

Medication Adherence and Related Factors in Elderly Patients

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Abstract

Objective: The present study investigates medication adherence, motivation, and knowledge level in the elderly who are on chronic medication as well as adherence-related factors.

Materials and Methods: The study included 316 patients aged 60 years and above who were admitted to the family medicine outpatient clinic and who had been on chronic medication for at least one year. Demographic characteristics, presence of polypharmacy, number of medications, duration of chronic medication use, and comorbid diseases were determined. The Modified Morisky scale (MMS) whose validity and reliability of the Turkish version has been evaluated was used to determine medication adherence in the patients. To analyze adherence-related factors, Spearman's correlation coefficient was used.

Results: The mean age of the 316 patients was 68.6±6.8 years, the mean number of chronic diseases was 2.49±1.2, the mean number of medications was 4.53±2.2, and the mean duration of medication use was 12.8±7.7 months. The analysis of patients' medication adherence using the MMS revealed that the level of motivation to medication adherence was 97.2% and knowledge level was 97.5%. The level of motivation to medication adherence were significantly higher in male patients ($r=0.149$, $p=0.008$) and professionally active patients ($r=0.140$, $p=0.013$). The level of knowledge of therapeutic goals was significantly higher in male patients ($r=0.140$, $p=0.013$) and professionally active patients ($r=0.125$, $p=0.026$).

Conclusion: We believe that frequent and appropriate patient education can help improve drug compliance.

Keywords: Elderly, medication adherence, Modified Morisky scale

Introduction

Although the elderly population worldwide was 841 million people in 2013, this figure is estimated to reach 2 billion by 2050 (1). The increase in the average age, which is seen as one of the biggest problems of European countries, is also being observed in Turkey. According to the data made available by the Turkish Statistical Institute, the ratio of our citizens aged 65 years and above to the overall population was 8% in 2014, which reached 8.8% in 2018 (2). Polypharmacy is an important Geriatric syndrome among elderly patients and is a problem for all patients, although it occurs mostly in the elderly (3,4). In the

elderly population, the polypharmacy rate varies between 23% and 39% (3). Polypharmacy is an important problem that affects the whole world economically and in terms of healthcare (5).

With the progression of age, the frequency of chronic diseases that require use of multiple medications also increases (6). It was shown that there exist one in 90%, two in 35%, three in 23%, and four or more concomitant diseases in 14% of the population aged above 65 years in Turkey. This, along with it, leads to an increase in drug consumption (7). One of the most important factors that determines the success rate of the treatment of chronic diseases is medication adherence

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Received: Jun 16, 2020 **Accepted:** Aug 25, 2020

Cite this article as: Polat Ö, Çırak M, Polat H, Yürüyen M. Medication Adherence and Related Factors in Elderly Patients. Eur J Geriatr Gerontol 2020;2(3):77-82



(5,8,9). Long-term medication adherence in chronic diseases in developed countries diminishes by up to 50%, whereas in developing countries, this figure is estimated to be lower (10). The rate of medication non-adherence in the elderly population ranges from 21% to 55% (3). In elderly, complex medical conditions are relatively frequent, which may indicate multiple drug therapy (11). Long-term use of medication that is both longer in duration and involves higher number of medications used in the elderly than in the younger population negatively affects medication adherence of elderly individuals (12).

Presence of multiple diseases, combined use of different treatment methods, and reduced cognitive functional capacity are indicated as factors that reduce medication adherence (13). This deteriorates the quality of life of the elderly population.

To achieve medication adherence in patients, level of disease perception, level of disease-related knowledge, will, and motivation are important (14). In many clinical trials, the average rates of medication adherence may be significantly higher depending on the study population selected and the attention paid to patients; however, the mean rate of medication adherence among patients treated for chronic conditions is reported to be between 43% and 78% (15-17). Therefore, we believe that it is important to increase the number of studies on medication adherence and the factors related to it (especially in elderly patients). There is no gold standard method to determine the level of medication adherence based on disease perception, level of knowledge, and motivation, but it is still possible to assess medication adherence using surveys and scales developed for this purpose (18). The Turkish Modified Morisky scale (MMS), whose validity and reliability in Turkish was examined by Vural et al. (19), is a short and easy-to-apply test to evaluate the habit of medication use.

Using the MMS, the present study aimed to evaluate medication adherence, level of motivation, and knowledge of patients aged 60 years and above who have been on chronic follow-up at our family medicine clinic, which is a tertiary center, and to investigate the factors associated with medication adherence.

Materials and Methods

Patients and Study Design

This prospective study includes patients aged 60 years and above who were admitted to the Family Medicine Outpatient Clinic of the Bakırköy Dr. Sadi Konuk Training and Research Hospital in the University of Health Sciences Turkey between January and April 2019 and who had been on chronic medication use for at least 1 year. Patients (n=428) who had been on chronic medication use for less than one year and those who were unwilling to participate in the study (n=84) were excluded.

A total of 316 patients suitable for the study were included. Chronic medications used by patients were prospectively analyzed in terms of medication adherence and adherence-related factors. Demographic characteristics of the patients, presence of polypharmacy, number of medications at the time of first admittance, duration of chronic medication use (1 year, 1-5 years, 5 years and more), and comorbid diseases as well as number of such diseases were identified. Data concerning what group of medications the patients used was also recorded. In our study, the use of five and more medications was considered polypharmacy (5).

Patients were analyzed in terms of educational background as no degree, elementary school, secondary school, high school, or university; in terms of marital status as single, married, or widowed; and in terms of professional status as housewife, pensioner, and employed. This study was approved by the Ethical Committee of University of Health Sciences Turkey, Bakırköy Dr. Sadi Konuk Training and Research Hospital (2018/452). The authors assert that all procedures contributing to this work comply with the ethical standards in Bakırköy Dr. Sadi Konuk Training and Research Hospital and the Helsinki Declaration of 1975, as revised in 2008. The participants' consent to participate in the study was requested personally from each individual.

Modified Morisky Scale

The MMS, whose validity and reliability in Turkish have been confirmed, was used to assess the medication adherence of patients (20). The Turkish MMS is a short and easy-to-apply test comprising six questions, which can evaluate the levels of knowledge and motivation for medication use separately. MMS is used to question whether there is a belief in the benefit of treatment as well as to investigate the habit of taking medications on time and the state of forgetting to take medications or quitting medications use. The six items in this test are as follows: 1. Do you ever forget to take your medicine/medication? (yes/no); 2. Are you careful to take your medicine/medication on time? (yes/no); 3. Have you stopped taking your medication when you feel good? (yes/no); 4. Sometimes when you feel bad, do you think that this is due to the drug and stop taking the drug? (yes/no); 5. Do you know the long-term benefits of taking medication? (yes/no); and 6. Do you ever forget to get your medication prescribed even though it is time? (yes/no). Questions were answered as yes/no. While assessing the responses, yes is considered equal to 1 point and no to 0 point in the 2nd and 5th questions, whereas yes is considered equal to zero point and no to one point in other questions. A total score of 0 or 1 in the questions 1, 2, and 6, indicates low motivation level, whereas a total score of >1 indicates high level of motivation. A total score of 0 or 1 in the questions 3, 4, and 5 indicates low level of knowledge, whereas a total score of >1 indicates high level of knowledge.

Statistics

All data was analyzed using SPSS software (SPSS Inc, Chicago, IL) for Windows 15.0 version. Categorical variables were given as ratios, whereas continuous values were expressed as mean ± standard deviation. Chi-square (χ^2) test was used to assess medication adherence as per gender. To assess medication adherence based on the MMS and adherence-related factors, analysis was performed using Spearman's correlation test. $P < 0.05$ was considered statistically significant.

Results

The mean age of 316 patients included was 68.6 ± 6.8 years, and the female and male patients accounted for 57% (n=180) and 43% (n=136), respectively, of the study population. Demographic status of all patients, their clinical characteristics, and the medications used are shown in Table 1.

The response rates of all patients to the questions in the MMS and medication adherence as per gender are shown in Table 2. Medication adherence as per gender showed a significant difference only in question 4. Further, 5.1% (n=16) of the patients provided the response "yes" to the "Have you stopped taking your medication thinking sometimes that, when you feel bad, it was because of your medication?" question. In particular, the rate of medication discontinuation among the female patients was significantly higher than that among the male patients ($p=0.02$).

MMS assessment of medication adherence in the patients and adherence-related factors are shown in Table 3. Accordingly, the motivation level in medication adherence was 97.2% and the knowledge level was 97.5%. The level of motivation for medication adherence was significantly higher in male patients ($r=0.149$; $p=0.008$), professionally active patients ($r=0.140$; $p=0.013$), and patients using proton pump inhibitors (PPIs) ($r=0.120$; $p=0.033$). However, among patients using bronchodilators ($r=-0.178$; $p=0.001$), the level of motivation for medication adherence was statistically significantly lower. Although the level of motivation for medication adherence was positively correlated with age; educational background; number of medications; and antihypertensive, anti-ischemic, antirheumatic, anti-osteoporotic, and antidepressant medications, this correlation was not statistically significant. Although there was a negative correlation between marital status (widowed), number of chronic diseases, duration of chronic medication use, and antidiabetic drug use, this correlation was also not statistically significant. The level of knowledge in medication adherence was significantly higher among male patients ($r=0.140$; $p=0.013$) and professionally active patients ($r=0.125$; $p=0.026$). In addition, the level of knowledge in medication adherence was not correlated with age, educational background, marital status, number of chronic

diseases, number of medications and duration of their use, and other medications used.

Discussion

With the increase in the frequency of chronic diseases in societies, use of multiple medications is also increasing. Particularly in elderly patients, polypharmacy leads to negative consequences in terms of adverse effects and drug interactions as well as deteriorates the quality of life of patients. The quality of life of the growing elderly population worldwide is aimed

Table 1. Demographic and clinical characteristics of all patients (n=316)

Gender, n (%), F/M	180 (57) /136 (43)
Age, year (mean ± SD)	68.6±6.8
Number of chronic diseases (median, min-max)	2 (1-6)
Number of chronic medications (median, min-max)	4.5 (1-10)
Duration of chronic medication use, month (mean ± SD)	12.8±7.78
Presence of polypharmacy, n (%)	158 (50)
Educational background, n (%)	
No degree	5 (1.6)
Elementary school	143 (45.3)
Secondary school	44 (13.9)
High school	75 (23.7)
University	49 (15.5)
Marital status, n (%)	
Single	20 (6.3)
Married	223 (70.6)
Widowed	73 (23.1)
Occupational status, n (%)	
Housewife	123 (38.9)
Retired	120 (38)
Currently employed	73 (23.1)
Medications used, n (%)	
Oral antidiabetic	114 (36.1)
Insulin	20 (6.3)
ACE/ARB inhibitor	201 (63.6)
Diuretic	138 (43.7)
Calcium channel blocker	100 (31.6)
Betablocker	117 (37)
Antiaggregants (ASA and/or clopidogrel)	66 (20.9)
Anticoagulant (warfarin and/or NOAC)	39 (12.3)
Antihyperlipidemic medication	74 (23.4)
Antithyroid medication	61 (19.3)
Bronchodilator	36 (11.4)
Antirheumatic medication	10 (3.2)
Antiosteoporotic medication	38 (12)
Antineuropathic medication	21 (6.6)
Antidepressant medication	62 (19.6)
Proton pump inhibitor	104 (32.9)
Other medications	101 (32)

N: Number of patients, F: Female, M: Male, SD: Standard deviation, min: Minimum, max: Maximum, ACE: Angiotensin-converting enzyme, ARB: Angiotensin receptor blocker, ASA: Acetylsalicylic acid, NOAC: Novel oral anticoagulants

Table 2. Medication adherence and gender distribution of all patients based on the modified Morisky scale

Scale questions*	All patients	Female	Male	p **
Q1, n (%), yes/no	33 (10.4)/283 (89.6)	23 (7.3)/157 (49.7)	10 (3.2)/126 (39.9)	0.12
Q2, n (%), yes/no	315 (99.7)/1 (0.3)	180 (57)/ -	135 (42.7)/1 (0.3)	0.19***
Q3, n (%), yes/no	14 (4.4)/302 (95.6)	11 (3.5)/169 (53.5)	3 (0.9)/133 (42.1)	0.10***
Q4, n (%), yes/no	16 (5.1)/300 (94.6)	14 (4.4)/166 (52.5)	2 (0.6)/134 (42.4)	0.02***
Q5, n (%), yes/no	301 (95.3)/15 (4.7)	170 (53.8)/10 (3.2)	131 (41.5)/5 (1.6)	0.43
Q6, n (%), yes/no	25 (7.9)/291 (92.1)	17 (5.4)/163 (51.6)	8 (2.5)/128 (40.5)	0.24

N: Number of patients, Q: Question, *: Modified Morisky scale (please see the method section), **: chi-square (χ^2) test, ***: Fischer's Exact test

Table 3. *Factors related to medication adherence in all patients based on the modified Morisky scale

	n (%)	Associated factors	Correlation coefficient (r)	p **
Level of motivation in medication adherence***	307 (97.2)	Male gender	0.149	0.008
		Occupation (professionally active)	0.140	0.013
		Bronchodilator use	-0.178	0.001
		Proton pump inhibitor use	0.120	0.033
Level of knowledge in medication adherence****	308 (97.5)	Male gender	0.140	0.013
		Occupation (professionally active)	0.125	0.026

N: Number of patients, Q: Question, *: Modified Morisky scale (see the Method section), **: Spearman's Correlation test, ***: The level of motivation in medication adherence was not significantly correlated with age, educational background, marital status, number of chronic diseases, number of medications used and duration of their use, and other medications used (data not shown), *****: The level of knowledge in medication adherence was not significantly correlated with age, educational background, marital status, number of chronic diseases, number of medications used and duration of their use, and other medications used (data not shown)

to be improved. We believe that it would contribute to the practices of family medicine to investigate motivation and knowledge levels in medication adherence among the elderly and to identify adherence-related factors. The present study investigates medication adherence in elderly patients with polypharmacy who were admitted to our family medicine outpatient clinic as well as the related factors.

The 316 elderly patients admitted to our family medicine outpatient clinic had a mean age of 68.6 years, and the female patients accounted for 57% of the study population. Similar to the literature, the number of medications used was 4.5 and the mean duration of medication use was 12.8±7.78 months. In many studies which examined medication use among patients in Turkey, multiple drug use rate was found to be more common in patients older than 65 years of age and females (20-23).

The study by Lesage (24) on multiple medication use reported that polypharmacy was higher in female patients aged 65 years and above. Similarly, the UK's Public Health Statistics show that individuals aged above 60 years constitute one-fifth of the population, but half of all the medications prescribed belong to these individuals (25). Medication adherence is highly important in terms of polypharmacy risk of the elderly population and the success of treatment.

In the present study, medications for cardiovascular system were the most common ones used by the elderly patients and these medications included angiotensin-converting enzyme/angiotensin receptor blocker, inhibitors at a rate of 64%, diuretics

at 44%, and betablockers at 37%. The group of medications used most commonly after cardiovascular medications was found to be PPIs at a rate of 33%. In the study by Ozturk and Gulen Ugras (21) cardiovascular medications were the most commonly prescribed medications at a rate of 31%, which was similar to that in the present study. Moreover, in a study by Arslan et al. (26), it was reported that the most prescribed medications for elderly patients were cardiovascular medications. In another study, antihypertensive medications were reported to be the most commonly used medications at a rate of 68% (22).

In the present study that investigates medication adherence of elderly patients, the levels of motivation and knowledge were found to be 97.2% and 97.5%, respectively, which was quite high. The education level of the patients we serve in our region was high (Table 1). We think that the patients' motivation and knowledge levels are high because they frequently meet with the same physician and are informed at every visit. The level of motivation for medication adherence was found to be higher in the male patients. Female patients had a higher rate of medication discontinuation. In the study by Krousel-Wood et al. (27), a high proportion i.e., 52% of elderly individuals adhered to their medications. However, in the study by Demirbag and Timur (22), 85.5% of elderly individuals did not regularly use their medications. In another study was also found that the majority of the elderly patients did not regularly use the prescribed medications (28). In a study by Akkuş and Karatay (29), 52.4% of the elderly patients often forgot about taking their medications and the time and quantity of their

medication. In the present study, the rate of forgetting to take medication/s in any time period was 33%. However, in general, the patients herein stated that they paid attention to taking their medications on time. The rate of occasionally forgetting to take their prescribed medication was 25%. The mean duration of medication use herein was 13 months, and we believe that the rate of medication discontinuation is low because of the long-term benefits of the medications used owing to chronic diseases and considerable deterioration of the quality of life caused by the clinical outcomes that occur when medications are not used; therefore, the patients are highly adherent. In the study by Arslan and Eser (7), it was found that 25% of the elderly were taking breaks from using their medications and this was because the elderly were not sufficiently aware of the importance of the regular use of medication. In the present study, the high level of motivation for medication adherence is associated with male gender, being professionally active, and use of PPIs. The high medication adherence associated with PPIs might be related to the sense of safety that it offers to patients because PPIs alleviate adverse effects in cases of multiple medication use (antiaggregants, anticoagulants, etc) and are used for the diagnoses of reflux/gastritis. In contrast, the use of bronchodilator was negatively correlated with medication adherence. This correlation might be associated with the occasional need for the medication depending on the frequency of patients' complaints and perhaps the inadequate level of awareness of its importance. In another study conducted by Solmaz and Akin (28) reported that one of the most important problems affecting medication use in the elderly is low level of education. In the study by Demirbag and Timur (22), there was a statistically significant correlation between educational background and regular use of medications. In the present study, the level of motivation for medication adherence was positively correlated with educational background although this correlation was not statistically significant.

Study Limitations

There is a need for further large-scale and multicentric studies with more participants.

Conclusion

The levels of motivation and knowledge concerning medication adherence of the elderly within family medicine practices are quite high in our study. However, there remains a proportion of 25%–33% of the elderly patients who occasionally forget to take their medication and/or get their medication prescribed. The levels of motivation and knowledge appear to be lower in female patients. Although adherence to antihypertensive and cardiac medications is better, we believe that the lower level of motivation in bronchodilator use and antidiabetic

medication use (insulin and oral antidiabetic medications) should not be ignored. Therefore, the importance of proper and regular medication use should be explained during each visit and individual awareness should be raised in each patient. We believe that often and proper training will be useful in achieving a considerable reduction in the improper use of medication by the elderly and an improvement in their medication adherence, thereby facilitating preventive and therapeutic medicine in the practice of family medicine.

Ethics

Ethics Committee Approval: This study was approved by the Ethical Committee of University of Health Sciences Turkey, Bakırköy Dr. Sadi Konuk Training and Research Hospital (2018/452).

Informed Consent: The participants' consent to participate in the study was requested personally from each individual.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Ö.P., M.Ç., H.P., M.Y., Concept: Ö.P., M.Y., Design: Ö.P., M.Y., Data Collection or Processing: Ö.P., M.Ç., H.P., M.Y., Analysis or Interpretation: Ö.P., M.Ç., H.P., M.Y., Literature Search: Ö.P., M.Ç., H.P., M.Y., Writing: Ö.P., M.Ç., H.P., M.Y.

Conflict of Interest: The authors declare no conflict of interest.

Financial Disclosure: This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

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