Drug Use Pattern Among Elderly People Referred to the Retirement Centers

Shahla Asiri [1], Fatemeh Mahmoudi [2, *], Afsaneh Pasha [1] and Ehsan Kazemnezhad Leyli [3]

[1]Department of Community Health Nursing, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran
[2]Social Determent of Health Research Center, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran
[3]Social Determent of Health Research Center, Guilan University of Medical Sciences, Rasht, Iran

*Corresponding author: Social Determent of Health Research Center, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran. Tel: +98-9111348649, Email: fateme.mahmoudi1357@gmail.com

Abstract

Background: Elderly people are more susceptible to common chronic diseases based on their age-related physiological changes and also use drugs more commonly, than younger people.

Objectives: The aim of the present study was to determine the pattern of drug use and related factors in elderly people who referred to the retirement centers covered by the national retirement fund in Rasht.

Methods: This cross-sectional study was conducted on 381 consecutive randomly selected elderly people in Rasht during 2017. Data was collected using a questionnaire that included demographic characteristics, common chronic diseases, pattern of drug use, and medication adherence by face-to-face interviewing at the centers covered by the retirement fund. Data analysis was carried out using descriptive statistics and Chi-square tests.

Results: Of 381 people, 88.5% took drugs. The average number of drugs used and the self-medication frequency were 3.95 per day, and 35.7%, respectively. The most common causes of self-medication included previous use of the same drug and symptom recovery. The most commonly used drug group among the research groups included lipid-lowering agents (48.8%). Atorvastatin, Aspirin, and Losartan were the most commonly used drugs in the elderly that most of subjects (53.4%) had medium medication adherence.

Conclusions: Since the elderly suffer from multiple diseases simultaneously, they often use several drugs. Therefore, self-medication and also medication adherence are the most important issues in this period. Educational interventions on the proper pattern of drug use among older people seem to be necessary.

Keywords: Drug Utilization, Elderly, Self-Medication, Medication Adherence

1. Background

Demographic transition and population aging are the important challenges facing countries in the 21st century. Due to the demographic, social, economic, and cultural changes, the aging phenomenon is increasingly emerging as a social issue (1). The global growth rate of the elderly (1.9%) is higher than the general population (1.2%) (2). The United Nations estimates that the elderly will account for 11% of the world's total population (about 800 million), rising to about 2 billion in 2050 (3). The population of the age group of 65 years old and older, constitutes 6% of the total population in Iran (4). An elderly community poses challenges to the health system and the provision of health services. One of these challenges is drug use, its pattern, and prescription among the elderly (5). The drug use among the elderly has attracted a lot of attention in recent years, and various studies indicate an increase in the

prevalence of polypharmacy in the elderly population (6, 7). Over the past few years, previous studies on the healthy and effective use of drugs in developing as well as developed countries showed that irrational drug use is a global phenomenon (8).

The elderly, due to age-related physiological changes, are susceptible to multiple common chronic diseases, which lead them to use more drugs than other life periods (9, 10). This situation result increase in irrational drug use, use of inappropriate treatments, economic burden, drug complications, and interactions (11, 12). Age increasing can cause inevitable physiological, pharmacokinetic, and pharmacodynamics changes (13, 14). These changes may lead to accumulation of drugs in the body to the toxic level and cause severe complications (15-17). In addition to the changes mentioned above, some drug use and prescription behaviors, such as the use of prescription and

non-prescription drugs, self-medication, use of medicinal plants, regardless of the possible drug interaction with chemical drugs, and failure to follow medication adherence or inadequate drug prescription have highlighted the importance of the pattern of drug use in the elderly (18).

Self-medication can be defined as obtaining and consuming drugs without the advice of a physician either for diagnosis, prescription or surveillance of treatment (19, 20). Self-medication is currently one of the major problems in the treatment cycle of Iran and many other countries. This leads to bacterial resistance, lack of optimal treatment, unwanted poisonings, adverse effects and unwanted complications, drug market disruption, waste of costs, and increasing drug per capita in the society (21). According to the research, it is estimated that 83.3% of Iranians self-medicate (22). Elderly health care is one of the priorities of the Ministry of Health; the integration into primary health care (PHC) services and the elderly will form the largest number of a community's health (care) nurse clients in the near future.

2. Objectives

The aim of the present research was to determine the pattern of drug use in the elderly population of Rasht, the capital of Gilan as the one of three Northern Province of Iran.

3. Methods

3.1. Study Design

The present study is a descriptive-analytic cross-sectional study.

The study population included all individuals who aged 60 years or older and members of the retirement centers and House of Hope of retirees of Rasht city. The sample size of this study is 381 people. The sampling method used in this study is a consecutive random sampling. Our inclusion criteria were age equal or more than 60 years, membership in these centers, the ability to communicate verbally in terms of answering questions and the willingness to participate in the study. After confirming the eligibility of the patients to participate in the research, the questionnaire was completed through interviewing the participants and observation of the medicine bags after providing the necessary explanations and obtaining their informed consent from. Also, individuals who did bring their medicine bags were asked to refer at another time with their medicine bag. A four-part questionnaire was used in this study to collect data.

3.2. Study Tools

A four-part questionnaire was used in this study to collect data about; (A) sociodemographic features (age, sex, area of residence, level of education, marital status, level of income, living arrangement, smoking and abuse of drug); (B) chronic disorders and diseases (this part of the questionnaire contains a list of disorders and common diseases of the elderly, which was completed through self-reporting); (C) pattern of drug use (consists of nine questions regarding use or disuse of drugs, polypharmacy, forms of drugs taken, use of herbal medicines, self-medication, and its reasons and types, which were determined and coded based on the anatomical therapeutic chemical (ATC). Its information was completed by the researcher through interviewing the participants and observing their medicine bag, the number of drugs used included prescribed and non-prescribed drugs, vitamins and food supplements consumed within 24 hours (PRN), topical forms of drugs, herbal medicines, and medication doses were not considered, and (D) medication adherence based on the Morrisky medication adherence scale (includes four questions: Failure to follow the medication adherence due to forgetfulness, carelessness in observing the exact time of taking medications, medication discontinuation after feeling worse, and after feeling better). These questions were answered using a yes-no rating scale. The No and Yes options were given scores 0 and 1, respectively. Finally, the score 0, 1 - 2, and 3 - 4 are considered high, medium, and low adherence levels, respectively (23).

3.3. Validity and Reliability

The researcher-made questionnaire, on patterns of drug use was validated through content validation and surveying 10 faculty members of the Faculty of Nursing and Midwifery of Shahid Beheshti University of Rasht (CVI and CVR) (with score ranges of 0.9 - 1 and 0.62 - 0.8 in CVI and CVR, respectively). While investigating the internal consistency of questions, the Richardson coefficient of 20 was used on 17 subjects as a pilot study in order to measure the level of medication adherence. The obtained Richardson coefficient ($\alpha = 0.7$) indicated the convergence of questions in order to determine the medication adherence. For the test-retest procedure, the medication adherence scale was completed by 17 eligible elderly people in an interval of two weeks. The correlation coefficient (r = 0.893, P < 0.001) and test-retest reliability coefficient (Re = 0.78) showed that the repeatability of this questionnaire is highly reliable.

3.4. Statistical Analysis

SPSS version 20 was used and the data analysis was performed using descriptive statistics (frequency, percentage

and confidence interval of 95%, mean, and standard deviation). Chi-square tests were used to compare qualitative variables and P < 0.05 was considered as the significant level.

4. Results

A total of 381 individuals aged over 60 years of age were studied. The mean age was 67.27 ± 6.14 years and 96.3% of them lived in the city. The socio-demographic characteristics of the participants are presented in Table 1.

A total of 337 ones (88.5%) used drugs as mean as 3.95 ± 2.71 per person daily. Polypharmacy (taking 5 drugs a day) was observed in 38.1% of the subjects. The most commonly used drugs were Atorvastatin, Aspirin, Losartan, and Calcium, respectively. Regard drug forms, the majority of elderly people took pills and capsules (Table 2). The therapeutic classes of the elderly are used in Table 3. The most commonly used pharmaceutical groups included anti-hyperlipidemia (48.8%), non-steroidal anti-inflammatory (44.6%), cardiovascular (38.8%), supplements (38.6%), and anti-hypertensive drugs (34.1%). Also, the findings on self-medication showed that 35.7% of the individuals used self-medication and 17.6% of the subjects used herbal medicines. The most common causes of self-medication included previous use of the same drug, and symptom recovery (44.9%), minor symptoms and lack of any need for medical attention (31.6%) (Table 4). The most commonly self-medication used drugs included acetaminophen and cold tablets. Self-medication was seen more, but, insignificant in the 60 - 64 age group, male, urban, married, non-smoker groups, with a secondary level of education, and low level of income. Morrisky medication adherence criteria (Figure 1) showed that most of the subjects (53.4%) had medium medication adherence. The most common chronic diseases included hypertension (44.6%) and hyperlipidemia (35.2%) (Table 5).
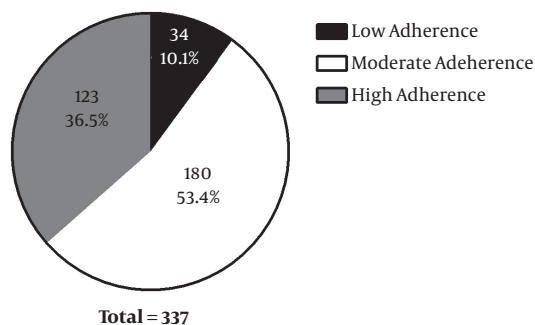

Figure 1. Medication adherence

Table 1. The Socio-demographic Characteristics of the Participants[a]

Variable	Values
Age, mean $\pm$ SD (Range)	67.27 ± 6.14 (60 - 88)
Sex	
Male	248 (65.1)
Female	133 (34.9)
Area of residence	
City	367 (96.3)
Village	14 (3.7)
Level of education	
Illiterate	9 (2.4)
Reading and writing	13 (3.4)
Elementary	33 (8.7)
Cycle	27 (7.1)
Secondary school	159 (41.7)
Academic	140 (36.7)
Marital status	
Married	337 (88.5)
Single	3 (8.0)
Divorced	3 (0.8)
Widow	38 (10)
Level of income	
Less than family needs	261 (68.5)
Meeting family requirements	112 (29.4)
More than family needs	8 (2.5)
Living arrangement	
Alone	23 (6)
With spouse	189 (49.6)
With children	20 (5.2)
With spouse and children	147 (38.6)
With relatives and acquaintances	2 (0.5)
History of smoking	
Yes	357 (93.7)
No	24 (6.3)

[a] Values are expressed as No. (%) unless otherwise indicated.

5. Discussion

In the present study, we aimed to investigate the pattern of drug use in the elderly population of Rasht. Our results revealed that 88.5% of the people used drugs. On the other hand, polypharmacy was observed in 38.1% of the cases, i.e. consumption of five drugs or more per day, which could indicate the presence of multiple and com-

Table 2. Frequency Distribution of Forms of Drug Used by the Participants

Drug Forms	No. (%)
Pill	322 (84.5)
Capsule	118 (31)
Ampoule	14 (3.7)
Spray	11 (2.9)
Drop	11 (2.9)
Syrup	3 (0.8)

Table 3. Frequency Distribution of Drugs Based on Therapy Class Among the Participants

Therapy Class	No. (%)
Anti-hyperlipidemia	186 (48.8)
Non-steroidal anti-inflammatory	170 (44.6)
Cardiovascular	148 (38.8)
Supplements	147 (38.6)
Anti-hypertensive	130 (34.1)
Analgesics	106 (27.8)
Anti-diabetes	98 (25.7)

Table 4. The Reasons for Self-Medication Among the Research Participants

Reasons for Self-Medication	No. (%)
Previous use of the drug and symptom recovery	61 (44.9)
The minor symptoms and lack of need to a doctor	43 (31.6)
Recommendation of non-specialists to the benefits of drug therapy	16 (11.8)
A similar prescription written by a doctor	14 (10.3)
Pharmacy recommendation	12 (8.8)
Ensuring the drug safety	12 (8.8)
Having insufficient time to visit a doctor	11 (8.1)
Lack of affording for visiting physicians	8 (5.9)
Disbelief and trust in doctors and health centers	8 (5.9)
Having belief in traditional medicine and herbal medicines	6 (4.4)
Crowed physicians' offices or treatment centers	5 (3.7)
Fear and embarrassment of medical examinations	0 (0)
Absence of treatment centers near the place of residence	0 (0)

Table 5. Common Disorders and Diseases Among the Participants

Chronic Disorders and Diseases	No. (%)
Hypertension	170 (44.6)
Hyperlipidemia	134 (35.2)
Bone and joint diseases	115 (30.2)
Diabetes	97 (25.5)
Heart disease	74 (19.4)
Eye diseases	77 (20.2)
Prostate enlargement	64 (16.8)
Sleep disturbances	59 (15.5)
Diseases and gastrointestinal ulcers	37 (9.7)

polypharmacy (taking 5 drugs or more) being seen in 42.2% of the elderly, which is almost similar to our findings (24). Walckiers et al. also conducted a study on the elderly residing in the Belgian care centers and community and the results showed that 81.9% of them took drugs with the average number of 3.5 per person and with a range of 0-19 and a polypharmacy rate 33% (5 drugs and more within 24 hours) (25). This difference in the findings may be due to differences in demographic characteristics, differences in regulations and supervision governing the drug use, and the prevalence of different diseases in the studied populations.

We found that the most commonly used pharmaceutical groups included anti-hyperlipidemia, non-steroidal anti-inflammatory, cardiovascular, supplements, and anti-hypertensive drugs. Jyrkka et al. also showed that the most commonly used drugs for the elderly included cardiovascular, analgesics, blood and blood forming organs, and gastrointestinal drugs (6). Moreover, Nomura referred in their study to the cardiovascular, digestive, and central nervous system drugs as the most commonly used drug group among the Japanese elderly (26). In addition, Nobili et al. indicated that antithrombotic, digestive, and diuretic drugs were the most commonly used drug groups in the Italian elderly, respectively (27). The results of the above mentioned studies that were performed in various communities show that cardiovascular drugs are among the most commonly used drugs in all studies. This similarity probably indicates the prevalence of cardiovascular diseases among the elderly in different communities.

Our results, using the Morrisky's scale, showed that 36.5%, 53.4%, and 10.1% of the participants had high, moderate, and poor levels of medication adherence, respectively. Joshi and Shalini also demonstrated that 49.68% of persons observed the medication adherence (28). Moreover, Delshad Noghabi et al. showed that 71.5% of the subjects fully observed the medication adherence and only 2.8% of

mon chronic diseases in the elderly. The average number of drugs was 3.95 per day for every elderly, which is approximately in line with the findings of Delshad Noghabi et al. (1), They reported that the average drug numbers were 4.06 per person with 56.6% of persons simultaneously using four drugs per day (1). The results of the study by Haider et al. in Sweden, also showed that 88.5% of the elderly took drugs with the average number of 4.4 per day and the

them failed to observe the medication adherence. Also, three of the main reasons justifying the lack of the medication adherence included forgetting the time of drug use, symptom recovery, and unfamiliarity with drug orders (1). This difference in results may be due to demographic differences and the type of instrument used. In the present study, 35.7% of the subjects practiced had self-medication. In some studies, the rate of self-medication was lower than the current study. For instance, the rate of self-medication was 31%, 23.9%, and 24%, respectively, in Karimy et al.'s study on the elderly patients covered by urban centers of Zarandieh (29), study of Shalini and Joshi in India (28), and Shadeh et al.'s study (30). Furthermore, several other studies, including Delshad Noghabi et al.'s study reported the self-medication of 53.3% (1). Moen et al., showed in his study, which was performed in Sweden that 38.4% of subjects used over-the-counter (OTC) drugs (31), which is more than the rate reported in the present study. This difference in results may be due to cultural and social differences, such as the level of literacy and the degree of urbanization of the subjects, the difference in the instruments used to check the self-medication, and the use of OTC drugs.

In the present study, there was no significant relationship between self-medication with any of the demographic characteristics. Similar to our findings, Davati et al., showed no significant relationship between the self-medication with age, sex, occupation, and level of income, which is consistent with the present study (5). The most important causes of self-medication included symptom recovery (44.9%), minor symptoms, and lack of need to visit physicians (31.6%), the recommendation of non-specialists to the benefits of drug therapy, prescription of similar drugs by the physician (10.3%), the drug safety and the pharmacies recommendation (8.8%). These findings were consistent with Davati et al.'s study, which attributed the most common reason for self-medication to prescribing the same drugs by the physician, prior use of the drug, and symptom recovery, minor symptoms, and lack of need to the medical attention as well as Karimy et al.'s study , which reported that the most frequent reasons for self-medication included the previous experience of the disease and its diagnosis, the availability of the required drugs, and a history of recovery resulted by self-medication (29). Considering that some of the reasons for the self-medication are frequently referred to in various studies, there is a need to consider the educational needs of the elderly in this regard. Hypertension (44.6%) is the most common disease, and other cases are as follows: Hyperlipidemia (35.2%), bone and joint diseases (30.2%), diabetes (25.5%), and cardiovascular diseases (19.4%). The results of Nobili et al. showed that the most common dis-

eases included hypertension, diabetes, coronary heart disease, and atrial fibrillation (27). In a study in Turkey, Bahat et al. referred to hypertension, depression, dementia, and diabetes as the most common diseases (32). In a study on the elderly admitted to a hospital in Nepal, Besent et al. showed that hypertension, stroke, and cardiovascular diseases were more prevalent (33). The results of various studies indicate that hypertension was the most prevalent disease among elderly people in different societies, which can lead to other common diseases, such as cardiovascular and cerebrovascular diseases.

5.1. Conclusion

The geriatric population is on the rise worldwide. Older people are vulnerable to chronic diseases, which requires long-term medical treatment and leads to the use of several medications and drug-related problems. The pharmacokinetic and pharmacodynamic changes secondary to age or illnesses make them particularly sensitive to the adverse effects of many drugs. On the basis of the finding of this study, 88.5% of the subjects used drugs, the average number of drugs was 3.95 per day, and 35.7% of the participants had self-medication. This clearly shows that it is necessary and requires careful attention, to promote a rational use of drugs, and drug use patterns, in older people requires careful attention. Regular training programs for doctors, pharmacists, nurses, and the elderly, can not only prevent the adverse effects of irrational drug use, but also enhances the dynamics and vitality as well as the health status of the elderly.

Acknowledgments

Footnotes

Authors' Contribution: Study concept and design, Shahla Asiri and Afsaneh Pasha; acquisition of data, Fatemeh Mahmoudi; analysis and interpretation of data, Ehsan Kazem Nejad Leyli; drafting of the manuscript, Shahla Asiri, Fatemeh Mahmoudi, Afsaneh Pasha, and Ehsan Kazem Nejad Leyli; critical revision of the manuscript for

References

1. Delshad Noghabi A, Darabi F, Baloochi Beydokhti T, Shareinia H, Radmanesh R. [Irrational use of medicine status in elderly population of Gonabad]. *Quart Horizon Med Sci*. 2014;**19**(5):49–56. Persian.

2. Jhaveri BN, Patel TK, Barvaliya MJ, Tripathi C. Utilization of potentially inappropriate medications in elderly patients in a tertiary care teaching hospital in India. *Perspect Clin Res*. 2014;**5**(4):184–9. doi: 10.4103/2229-3485.140562. [PubMed: 25276629]. [PubMed Central: PMC4170537].

3. Advinha AM, de Oliveira-Martins S, Mateus V, Pajote SG, Lopes MJ. Medication regimen complexity in institutionalized elderly people in an aging society. *Int J Clin Pharm*. 2014;**36**(4):750–6. doi: 10.1007/s11096-014-9963-4. [PubMed: 24906719].

4. Mirzaie M, Darabi S. [Population aging in Iran and rising health care costs]. *Salmand*. 2017;**12**(2):156–69. Persian. doi: 10.21859/sija-1202156.

5. Davati A, Jafari F, Samadpor M, Tabar K. [Survey polypharmacy and its related factors among the elderly population in the Tehran]. *Sys Med Islam Repub Iran*. 2007:450–6. Persian.

6. Jyrkka J, Enlund H, Korhonen MJ, Sulkava R, Hartikainen S. Patterns of drug use and factors associated with polypharmacy and excessive polypharmacy in elderly persons: Results of the Kuopio 75+ study: A cross-sectional analysis. *Drugs Aging*. 2009;**26**(6):493–503. doi: 10.2165/00002512-200926060-00006. [PubMed: 19591524].

7. Lai SW, Lin CH, Liao KF, Su LT, Sung FC, Lin CC. Association between polypharmacy and dementia in older people: A population-based case-control study in Taiwan. *Geriatr Gerontol Int*. 2012;**12**(3):491–8. doi: 10.1111/j.1447-0594.2011.00800.x. [PubMed: 22233227].

8. Shukrala F, Gabriel T. Assessment of prescribing, dispensing, and patient use pattern of antihypertensive drugs for patients attending outpatient department of Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia. *Drug Des Devel Ther*. 2015;**9**:519–23. doi: 10.2147/DDDT.S73670. [PubMed: 25632220]. [PubMed Central: PMC4304532].

9. Dianati M, Shojaegharebag GA, Mesdaghinia A, Taghadosi M, Shenasa F, Taiebi A, et al. [Polypharmacy and its related factors among the elderly population in Kashan, Iran during 2011 - 2012]. *KAUMS J (FEYZ)*. 2015;**18**(6):578–84. Persian.

10. Linjakumpu T, Hartikainen S, Klaukka T, Koponen H, Kivela SL, Isoaho R. Psychotropics among the home-dwelling elderly–increasing trends. *Int J Geriatr Psychiatry*. 2002;**17**(9):874–83. doi: 10.1002/gps.712. [PubMed: 12221663].

11. Jhaveri BN, Patel TK, Barvaliya MJ, Tripathi CB. Drug utilization pattern and pharmacoeconomic analysis in geriatric medical in-patients of a tertiary care hospital of India. *J Pharmacol Pharmacother*. 2014;**5**(1):15–20. doi: 10.4103/0976-500X.124411. [PubMed: 24554905]. [PubMed Central: PMC3917160].

12. Vali L, Pour Reza A, Rahimi Foroushani A, Batoul A, Akbari Kamrani AA. [Analysis of inappropriate medication use in older adults discharged from hospitals affiliated with Tehran University of Medical Sciences (TUMS) using the Beers criteria in 2010]. *Salmand*. 2011;**6**(3):56–65. Persian.

13. Spence AP. *Biology of human aging*. New York: Prentice Hall; 1995.

14. Yavari HR, Akbari Kamrani AA, Saboor M, Delbari A, Bakhshi E, Sahhaf R. [Prevalence of Poly pharmacy among the elderly residents of Kahrizak Charity Foundation (KCF), Tehran, 2010-2011]. *J Sabzevar Univ Med Sci*. 2013;**20**(67):42–50. Persian.

15. Kim HA, Shin JY, Kim MH, Park BJ. Prevalence and predictors of polypharmacy among Korean elderly. *PLoS One*. 2014;**9**(6). e98043. doi: 10.1371/journal.pone.0098043. [PubMed: 24915073]. [PubMed Central: PMC4051604].

16. Cooper N, Forrest K, Mulley G. *ABC of geriatric medicine*. United Kingdome: John Wiley & Sons; 2013.

17. Asadi Noghabi A. *[Text geriatric nursing]*. Tehran: Jameenegar; 2008. Persian.

18. Wimmer BC, Cross AJ, Jokanovic N, Wiese MD, George J, Johnell K, et al. Clinical outcomes associated with medication regimen complexity in older people: A systematic review. *J Am Geriatr Soc*. 2017;**65**(4):747–53. doi: 10.1111/jgs.14682. [PubMed: 27991653].

19. Shankar PR, Partha P, Shenoy N. Self-medication and non-doctor prescription practices in Pokhara valley, Western Nepal: A questionnaire-based study. *BMC Fam Pract*. 2002;**3**:17. doi: 10.1186/1471-2296-3-17. [PubMed: 12236905]. [PubMed Central: PMC130019].

20. Klemenc-Ketis Z, Hladnik Z, Kersnik J. Self-medication among healthcare and non-healthcare students at University of Ljubljana, Slovenia. *Med Princ Pract*. 2010;**19**(5):395–401. doi: 10.1159/000316380. [PubMed: 20639665].

21. Ziayee T, Azgholi G, Yaghmaei F, Akbar Zadeh AR. [The survey of self medication in woman with pregnancy in Tehran]. *J Nurs Midwifrey*. 2008;**18**:35–9. Persian.

22. Sharifirad G, Mohebi S, Motalebi M, Abasi M, Rajati F, Tal A. [The prevalence of self-medication and modifiable factors influencing it based on health belief model in the elderly Ghonabad]. *J Prevent Med*. 2011;**10**:411–21. Persian.

23. Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*. 1986;**24**(1):67–74. doi: 10.1097/00005650-198601000-00007. [PubMed: 3945130].

24. Haider SI, Johnell K, Thorslund M, Fastbom J. Analysis of the association between polypharmacy and socioeconomic position among elderly aged > or =77 years in Sweden. *Clin Ther*. 2008;**30**(2):419–27. doi: 10.1016/j.clinthera.2008.02.010. [PubMed: 18343279].

25. Walckiers D, Van der Heyden J, Tafforeau J. Factors associated with excessive polypharmacy in older people. *Arch Public Health*. 2015;**73**:50. doi: 10.1186/s13690-015-0095-7. [PubMed: 26557365]. [PubMed Central: PMC4638096].

26. Nomura K. *Drug use patterns and predictors of polypharmacy among elderly, community-residing persons in Hiroshima, Japan from October to December 2009*. Liverpool, UK: Laureate Online Education; 2011.

27. Nobili A, Licata G, Salerno F, Pasina L, Tettamanti M, Franchi C, et al. Polypharmacy, length of hospital stay, and in-hospital mortality among elderly patients in internal medicine wards. The REPOSI study. *Eur J Clin Pharmacol*. 2011;**67**(5):507–19. doi: 10.1007/s00228-010-0977-0. [PubMed: 21221958].

28. Shalini MD, Joshi MC. Study of polypharmacy and associated problems among elderly patients. *Int J Med Update*. 2012;**7**(1).

29. Karimy M, Heidarnia AR, Ghofranipour F. Factors influencing self-medication among elderly urban centers in Zarandieh based on health belief model. *Arak Med Univ J*. 2011;**14**(58):70–8.

30. Shade MY, Berger AM, Chaperon C, Haynatzki G, Sobeski L, Yates B. Factors associated with potentially inappropriate medication use in rural, community-dwelling older adults. *J Gerontol Nurs*. 2017;**43**(9):21–30. doi: 10.3928/00989134-20170406-01. [PubMed: 28399319].

31. Moen J, Antonov K, Larsson CA, Lindblad U, Nilsson JL, Rastam L, et al. Factors associated with multiple medication use in dif-

ferent age groups. *Ann Pharmacother*. 2009;**43**(12):1978–85. doi: 10.1345/aph.1M354. [PubMed: 19920158].

32. Bahat G, Tufan F, Bahat Z, Aydin Y, Tufan A, Akpinar TS, et al. Assessments of functional status, comorbidities, polypharmacy, nutritional status and sarcopenia in Turkish community-dwelling male elderly. *Aging Male*. 2013;**16**(2):67–72. doi: 10.3109/13685538.2013.771329.

[PubMed: 23461711].

33. Basnet S, Paudel KR, Sah AK, Jha RK, Sah P, Adhikari S, et al. Prescribing pattern, polypharmacy and potentially inappropriate prescribing in hospitalized elderly patients: A retrospective study in a teaching hospital in Nepal. *Int J Sci Rep*. 2016;**2**(1):7. doi: 10.18203/issn.2454-2156.IntJSciRep20160087.