

Polypharmacy and Related Factors in Geriatric Outpatients

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Abstract

Objective: The term "polypharmacy" is defined as the usage of multiple medications or more medications than are clinically indicated. Older people tend to have several chronic diseases and prescriptions for these conditions. Polypharmacy is associated with significant consequences such as adverse drug reactions, medication nonadherence, drug-drug and drug-disease interactions, and increased risk of geriatric syndromes. The purpose of the present study was to evaluate the relationship between polypharmacy and common geriatric syndromes.

Materials and Methods: Three-hundred individuals ≥ 60 years of age admitted to Istanbul Faculty of Medicine, Department of Geriatrics outpatient clinic between 2013-2016 were recruited to the study. Patients' data about the number of prescribed drugs, falls (in the preceding year), urinary incontinence, constipation, presence of malnutrition, sleep disorders and functionality were noted. Polypharmacy was defined as the usage of four or more medications.

Results: The study was consisted of 198 (66.8%) women and 102 (33.2%) men with mean age of 76.5 ± 6.7 years. The prevalence of polypharmacy was 82.7%. Univariate and multivariate analysis were performed to examine the relationship between polypharmacy and other geriatric syndromes. In regression analysis, polypharmacy was found to be independently associated with sleep disorders [Odds ratio (OR): 2.21, 95% Confidence interval (CI): 1.15-4.24, $p=0.016$] and urinary incontinence (OR: 2.53, 95% CI: 1.21-5.27, $p=0.013$).

Conclusion: Polypharmacy is an important health problem among older adults, which is frequently associated with inappropriate medication use, increased risk of adverse drug reactions, and poor health outcomes. In this study, sleep disorders and urinary incontinence were found to be independently associated with polypharmacy. Clinicians should consider polypharmacy and related risks when prescribing medications for older adults.

Keywords: Polypharmacy, urinary incontinence, sleep disorders

Introduction

Polypharmacy, which is defined as the usage of multiple medications or more medications than clinically necessary, is a common health problem for older adults. Although there is no standard cut-off number of medications for the polypharmacy; it can be defined as the use of four or more medications (1).

Another definition is the administration of more medications than clinically indicated. Related to this definition, drugs not indicated for use, therapeutic duplications of medication should be considered as polypharmacy. Elderly population, represent nearly 42 million around the worldwide making up the 13.3% of total population, are receiving more than 50% of all prescribed medications.

The number of drugs increases in relation to the multiple chronic conditions; such as diabetes mellitus, hypertension, chronic obstructive disease and heart failure. Polypharmacy is often required and appropriate in these cases.

Impaired function of organs and systems; such as heart, kidney, liver and stomach and adverse effects of drug metabolism appear with advancing age. Due to the changes in pharmacokinetic and pharmacodynamics of many drugs, the risk of adverse drug reactions increases. Response to drugs due to drug absorption, body distribution, metabolism, excretion and changes in receptor level show differences in elderly individuals. The prevalence of polypharmacy in the literature, ranges 5% to 78%, in relation to different definitions (2-5). Polypharmacy generally occurs due to demographic and health factors, and access to healthcare.

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Unfortunately, there are many negative outcomes; such as high expenses on healthcare, adverse drug events, drug-drug interactions, the increase at the risks of inappropriate medications, non-adherence to medication and geriatric syndromes associated with polypharmacy (6).

World Health Organization defined adverse drug events as "Unintended and undesired effects of a medication at a normal dose" and classified into five categories as adverse drug reaction, medication error, therapeutic failure, drug withdrawal and overdose (7-9).

In this study we aimed to examine the relationship between polypharmacy and common geriatric syndromes including falls, functionality, constipation, urinary incontinence, sleep disorders and malnutrition.

Materials and Methods

Three-hundred individuals ≥ 60 years of age admitted to İstanbul University Faculty of Medicine, Department of Geriatrics outpatient clinic between 2013-2016 were included to the study. Patients' data on admission about the number of prescribed drugs, falls (in the preceding year), urinary incontinence, constipation, presence of malnutrition, sleep disorders, and functionality were evaluated by a geriatrician. Polypharmacy was defined as the use of four and more medications. Malnutrition was assessed by MNA-sf.

Presence of urinary incontinence, was defined as the unintentional loss of urine in the preceding year. Katz et al. (10) activities of daily living (ADL) scores and Lawton instrumental ADL (IADL) scores (11) were used to assess functionality. Patients were asked whether they have difficulty in sleeping; falling or staying asleep through the night. Insomnia is defined by a positive response to either question (12). Rapid eye movement behavior disorder was defined as clinically violent behaviour occurring during the night: sleep talking, vivid dreams, shouting, screaming, hitting or punching.

Patients were questioned about the presence of witnessed sleep apnea, snoring, sweating, excessive daytime sleepiness or whether they had received a diagnosis of obstructive sleep apnea before. A simple questionnaire was used to define restless legs syndrome (13). For ADL scores patients who got 6 points considered as dependent; and who got 18 points as independent; for IADL scores patients who got 8 points considered as dependent, and 24 points represented total independency. Constipation was defined as symptom based; combination of fewer than 3 stools per week, hard or lumpy form of stool, difficult stool passage for more than 6 month (14). The study protocol was approved by the İstanbul University Faculty of Medicine Ethics Committee on June 28, 2018 (number: 956).

Statistics

Variables were assessed whether normally distributed or not. Normally distributed numerical variables were presented as mean \pm standard deviation and non-normally (skewed) distributed variables were presented as median (minimum-maximum). Frequencies were used to present categorical variables. For two groups comparison we used independent Sample t-test or Mann-Whitney U test. Correlations between categorical variables were analyzed with chi-square test. Pearson's or Spearman's rho correlation tests were used to analyze the correlation of numerical parameters. P values less than 0.05 were accepted as statistically significant. We used Binary logistic regression models to investigate the relationship between variables and SPSS (statistical package for social sciences) version 21 program for statistical analysis.

Results

Among the three-hundred enrolled individuals, 198 (66%) were women and 102 (34%) were men. The mean age of the study population was 76.5 ± 6.7 (median 77) years, the mean number of chronic diseases was 4.19 ± 2.1 (median 4) and the mean number of medications was 7 ± 2 (median 7). The prevalence of four and more drug use was 82.7%. The population of the study was tend to be more independent. The characteristics of study population are shown in Table 1.

Polypharmacy was found not to be associated with age or sex. Dependency in functionality (for ADL $p=0.023$ /for IADL $p=0.045$), malnutrition ($p<0.001$), urinary incontinence ($p=0.009$), sleep disorders ($p=0.021$) and falls ($p=0.028$) were associated with polypharmacy.

In multivariate analysis, sleep disorders [Odds ratio (OR): 2.21, 95% Confidence interval (CI): 1.15-4.24, $p=0.016$] and urinary incontinence (OR: 2.53, 95% CI: 1.21-5.27, $p=0.013$) were independently associated with polypharmacy. Univariate and multivariate analysis' results are demonstrated in Table 2 and Table 3.

Discussion

The present study showed that, about 82% of patients have polypharmacy when we consider polypharmacy as the usage of four or more medications. The prevalence of polypharmacy varied between 5% and 78% in other studies reported from other countries (2-5). The heterogeneity in polypharmacy prevalence seems to be dependent on the development level of countries and the cut-off numbers of medications accepted as polypharmacy (6,15,16). In this study; polypharmacy was not associated with age or sex.

Polypharmacy was independently associated with sleep disorders and the presence of urinary incontinence.

Sleep disorders are common among older adults, because the aging process is associated with an increased risk of multimorbidity, polypharmacy, and psychosocial factors influencing sleep cycle. It is also associated with morbidity and mortality. In older adults using activating medications; insomnia symptoms are common. On the other hand, because

Table 1. The characteristics of the study population

	Total	Polypharmacy	No Polypharmacy
Age (years)	76.5±6.7	78±5.8	77.4±6.6
Sex			
Female (%)	198 (66)	164 (82.2)	34 (17)
Male (%)	102 (34)	82 (80)	18 (17)
Disease (chronic)	4.2±2.1	4.6±1.83	7±1.9
Functionality (ADL/IADL)			
ADL			
0-6 (Dependent)	1 (0.3)	1 (0.3)	0 (0.0)
13-18 (Independent)	292 (97)	242 (80)	50 (17)
IADL			
0-8 (Dependent)	9 (0.3)	8 (0.2)	1 (0.3)
17-24 (Independent)	243 (81)	198 (66)	45 (15)
Nutrition (MNA-sf)			
0-7 (Malnutrition)	14 (4.6)	12 (4)	2 (0.6)
>11 (Normal)	223 (74)	179 (59)	44 (14)
Urinary incontinence	140 (47)	124 (42)	16 (5.4)
Falls	117 (39)	104 (34)	13 (4.3)
Constipation	77 (26)	68 (23)	9 (3)
Sleep disorders	141 (47)	124 (42)	17 (5.7)
"mean ± standart deviation, number (%)"			
ADL: Activities of daily living, IADL: Instrumental activities of daily living, MNA-sf: Mini Nutritional Assessment short form			

Table 2. Univariate analyses for the association of study variables and polypharmacy

	p	OR	CI 95%
Gender	1.0	1.03	0.55-1.93
Age	0.185	1.02	0.97-1.06
Falls	0.028	2.16	1.10-4.26
Urinary incontinence	0.009	2.34	1.23-4.44
Sleep disorders	0.021	2.14	1.14-4.03
Malnutrition	<0.001	0.78	0.64-0.95
Constipation	0.123	1.86	0.86-4.03
ADL	0.023	0.95	0.88-1.02
IADL	0.045	0.87	0.67-1.12
ADL: Activities of daily living, IADL: Instrumental activities of daily living, OR: Odds ratio, CI: Confidence interval			

of sedating medications, chronic illnesses or sleep apnea, patients may suffer from daytime drowsiness (17,18).

Several medications commonly used in older patients, have various effects on sleep periods through multiple mechanisms. Antihistamines, anticholinergics and anticonvulsants, opiates are known to cause daytime drowsiness. Medications can have activating or stimulating effects on older adults, such as pseudoephedrine, beta agonists, corticosteroids, antidepressants or methylphenidate. Antidepressants can worsen restless leg syndrome and periodic limb movement symptoms, while opiates or benzodiazepins are known to exacerbate sleep disordered breathing.

Polypharmacy causes insomnia with a cascade effect like; many medications in relation to sleep disturbance and as a result of more medications required and prescribed (19,20).

In a recent study, in 379 older patients, insomnia was found in 43% (n=163) and the mean number of medications was 9.2. No significant relation was found between insomnia and polypharmacy (21). In a study examining the association between the number and dosage of antipsychotic medications and sleep disorders, they found that the increased dosages of antipsychotics were associated with better sleep, although these medications were only associated with a relatively small amount of the variance in sleep quality.

Additionally, sleep complaints remained persistent in 70% of patients.

These results suggested that the use of antipsychotic medications have limited efficacy as a treatment option for sleep dysfunctions (22). In a recent study, aiming to evaluate the effects of the number of medications on the sleep periods, results showed that the number of medications had not effect on total sleep time but affected the sleep cycle negatively (23).

Urinary incontinence is one of the most common geriatric syndromes that is associated with the use of multiple medications and poor quality of life. Lower urinary tract symptoms increase with aging in both men and women, and constitute poor outcomes in older patients due to multiple medical and psychosocial conditions. Nuotio et al. (24) found that polypharmacy was associated with the increased risk of lower urinary tract symptoms in women aged 70 years or older.

Table 3. Multivariate analysis for factors associated with polypharmacy

	p	OR	CI %95
Sleep disorders	0.016	2.217	1.157-4.248
Urinary incontinence	0.013	2.535	1.218-5.278
*Variables entered falls, malnutrition ADL, urinary incontinence, sleep disorders ADL: Activities of daily living, OR: Odds ratio, CI: Confidence interval			

Many drugs are known to increase the risk of urinary incontinence and exacerbate the urinary tract symptoms such as diuretics, angiotensin converting enzymes, anticholinergics, opiates and calcium channel blockers. Clinicians should perform a medication review to evaluate the specific types and the number of medications (25).

In a recent study, examining the relationship between other geriatric syndromes and urinary incontinence; they found that mobility decline, polypharmacy, and pain were associated with urinary incontinence in both men and women. Delirium and fecal incontinence were associated with urinary incontinence in men, and cognitive impairment was significantly associated with urinary incontinence in women (26).

In a study evaluating the frequency of drugs that can exacerbate incontinence, prevalence of polypharmacy and adverse drug events in female patients with overactive bladder; researchers showed that 57% of the patients were using at least one drug that could exacerbate urinary incontinence. The prevalence of polypharmacy was 38%, while 45% of the patients had drug-drug interactions that can disrupt the quality of life (27).

Study Limitations

The present study had some limitations. This is a retrospective study that contains no follow up data, and thus reveals no cause-effect relationship between polypharmacy and geriatric syndromes. The diagnosis of sleep disorders was based on a questionnaire and clinical suspicion; we did not any further evaluation. This study composed of community-dwelling outpatients' single center data; therefore the results can not be generalized.

However, this study also has some strengths. The total sample size was relatively large and patients were selected randomly from a large group of outpatients.

Conclusion

In this study, polypharmacy was independently associated with sleep disorders and urinary incontinence. These results indicated that patients, who suffered from sleep disorders and urinary incontinence, should be considered carefully in terms of the use of multiple medications. Healthcare practitioners should identify polypharmacy and patients at high risk for adverse outcomes associated with polypharmacy.

Ethics

Ethics Committee Approval: The study protocol was approved by the İstanbul University Faculty of Medicine Ethics Committee on June 28, 2018 (number: 956).

Informed Consent: This study is a retrospective study. Therefore, informed consent form was not taken.

Peer-review: Externally peer-reviewed.

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