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#### RESEARCH

## FREQUENCY OF POLYPHARMACY AND RISK FACTORS IN THE ELDERLY IN BURDUR

### ABSTRACT

**Introduction:** Polypharmacy is common among the elderly. This study aimed to determine the frequency of polypharmacy and the risk factors in the elderly.

**Materials and Method:** This cross-sectional study will be analysed in three stages (polypharmacy, drug characteristics and drug interaction). Herein, the first stage (polypharmacy) was conducted at Burdur city centre and the connected villages. A total of 400 of 11,360 subjects aged  $\geq 65$  years who were registered with family physicians in Burdur city centre were selected using a systematic sampling method. A questionnaire of 30 questions about socio-demographic variables and rational drug use was distributed among the subjects. Subsequently, the subjects were asked to bring their own drugs from home that they were actively using or not currently using, and their drug-using behaviour was analysed via specific questions.

**Results:** The average number of different drugs possessed by the subjects at home was approximately 6 ( $5.95 \pm 4.30$ ). A total of 64.9% of the drugs were used regularly, 21.3% were used occasionally and 13.8% were previously used but not currently used. The median number  $\pm$  standard deviation of the drugs that were used regularly, used occasionally and previously used but not currently used was  $3.86 \pm 3.36$ ,  $1.27 \pm 1.75$  and  $0.82 \pm 1.82$ , respectively. According to the results of multivariate analysis, the presence of diabetes, hypertension, respiratory system or cardiovascular (except hypertension) diseases, visual impairment or hearing disorders significantly increased the total drug use ( $p < 0.05$ ).

**Conclusion:** Chronic diseases and living in the city centre are the main risk factors leading to polypharmacy. Therefore, interventions must be undertaken by monitoring and reducing chronic diseases and providing training on rational drug use in the provincial centres.

**Key words:** Polypharmacy; Aged; Chronic disease

#### ARAŞTIRMA

## BURDUR İLİNDE YAŞAYAN YAŞLILARDA POLİFARMASİ SIKLIĞI VE POLİFARMASİYİ ETKİLEYEN ETMENLER

### Öz

**Giriş:** Polifarmasi yaşlılıkta çok sık görülür. Bu çalışmada Burdur ilinde yaşayan yaşlı bireylerde polifarmasi sıklığı ve neden olan risk faktörlerinin incelenmesi amaçlanmıştır.

**Gereç ve Yöntem:** Kesitsel tipte planlanan polifarmasi, ilaçların özellikleri, ilaç etkileşimi aşamalı bir çalışmanın birinci aşamasının (polifarmasi) yer aldığı bu araştırma, Burdur ili merkezi ve merkeze bağlı köylerde gerçekleştirildi. Burdur ili merkezde aile hekimlerine kayıtlı 65 yaş ve üzeri 11360 kişiden 400'ü sistematik örneklem yöntemiyle seçilmiştir. Kişilere sosyodemografik değişkenler ve akılcı ilaç tutumuna yönelik 30 soruluk anket uygulandı ve ikinci aşamada kişilerin evlerinde bulunan ve kendilerine ait olan kullandıkları veya şu an kullanmadıkları ilaçları getirmeleri talep edildi ve ilaçları kullanma ile ilgili davranışları belirli sorularla irdelendi.

**Bulgular:** Kişilerin evlerinde kendilerine ait yaklaşık olarak ortalama 6 farklı etken maddeli ilaç ( $5.95 \pm 4.30$ ) olduğu belirlendi. İlaçların %64,9'unu düzenli olarak, %21,3'ünü ara sıra kullanılmakta ve %13,8'ini ise önceden kullanmış ancak şu anda kullanılmamakta olduğu saptandı. Düzenli olarak kullanılan, ara sıra kullanılan ve önceden kullanılmış olup şimdi kullanılmayan ilaç sayısı ortalaması ve standart sapması sırasıyla;  $3.86 \pm 3.36$ ,  $1.27 \pm 1.75$ ,  $0.82 \pm 1.82$ 'dir. Polifarmasi (5 ve üzeri aktif olarak ilaç kullanma) sıklığı %36,5'dir. Multivariate analiz sonuçlarına göre, kişide diyabet, hipertansiyon, solunum sistemi veya kardiyovasküler sistem (hipertansiyon dışı) hastalığı bulunması, görme bozukluğu yaşaması veya iştih kaybı rahatsızlığı bulunması toplam ilaç kullanımını anlamlı şekilde arttırmıştır ( $p < 0.05$ ).

**Sonuç:** Polifarmasiye yol açan asıl etkenin kronik hastalıklar ve kent merkezinde yaşam olduğu saptanmıştır; dolayısıyla kronik hastalıkların takibi ve azaltılmasına yönelik uygulamalar ve il merkezlerine akılcı ilaç kullanımı konusunda eğitim verilerek müdahale edilmesi gerekmektedir.

**Anahtar sözcükler:** Polifarmasi; Yaşlı; Kronik hastalık



## INTRODUCTION

The population over the age of 65 years has been growing rapidly as a result of the demographic transformation of the world and Turkey. The global elderly population, which was approximately 534 million in 2010, is estimated to be approximately 1.5 billion (mostly in developing countries) in 2050 (1).

In Turkey, the elderly population (age $\geq$ 65 years) was 5,891,694 in 2013. In the last 5 years, it increased by 17% and reached 6,895,385 in 2017. The ratio between the elderly population and the total population was 7.7% in 2013 and increased to 8.5% in 2017. Based on future population estimates by the Turkish Statistical Institute, the ratio of elderly population is expected to be 10.2% in 2023, 12.9% in 2030, 16.3% in 2040, 22.6% in 2060 and 25.6% in 2080 (2).

Along with increase in the life expectancy, there have been changes in the causes of diseases and deaths. At the dawn of the 20th century, the major health threats were infectious and parasitic diseases that most often claimed the lives of infants and children. Currently, non-communicable diseases that more commonly affect adults and older people impose the greatest burden on global health. As a result, elderly people refer more to physicians due to increase in the number of elderly people with prolonged life expectancy, the multiplicity of comorbid diseases and increase in the need for health care. This may cause the elderly population to be in the forefront of drug consumption. The need for long-term use of drugs due to chronic diseases leads to concomitant use of certain drugs. Besides, undesirable side effects of drugs can easily occur owing to long-term use, drug-drug interactions and age-related changes in metabolic processes. For these reasons, the use of multiple drugs leads to a vicious circle that is difficult to break, if not prevented, in the elderly (3).

Polypharmacy (multi-drug use) has different definitions and can be expressed as the use of  $\geq$ 4–5 drugs per day, the use of drugs more than those that are clinically indicated and the use of at least one unnecessary drug (4). The incidence of polypharmacy increases with age and also varies among countries. Study in the United States of America (USA) report

that 23% of women aged over 65 years living in the community and 35%–40% of those aged 75–85 years have been shown to use  $\geq$ 5 drugs (5). In the United Kingdom, 36% of individuals aged over 75 years have been shown to use  $\geq$ 4 drugs per day (6). In Turkey, although there are no comprehensive data concerning the elderly living in the community, in studies among patients admitted to polyclinics, the rate of using  $\geq$ 5 drugs was found to be 63.2% for women and 55.3% for men aged over 65 years. According to this study, the average number of drugs used per person was 4.5 and the use of  $\geq$ 10 drugs was 7.9% (7).

The present study aimed to determine the frequency of polypharmacy and the risk factors in the elderly (aged  $\geq$ 65 years).

## MATERIALS AND METHOD

This cross-sectional study will be analysed in three stages (polypharmacy, drug characteristics and drug interaction). Herein, the first stage (polypharmacy) was conducted at Burdur city centre and the connected villages. The study population comprised 11,360 subjects, after excluding individuals who are in prison (12 individuals) and those whose residence is outside the city centre (519 individuals) from 11,900 subjects aged  $\geq$ 65 years who were registered with 28 family physicians in Burdur city centre. Considering the population of 11,360 individuals, prevalence of 50%, sampling error rate of 0.05 and confidence interval of 95.0%, the minimum sample size, which represents the population in the Epi info programme, was calculated to be 378. A total of 400 subjects were decided to be included in the study. The subjects to be sampled were selected by listing them as those who are registered with 1st family physicians to those who are registered with 28th family physicians (to protect regional factors as much as possible) using a systematic sampling method. A backup for each person was also identified. Because 13 individuals could not be reached, predefined back-ups were contacted. A pre-test was performed on 10 subjects (aged  $>$ 65 years), who dropped out from the selected samples and back-ups selected before the research, and the questions were revised. The dependent variable of the study included

the total number of different drugs used by the subjects, whereas the independent variables included the rational drug use, attitudes and behaviours of the elderly and the general socio-demographic variables. First, a questionnaire of 30 questions about socio-demographic variables and rational drug use was distributed among the subjects. Second, the subjects were asked to bring their own drugs from home that they were actively using or not currently using. Their drug-using behaviour was then analysed via specific questions. Before data collection, training was provided to midwives and nurses who would collect the data to fill the questionnaire in order to ensure standardisation. Home visits were conducted by community health centre midwives and nurses who had previously received training and had field experience, and face-to-face interviews and questionnaires were conducted for subjects who provided consent to participate in the survey. Survey forms were filled by midwives and nurses. Data were collected between May 2016 and June 2016, and the obtained data were recorded electronically for statistical analysis using SPSS 22.0 statistical analysis software (SPSS Inc. Chicago, IL, USA). Quantitative data were represented as arithmetic average and standard deviation, and count data were represented as number (percentage). The chi-square test and Student's *t*-test were used for the analysis of variables, and logistic regression (backward LR) was used for multivariate analysis. The results were evaluated using a 95% confidence interval, and  $p < 0.05$  was considered statistically significant. Medical ethics committee approval was obtained from Başkent University Medical and Health Sciences (date: 17 May 2016, protocol number: KA16/215). After obtaining the necessary permits, the permission of Burdur Governorship Public Health Directorate was also obtained (date: 20 May 2016 and number of the permission file: 13124672/663.08), and the implementation of the research was started.

## RESULTS

This study included a total of 400 subjects aged  $\geq 65$  years, among which 64.0% lived in the city centre, 57.0% were women and 45.2% were aged  $\geq 75$  years.

Furthermore, 64.2% of the subjects were married and 25.2% had no social security. Only 9.7% of the subjects graduated from secondary school and higher education institutions. During the study, subjects aged  $> 65$  years were asked to bring all their medications from home, and the medications were recorded according to their different types. A total of 2,378 different drugs were found to be possessed by the 400 subjects. The average number of different drugs possessed by the subjects at home was approximately 6 ( $5.95 \pm 4.30$ ). A total of 64.9% of the drugs were used regularly, 21.3% were used occasionally and 13.8% were previously used but not currently used. The median number  $\pm$  standard deviation of the drugs that were used regularly, occasionally used and previously used but not currently used was  $3.86 \pm 3.36$ ,  $1.27 \pm 1.75$   $0.82 \pm 1.82$ , respectively. The frequency of polypharmacy (active use of  $\geq 5$  drugs) was 36.5%.

The results of univariate analysis performed to evaluate factors affecting polypharmacy in the elderly showed that the following were statistically significant risk factors responsible for increasing the frequency of polypharmacy: *decreased number of people living in the house; female sex; age  $> 75$  years; those living in city centres; those who are widowed, single or separated; those living in nursing homes; diabetes; hypertension; heart problems; hearing problems; visual problems; chronic respiratory disorders; history of urinary incontinence and falling in the last 6 months and total number of illnesses and findings observed in the subject*. The following factors did not have a statistically significant effect on polypharmacy in this age group: education status, presence of social security and income status, making the doctor prescribe medication without being sick, rheumatism, hernia, osteoarthritis and osteoporosis, gastrointestinal disorders, history of faecal incontinence, presence of disability report and nervous system disorders (Alzheimer, parkinson, vertigo, paralysis, etc.) (Table 1).

According to the results of multivariate analysis, the presence of diabetes, hypertension, respiratory system or cardiovascular system (except hypertension) diseases; visual impairment or hearing disorder significantly increased the total drug use ( $p < 0.05$ ) (Table 2).



**Table 1.** Effect of descriptive factors on polypharmacy.

Characteristics	Total (n=400, [%100.0])	Polypharmacy is absent (0–4 medications) (n=254[%63.5])	Polypharmacy is present (≥5 medications) (n=146 [%36.5])	P
Sex (Female)	228 (57.0)	132 (52.0)	96 (65.8)	0.007
Age (years   mean±sd)	74.5±6.8	73.9±6.8	75.6±6.7	0.017
Living place (city centre)	256 (64.0)	150 (59.1)	106 (72.6)	0.007
Marital status (married)	257 (64.3)	177 (69.7)	80 (54.8)	0.003
Education status				
Illiterate	78 (19.5)	44 (17.3)	34 (23.3)	0.255
Literate	49 (12.3)	29 (11.4)	20 (13.7)	
Primary school graduate	234 (58.5)	158 (62.2)	76 (52.1)	
Secondary school graduate and higher	39 (9.7)	23 (9.1)	16 (11.0)	
Has social security	299 (74.8)	194 (76.4)	105 (71.9)	0.323
Income status				
Not enough	89 (22.3)	52 (20.5)	37 (25.3)	0.498
Barely enough	187 (46.8)	120 (47.2)	67 (45.9)	
Easily earn a livelihood	124 (31.0)	82 (32.3)	42 (28.8)	
Lives at home with				
Only partner	206 (51.5)	142 (55.9)	64 (43.8)	0.028
Partner and relatives*	51 (12.8)	35 (13.8)	16 (11.0)	
Only relatives	54 (13.5)	32 (12.6)	22 (15.1)	
Alone	72 (18.0)	38 (15.0)	34 (23.3)	
Nursing home	17 (4.2)	7 (2.8)	10 (6.8)	
The number of people living at home (mean±sd)	2.2±1.2	2.3±1.2	2.1±1.1	0.044
Making the doctor prescribe medication without being sick	174 (43.5)	114 (44.9)	60 (41.1)	0.462
Diabetes	82 (20.5)	30 (11.8)	52 (35.6)	<0.001
Hypertension	201 (50.3)	97 (38.2)	104 (71.2)	<0.001
Cardiovascular disease (except hypertension)	123 (30.8)	42 (16.5)	81 (55.5)	0.000
Cancer	7 (1.8)	3 (1.2)	4 (2.7)	0.264
Vision impairment	305 (76.2)	188 (74.0)	117 (80.1)	<0.001
Hearing problem	166 (41.5)	87 (34.3)	79 (54.1)	<0.001
Respiratory tract disorders	46 (11.5)	19 (7.5)	27 (18.5)	0.001
Rheumatism, herniated disc, osteoarthritis and osteoporosis	122 (20.5)	82 (32.3)	40(27.4)	0.307
Gastrointestinal tract disorders	46 (11.5)	27 (10.6)	19 (13.0)	0.472
Nervous system disorders (Alzheimer, Parkinson, vertigo, paralysis, etc.)	47 (11.8)	28 (11.0)	19 (13.0)	0.552
Stroke history	56 (14.0)	28 (11.0)	28 (19.2)	0.024
Stress incontinence	155 (38.8)	81 (31.9)	74 (50.7)	<0.001
Urge incontinence	168 (42.0)	93 (36.6)	75 (51.4)	0.004
Faecal incontinence	27 (6.8)	16 (6.3)	11 (7.5)	0.636
Fall in last 6 months	95 (23.8)	52 (20.5)	43 (29.5)	0.042
Disability reports	5 (1.2)	1 (0.4)	4 (2.7)	0.062
Total number of illnesses and findings in the person (mean±sd)	3.8±1.9	3.2±1.8	4.9±1.5	<0.001

\*\*\* Do you ask your doctor to prescribe medication without being sick or do you buy it and keep it at home thinking it might be necessary?

\* Relatives: children, grandchildren and other people.

**Table 2.** Factors affecting polypharmacy.

Factor	OR (95%, CI)	p
Living place (province centre, village ref.)	1.816 (1.054–3.130)	0.032
Diabetes (present, absent ref.)	3.239 (1.800–5.828)	<0.001
Hypertension (present, absent ref.)	2.689 (1.621–4.460)	<0.001
Cardiovascular (except hypertension) diseases (present, absent ref.)	4.923 (2.928–8.277)	<0.001
Hearing problem (present, absent ref.)	2.226 (1.409–3.873)	0.001
Chronic respiratory disorder (present, absent ref.)	2.934 (1.407–6.120)	0.004

Backward LR logistic regression, -2Log likelihood: 370.543, Nagelkerke R Square: 0.438, variables in the equation: p=0.000, wald: 28.426.  
 OR: odds ratio; CI: confidence interval

## DISCUSSION

In our study group, the frequency of polypharmacy (active use of  $\geq 5$  drugs) was 36.5%, which was considered as a significant problem. The incidence of polypharmacy increases with age and varies between countries, and it is reported to be approximately 35%–40% in the elderly aged >75 years (8,9). The frequency of polypharmacy also varies between the elderly living in the community and the elderly living in the nursing home. Among the patients living in the community, the incidence rates of 41%, 43.4%, 35.8% and 46.8% were reported from Iceland, USA, Australia and Italy, respectively (10-12). In a recent study conducted among nursing homes as a report of shelter work in eight European countries, the incidence rate was reported to be 49.7% (13). In the study conducted by Arslan et al., it was found that 28.2% of the participants were using one drug, 24.3% two drugs, 18.5% three drugs, 11.7% four drugs and 17.3% five or more drugs (14). Gurol Arslan et al. revealed that 35% of the elderly were using 5–6 drugs and the number of drugs used by them was  $4.5 \pm 1.8$  (15). In the study conducted by Kutsal et al. in 2006 on multiple drug use by interviewing 1,433 elderly aged  $\geq 65$  years, 84.7% of the elderly who participated in the survey had at least one drug that was regularly used

and 15.3% did not have any; furthermore, 23.2% of the subjects stated that they were using only one drug, 17% two drugs, 19.2% three drugs and 38.2% four and more drugs (16). In the study by Arslan et al. (15) evaluating drug use in patients aged  $\geq 65$  years, there was no significant difference between male and female patients in terms of the amount of drugs used; 11.7% of the elderly were using four drugs and 17.3% were using five or more drugs. The results of univariate analysis showed that polypharmacy was more common in women. Based on the results of multivariate analysis, it was found that the presence of chronic diseases in general was the main risk factor. Longer life expectancy and higher frequency of chronic illness in women, especially those aged >65 years, were risk factors for using multiple drugs. There are many factors driving polypharmacy. Some studies have shown a relationship between polypharmacy and both female sex and age >80 years (17,18). In our study, there was no relationship between socio-demographic factors and polypharmacy. This may have been due to the characteristics of the study group.

As a general outcome of the study, the presence of chronic diseases that increase with age leads to polypharmacy. Because chronic diseases,



especially hypertension, is both frequent and leads to the use of multiple drugs in the relevant age group, it is considered an important problem that needs to be addressed. Approximately half of those participating in the study and 71.2% of those with polypharmacy have hypertension. In the study by Ozturk et al. evaluating the drug use in patients aged >65 years, the amount of subjects using four and more drugs was 46.7% and similarly the frequency of hypertension was 48.1% (19). In the study conducted by Iscigil et al., in which the elderly living in nursing homes and patients who applied to university polyclinics were studied and compared based on their drug use, antihypertensives were reported as the most commonly used drugs (20). Ozturk et al. also found that the frequency of hypertension was high (approximately 50%) in the elderly, and it was one of the significant risk factors of polypharmacy (21). Diabetes, one of the chronic diseases, also emerged as a significant public health problem with a frequency of 20.5% in the study group. In addition, approximately 35% of those who used multiple drugs and 11.8% of those who did not use any drugs had diabetes. In our study, diabetes was considered to be another significant risk factor of polypharmacy. Similarly, in the study by Ozturk et al., the frequency of diabetes was found to be 23.2% in the elderly (19). Arslan et al. found that the frequency of diabetes was 10.2% in the elderly living in the nursing home (15). In the study by Oztürk et al. examining the factors affecting polypharmacy in the elderly, the frequency of diabetes was found to be 39.0% in the study group, 49.0% in the polypharmacy group and 24.0% in the non-polypharmacy group (21). It is understood that diabetes is one of the major disease groups, which requires intervention, in terms of rational drug use. In other foreign studies, similarly to our study, it has been found that diabetes and hypertension lead to polypharmacy (22-23). In our study, the number of elderly people with hearing impairment, which was diagnosed

based on the Problems and Expectations of People with Disabilities study (2010), was found to be significantly higher than that of people aged  $\geq 65$  years (7.7%) (24). This difference is considered to be attributed to the fact that those with mild hearing loss, who do not require hearing aids, were also included in our study as those with hearing problems. Hearing problems can also trigger polypharmacy as it appears with other chronic diseases. Another factor affecting polypharmacy was chronic respiratory diseases; 11.5% of the study group and 18.5% of those with polypharmacy had chronic respiratory disease. In patients with such chronic conditions, the problem of multiple and long-term drug use is prevalent.

In our study, polypharmacy was found to be higher in subjects who live in the city centre. Studies have shown that elderly people living in urban areas have more tendency toward polypharmacy due to the following: the ease of access to health services, the tendency of patients to visit different doctors and take many prescriptions, the presence of excess drug expectations, the use of medication for symptoms rather than diagnosis, the tendency of doctors to terminate current medication and start a new one, the large number of non-prescription drug sales without awareness of the physicians and the tendency of elderly patients to use medications taken from family members or surroundings (25). Doctor or Physicians; which one?

In conclusion, the prevention of chronic diseases, which is considered as the main cause of polypharmacy in the elderly, the adaptation of a rational drug use approach by physicians and the follow-up and regulation of drugs by family physicians, especially for the elderly with chronic diseases, are shown to be necessary to maintain multiple drug use at a certain level. We recommend trainings on rational drug use in city centres and then in rural areas and preventing patients from taking drugs from pharmacies in an uncontrolled manner.

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