratios in univariate analyses. Variables for which unadjusted p-value was ≤0.05 in univariate logistic regression analysis and those with previously demonstrated associations with increased risk of falls in older adults were identified as potential predictors and were included in the full multivariate model. The model was reduced using a backward elimination method regarding likelihood ratio test results. A p-value of less than 0.05 was accepted as statistically significant. Statistical analyses were performed using SPSS software version 24.0 (SPSS Inc, Chicago, II).

RESULTS

A total of 504 older adults who attended ambulatory visits for geriatric care in two consecutive years were evaluated. After the exclusion of 75 subjects based on the criteria defined above, the final analyses were performed with 429 individuals [280 women (65.3%) and 149 men (34.7%); mean age: 75.2±6.6 years; mean BMI: 30.4±5.2, kg/m²]. Table 1 shows the demographic and clinical characteristics of the total sample and fallers and non-fallers separately.

A history of falls in the preceding 12 months was present in 184 (42.9%) in subjects. Fallers were older (p=0.004) and mostly female (p<0.001) when compared to non-fallers. They also had higher rate of polypharmacy (p=0.017), psychoactive drug use (p<0.0001), insomnia (p=0.020), chronic renal failure (p=0.006), and fall risk based on the Tinetti-POMA score (p=0.003). Psychoactive drug use was 33.3% and more common in fallers than in non-fallers (45.1% vs. 24.5%) (Table 1). The prevalence of antidepressants use was higher in fallers than non-fallers group (29.9% vs. 20.8%), especially SSRIs (23.4% vs. 13.5%). The combination treatment was more common in fallers than in non-fallers (10.9% vs. 3.3%) (Table 2).

There was no difference between fallers and non-fallers with respect to increased BMI, lower education,

hypertension, diabetes mellitus, ischemic heart disease, chronic obstructive pulmonary disease, osteoporosis, and anemia. The frequencies of an increased GDS score, decreased MMSE score, and decreased MNA scores were also similar in the two groups (Table 1). Of the subjects with Tinetti-POMA score ≤18, 60.9% (n=28) had a history of falls.

Univariate and multivariate associations of the study parameters with falls

Age ≥75 years (OR=1.772; CI: 1.204–2.608; p=0.004), female gender (OR=2.176; CI: 1.431–3.309; p<0.0001), polypharmacy (OR=1.642; CI: 1.090–2.473; p=0.018), psychoactive drug use (OR=2.534; CI: 1.680–3.823; p<0.0001), insomnia (OR=1.923; CI: 1.099–3.365; p=0.022), and GFR <60.0 mL/min (OR=0.567; CI: 0.379–0.848; p=0.006) showed univariate associations with the risk of falls. Other variables showed no statistical significance in the univariate tests (Table 3).

In the multivariate regression analysis, age ≥75 years (OR=1.831; CI: 1.086–3.088; p=0.023), female gender (OR=2.704; CI: 1.626–4.496; p<0.0001), and psychoactive drug use (OR=2.143; CI: 1.320–3.478; p=0.002) were the independent predictors for falls in the preceding year. Polypharmacy, GDS-15 score >5, insomnia, anemia, and GFR <60.0 mL/min did not show any statistical significance in the multivariate model (Table 3).

DISCUSSION

This study showed and provided additional evidence linking psychoactive drug use to falls in a convenience sample of Turkish older adults when we eliminated confounding factors. A significant proportion of the whole group had a history of falls in the last year slightly more than in previous studies which may be caused by the high rate of psychoactive drug use (33.3%). Furthermore, falls were more frequent in the age group 75 years and older. Finally, women reported more falls than men.

Our study implied that the risk of developing fall was increased in community-dwelling older adults receiving psychoactive drugs, which is in line with findings from earlier cohort studies [9, 11, 13]. A retrospective cohort study of 73690 community-dwelling veterans found that patient on one or more psychoactive drug or increased dosage of that were observed to have a significantly increased fall risk [19]. Using data of German Health In-

Table 1. Characteristics of the whole group

Variables	Total (n=429)		Non-fallers (n=245)		Fallers (n=184)		p
	n	%	n	%	n	%	
Demographics							
Age categories (years)	n=429		n=245		n=184		
65-74	219	51.0	140	57.1	79	42.9	**0.004**
75+	210	49.0	105	42.9	105	57.1	
Gender	n=429		n=245		n=184		
Female	280	65.3	142	58.0	138	75.0	**<0.0001**
BMI (kg/m²)	n=403		n=234		n=169		
≥30.0	189	46.9	108	46.2	81	47.9	0.725
Education	n=429		n=245		n=184		
≤8 years	282	65.7	153	62.4	129	70.1	0.098
Polypharmacy	n=384		n=218		n=166		
No. (%) yes	207	53.9	106	48.6	101	60.8	**0.017**
Comorbidities							
Hypertension	n=429		n=245		n=184		
No. (%) yes	245	57.1	143	58.4	102	55.4	0.544
Diabetes mellitus	n=429		n=245		n=184		
No. (%) yes	112	26.1	67	27.3	45	24.5	0.500
Ischemic heart disease	n=429		n=245		n=184		
No. (%) yes	34	7.9	21	8.6	13	7.1	0.568
COPD	n=429		n=245		n=184		
No. (%) yes	30	7.0	21	8.6	9	4.9	0.139
Osteoporosis	n=429		n=245		n=184		
No. (%) yes	128	29.8	66	26.9	62	33.7	0.130
Anemia	n=426		n=242		n=184		
No. (%) yes	78	18.3	37	15.3	41	22.3	0.064
GFR <60.0 mL/min	n=403		n=234		n=169		
No. (%) yes	168	41.7	84	35.9	84	49.7	**0.006**
Psychoactive drug	n=429		n=245		n=184		
No. (%) yes	143	33.3	60	24.5	83	45.1	**<0.0001**
Insomnia	n=429		n=245		n=184		
No. (%) yes	58	13.5	25	10.2	33	17.9	**0.020**
GDS-15 score >5	n=403		n=233		n=170		
No. (%) yes	136	33.7	71	30.5	65	38.2	0.104
Tinetti-POMA score ≤18	n=345		n=205		n=140		
No. (%) yes	46	13.3	18	8.8	28	20.0	**0.003**
MMSE score ≤24	n=405		n=234		n=171		
No. (%) yes	70	17.3	41	17.5	29	17.0	0.882
MNA score ≤11	n=401		n=231		n=170		
No. (%) yes	117	29.2	61	26.4	56	32.9	0.155

BMI: Body mass index; COPD: Chronic obstructive pulmonary disease; GFR: Glomerular filtration rate; GDS: Geriatric depression scale; POMA: Performance-oriented mobility assessment; MMSE: Mini-mental state examination; MNA: Mini-nutritional assessment.

TABLE 2. Frequencies of psychoactive drugs used by subjects for both groups

Drugs	Fallers n=184	Non-fallers n=245
Antidepressants		
Total	55 (29.9)	51 (20.8)
SSRI	43 (23.4)	33 (13.5)
SNRI	3 (1.6)	6 (2.5)
TCA	3 (1.6)	6 (2.5)
Atypical	6 (3.3)	6 (2.5)
Anxiolytics	3 (1.6)	0 (0.0)
Antipsychotics	5 (2.7)	1 (0.4)
Combination treatment	20 (10.9)	8 (3.3)

SSRI: Selective serotonin reuptake inhibitor; SNRI: Serotonin-norepinephrine reuptake inhibitor; TCA: Tricyclic antidepressants. Combination treatment means using two or more different psychoactive drugs at the same time.

terview and Examination Survey for Adults 2008–2011, an epidemiological study found that self-reported psychoactive drugs were overall associated with 64% increase in the risk of falls and recurrent falls on self-report in the past 12 months in community-dwelling older adults aged 65–79 years [10]. A prospective cohort of 1759 community-dwelling healthy older adults followed up for 12 months by telephone showed a 90% higher fall risk among psychoactive drug users [9]. Our study demonstrated a 114% increased risk of falls in a similar sample, which is considerably higher than those found in previous community-based studies [11, 13]. Such a difference may be linked to the fact that because our outpatient clinic serves as a referral geriatric unit and most attendees have therefore increased number of co-

morbidities. Moreover, as a tertiary clinic, a fall history is evaluated carefully by a trained staff not to miss any fallers. Because, a significant proportion of older adults fail to recall falls and fall-related injuries that occurred in past 12 months [20].

Our study showed that among all psychoactive drugs, SSRIs and combination treatment was more frequently associated with fall, which is in line with other studies. Tinetti et al. found sedative use is associated with a 28.2-fold increase in falls among older adults living in the community [1]. Du et al. reported a 6.22-fold increase in the risk of developing falls among community-dwelling older people receiving a SSRI (10). According to findings of Health ABC prospective longitudinal study of 2948 older participants, SSRI use was related to falls, with the risk varying from 1.47 to 1.62 [11]. Although the exact mechanism is still unclear, SSRIs and other psychoactive drugs may promote balance and gait problems resulting in falls through several mechanisms, including anticholinergic and extrapyramidal adverse effects, sedation, orthostatic hypotension, dizziness, and sleep disturbance [21–23].

Stopping psychoactive drugs is the most effective intervention among individuals at high fall risk; however, this could not always be possible. The patients or family's request to restart the treatment appears to be the biggest obstacle to the intervention to stop the adverse effects of these medications. This problem implies some new questions. Could the patient-centered approaches, especially those involving family education, be helpful in patients who use these drugs? Do non-pharmacological approaches have both psychological and physical clinical benefits? If these initiatives are revealed to be beneficial,

TABLE 3. Associations between variables and a history of fall based on univariate and multivariate logistic regression analysis

		Unadjusted OR	95% CI	p	Adjusted OR	95% CI	p
Age	≥75 years	1.772	1.204–2.608	**0.004**	1.831	1.086–3.088	**0.023**
Gender	Female	2.176	1.431–3.309	**<0.0001**	2.704	1.626–4.496	**<0.0001**
Polypharmacy	Yes	1.642	1.090–2.473	**0.018**	1.198	0.752–1.907	0.447
Psychoactive drug	Yes	2.534	1.680–3.823	**<0.0001**	2.143	1.320–3.478	**0.002**
GDS-15 score >5	Yes	1.412	0.931–2.142	0.104	1.087	0.673–1.755	0.735
Insomnia	Yes	1.923	1.099–3.365	**0.022**	1.727	0.905–3.296	0.098
Anemia	Yes	1.589	0.970–2.601	0.066	1.495	0.819–2.730	0.190
GFR <60 mL/min	Yes	0.567	0.379–0.848	**0.006**	0.801	0.480–1.337	0.395

OR: Odd ratios; CI: Confidence interval; GDS: Geriatric depression scale; GFR: Glomerular filtration rate.

individually-tailored multifactorial interventions may help to stop those drugs.

Data from the 2014 Behavioral Risk Factor Surveillance System survey analyzed by the Center for Disease Control and Prevention showed that the risk of annual fall rate increases with age, from 26.7% at ages 65–74 years, to 29.8% at ages 75–84 years, to 36.5% at ages ≥85 years [22]. According to the data from the National Health Interview Survey study of 20,752 participants, 16.4% of community-dwelling people fell in the previous year [23]. Gale et al. have reported in the English Longitudinal Study of Ageing of 4,301 men and women aged 60 and over that fall prevalence rate was 28.4% in the last two years [24]. As expected, we observed that age of 75 years or older was an independent risk factor for falls in line with previous studies [25–28]. We observed that the prevalence of falls is slightly higher than that found in previous more extensive studies. The increased number of falls in our sample was likely due to the high rate of psychoactive drug use which may be associated with clinical characteristics of subjects requring care at a specialized referral unit. Another reason may our being a center which provides specialized care on referral from primary and secondary care. Moreover, another vital cause may be that the fall assessment is a component of our comprehensive evaluation of an older adult who reports a fall or not.

Not surprisingly, we recorded more falls among women compared to men. Most cross-sectional and longitudinal studies in community-dwelling older people have revealed a higher ratio of falls in older women [25–27, 29–32]. Decreased muscle strength, increased visual field dependence and variation in gait pattern during dual-task activities in older women have been suggested to be among the causes of higher risk of falls [33, 34].

There are several limitations of the present study. Firstly, we can identify associations but cannot infer causality due to the cross-sectional design of our study. Second, the study sample was obtained in one geographic location; thus our findings cannot be readily generalized to other populations. Third, the possibility of recall errors in the general elderly populations in identifying covariates cannot be neglected.

Our study was the first that examined the association between psychoactive drug use and falls in community-dwelling Turkish older people followed up in a geriatric outpatient clinic of a tertiary care hospital.

In conclusion, we demonstrated a higher risk of falls in Turkish older adults using psychoactive drugs and this was an independent predictor of falls. The findings suggest the need for increasing awareness of the adverse effects of psychoactive drugs on the risk of falls among physicians and other health care providers managing older adults at all levels of care in Turkey. Additionally, further studies are required in order to develop interventions that improve poor clinical outcomes in older adults by reducing psychoactive drug burden, while enhancing adherence of the patients.

Falls are common in older people but never be a condition medically acceptable. Therefore, whether subjects over 65 years have fallen at least once a year should be questioned. In the evaluation, possible risk factors should be investigated by medical history, physical examination and laboratory studies and then corrected. Furthermore, combination of education programs to prevent falls, exercises of improving strength and balance, and arrangement of environmental factors should be considered.

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