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Original Article

The Status of Drug Prescription Based on Beers Criteria (Edition 2022) in the Community-dwelling Older Adults Living in Tabriz, Iran: Data From Tabriz Older People Health Survey (TOPS)

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Abstract

Background: Physiological, physical, and mental changes along with chronic diseases require the elderly to use multiple drugs. In this study, the status of drug administration in the elderly was investigated.

Methods: In this retrospective community-based cross-sectional study, the data of 1362 people aged ≥ 60 years in Tabriz were collected by trained interviewers from July 2019 to January 2020. The data received included demographic variables and the status of drugs used, which were evaluated based on the 2022 edition of the Beers Criteria. Data analysis was done by Microsoft Excel version 2016 and Stata statistical software package (Release 16. College Station, TX: StataCorp LP).

Results: The mean and standard deviation of the drug number used by participants were estimated to be 3.72 ± 3.09. According to the Beers criteria, 28% of all used drugs were inappropriate for the elderly, and 62% of participants used at least one inappropriate medicine. Furthermore, the most common inappropriate drugs were from the group of non-steroidal anti-inflammatory drugs, benzodiazepines, cardiovascular, and anticonvulsants, including aspirin, gabapentin, diclofenac sodium, glyburide, and triamterene.

Conclusion: The use of inappropriate drugs in the elderly had a relatively high prevalence. In addition, the number of drug items used in more than one-third of the elderly indicated polypharmacy. The consequences of taking inappropriate and multiple drugs require the design and implementation of effective interventions in this regard, the findings of this study can provide evidence for policymakers and decision-makers in the health system.

Keywords: Drug prescription, Elderly, Side effects, Drug interactions

Introduction

The increase in chronic diseases in older adults leads to an increase in the consumption of many drugs. Therefore, about 84% of older people admitted to the hospital during admission and 95% during discharge are exposed to polypharmacy.[1] Accordingly, the management of the use of multiple drugs in older ages is of critical importance, and neglecting the different changes in the metabolism of drugs as well as their absorption, distribution, and excretion in the body of older people will lead to the occurrence of drug side effects.[2-5]

The results indicated that 25%-40% of older people's hospitalizations are related to problems caused by the prescription and use of drugs.[6] The cost of inappropriate and unnecessary drug use in the United States in 2012 was 200 billion dollars.[7] Therefore, due to the management of drug consumption and the reduction of drug side effects in these ages, drug prescription should be based on standards

Evidence on problems related to the prescription and consumption of drugs in older people has led to the formulation and development of numerous control tools in this field. In this regard, some criteria such as Beers, Zhan, Mcleod, Laroch, screening tool of older persons' prescriptions (STOPP), and screening tool to alert to right treatment (START) can be mentioned, which have been presented to help evaluate the quality of drug administration.[8-10]

The Beers Criterion was first developed in 1991 by the American Geriatrics Association and was reviewed and revised in 1997, 2003, 2012, 2015, 2019, and 2022.

According to the Beers criteria, it is necessary to examine three groups of drugs used in older patients: drugs that should be avoided in older adults, drugs to be used with caution in older adults, and drugs that are potentially inappropriate for older adults.[8,9]

Therefore, this study aimed to investigate the status of drug prescriptions based on the Beers criteria in community-dwelling older people living in Tabriz, Iran, in 2019 and 2020. Information about the status of drug prescriptions for older adults can be the basis for designing and implementing effective interventions to improve the quality of services provided to this group of people. Considering the vulnerability of older adults and the increase in their medical expenses, this issue becomes more important.

Methods

This cross-sectional analysis was embedded within the Tabriz Older People Health Survey (TOPS), which was conducted on a representative sample of community-dwelling older people.

Study Setting

The TOPS was conducted in Tabriz, East Azerbaijan province, Iran from July 2019 to January 2020. Tabriz is the most populated city in East Azerbaijan province.

Study Population

The statistical population included all community-dwelling elderly (people aged ≥ 60 years in Iran)[10] who were living in Tabriz.

Sample Size and Sampling Method

Details on the sampling methodology have been described elsewhere.[11] Shortly, using the probability proportional to size sampling method, 1362 community-based older people were randomly selected from 140 blocks out of 11 778 urban blocks in Tabriz.

Data Collection

Data collection in the study (i.e., TOPS) was done by structured interview method and by trained interviewers who were a male psychologist and a female general physician, based on developed tools. The interviewers received the necessary training from the relevant experts. Interviews were conducted after obtaining informed consent and by visiting the participants' homes in person. Moreover, the interviewers provided the participants with explanations about the study, its objectives, and its implementation method before completing the instrument information. All interviews were conducted in Turkish by interviewers whose native language was Turkish. Finally, a total of 1362 interviews were completed, and necessary information was collected.

Data Collection Tool

The tool used in this study was designed in two parts: general patient information consisting of age and gender and information related to the used drugs (i.e., the number and type of drugs).

Statistical Analysis

The collected data were reported using descriptive statistics, including frequency and percentage (categorical variables), mean and standard deviation, and also median and interquartile ranges (continuous variables). The received data about the number and type of drugs consumed according to the 2022 Edition of the Beers criteria[12] were examined, and their frequency and percentage were reported in three groups of drugs: potentially inappropriate drugs, drugs that should be used with caution, and medicines that should not be taken. Then, data management and analysis were done using Microsoft Excel version 2016 and Stata statistical software package (Release 16. College Station, TX: StataCorp LP).

Results

A total of 1362 questionnaires were completed by the interviewers (97% response rate). The number of older people in the age group of 60-69 years was 741 people (54.4%), the age group of 70-79 years was 431 people (31.6%), and the age group of 80 years and older was 190 people (13.9%). Furthermore, the mean and standard deviation of the participant's age was 70.3 ± 7.4 years. The participants included 768 (56.4%) women and 594 (43.6%) men. The mean and standard deviation of the number of medicinal items were estimated as 3.72 ± 3.09 (The median was 3 (1-6)). Moreover, about 19.3% of the participants did not take any medicine, 9.8% of them used only one medicine, and 4.9% took 10 or more drugs.

A total of 4577 items of medicine were consumed by the older participants in this study, of which 482 items were from the category of vitamins, supplements, and herbal medicines, which included 10% of all medicines.

According to the Beers criteria, 1044 drug items were potentially unsuitable for older people from the total number of reviewed questionnaires, which included 22% of the total drug items. Furthermore, 68 items of drugs should be used with caution in older people, which comprised 1.5% of all drugs. In addition, 214 drugs belonged to the category of drugs that should not be used by older adults, which included 4.5% of all drugs. The drugs prescribed according to the Beers Criteria are listed according to frequency in Tables 1, 2, and 3.

Discussion

This study was conducted to investigate the status of drug prescriptions based on the Beers criteria (2022 edition) among older people living in Tabriz. During the study, registered drugs related to 1362 participants with an average age of 70.3 years were examined.

The results showed that 844 of the investigated questionnaires (62%) contained drugs that were categorized according to the Beers criteria. This amount

Table 1. The Frequency and Percentage of Potentially Inappropriate Drugs for the Older Adults According to the Beers Criteria

Drugs	Frequency	Percent
Aspirin	373	8.1
Glyburide	94	2
Diclofenac sodium	89	1.9
Insulin	50	1.09
Clonazepam	43	0.9
Alprazolam	40	0.8
Nortriptyline	30	0.6
Prazosin	30	0.6
Chlorpheniramine	27	0.58
Warfarin	27	0.58
Clidinium	21	0.45
Naproxen	17	0.37
Lorazepam	16	0.34
Antihistamine	13	0.28
Digoxin	12	0.26
Diazepam	11	0.24
Indomethacin	11	0.24
Meloxicam	10	0.21

Table 2. The Frequency and Percentage of Drugs That Should Be Used with Caution According to the Beers Criteria

Drugs	Frequency	Percent
Clopidogrel	31	0.67
Carbamazepine	7	0.15
Tramadol	2	0.04
Dabigatran	1	0.02

Table 3. The Frequency and Percentage of Drugs to Be Avoided in the Older Adults According to the Beers Criteria

Drugs	Frequency	Percent
Gabapentin	69	1.5
Triamterene/hydrochlorothiazide	44	0.96
Spironolactone	16	0.34
Pregabalin	12	0.26
Baclofen	11	0.24
Ciprofloxacin	11	0.24
Colchicine	10	0.21

accounted for 28% of all drugs used by the participants, 22% of which were potentially inappropriate, 1.5% were drugs that should be used with caution, and 4.5% should not be used in old age. Furthermore, out of 844 people who received inappropriate medicine, 48% used one inappropriate drug, 23% two drugs, 6.7% three drugs, 1.5% four drugs, and 0.23% five drugs.

The results of a study in Tabriz, which was conducted on 1500 prescriptions by general physicians, indicated that 53.9% of the examined prescriptions contain drugs inappropriate for older people based on the Beers Criteria (2019 edition), and 37.8% of them used at least one inappropriate drug.[13] The percentage of prescriptions containing inappropriate drugs in the above study is lower than that among the participants of the present study. The reason for this difference can be related to the differences in the statistical sample in terms of demographic variables. Furthermore, in the aforementioned study, only the prescriptions of general practitioners were examined, while the drugs used in the present study were examined without considering the prescribing authority, which could have caused a difference.

In a study conducted in Japan on elderly people living in long-term care centers, 21% of people were taking drugs that were potentially inappropriate for older people.[14] In another study related to Jordan, which was conducted on 2891 older people, 62.5% were receiving at least one inappropriate drug based on the Beers standard drug list. Most of these drugs were reported to be from the category of painkillers (31.2%) and digestive drugs (25.3%).[15]

In addition, in a cross-sectional study related to China, which was conducted on 852 hospitalized older people, 85% of people over 65 were using potentially inappropriate drugs. The researchers of this study stated that one of the main causes is high polypharmacy (≥ 10 drugs) in older adults.[16] The difference in the type of used drugs can be one of the reasons for obtaining different results in different countries. Further, there may be several inappropriate drugs according to the Beers criteria in the essential drug list of some countries.[17]

In the current study, the most inappropriate drugs used by older adults included aspirin, glyburide, diclofenac sodium, gabapentin, and triamterene. In a similar study conducted in Tabriz, adult cold, diclofenac, glibenclamide, diphenhydramine, and ketorolac were reported to be the most inappropriate drugs.[13] The results of another study indicated that the prevalence of inappropriate drugs prescribed by general physicians is high and educational interventions significantly reduce the prescription of inappropriate drugs from 37.3% to 23.6%.[18]

In the present study, the most common inappropriate drugs were non-steroidal anti-inflammatory drugs, benzodiazepines, as well as cardiovascular and anticonvulsant drugs. The results of a similar study also reported the most common inappropriate drugs to belong to the group of non-steroidal anti-inflammatory drugs, followed by benzodiazepines and antihistamines.[13] In a study conducted in Chengdu, China, the most common inappropriate drugs were reported to be from the group of benzodiazepines, diuretics, and selective serotonin reuptake inhibitors.[13] A study conducted in South Korea on 86,457 older people indicated that the most inappropriate drugs belong to the cardiovascular group.[19] Similarly, a study conducted in North Cyprus on the drugs used by older adults hospitalized in public hospitals, based on the Beers criteria (edition 2015), demonstrated that most of the inappropriate drugs used by older adults are from the cardiovascular group.[19]

Strengths and Limitations of the Study

This study was conducted with an appropriate sample size, and the drugs used by older adults were extracted in the field. Moreover, since it is not extracted from the clinical records or doctors' prescriptions, it can well reflect the actual conditions of drug use among Iranian older adults. Considering that socio-cultural conditions along with demographic variables can be effective in determining drug consumption behaviors, the generalization of the findings of this study to other provinces of Iran should be done with caution, especially in this study, where information was collected for drugs that used outside clinical and therapeutic settings. This situation will be more significant, especially in Iran, where it is still possible to obtain most of the drugs without a prescription from pharmacies. Additionally, the difference in available drugs in different countries should be considered when comparing the findings of this study with studies conducted in other countries.

Conclusion

The findings of this study showed that the use of inappropriate drugs by older adults has a relatively high prevalence. On the other hand, estimates indicate that by 2050, around 30% of the country's population will be older adults.[20] Older population is more sensitive than other age groups due to major physical, psychological, and physiological changes. Therefore, drug prescriptions for this part of society should be based on established standards. The lack of rational and correct prescription of medicine for older adults affects the patient and society in various ways. The improper prescription of drugs, in addition to imposing heavy economic damages on older adults and their families in most cases, causes many side effects and drug resistance.[13] This factor also increases the duration or severity of the disease and patient dissatisfaction. On the other hand, the health and treatment costs of older adults have greatly increased as a result of the irrational prescription of drugs, affecting the health and treatment system and, consequently, the entire society. Despite the aforementioned complications and consequences related to the use of inappropriate drugs in older adults, the findings of the present study indicated that inappropriate drugs according to the Beers criteria are still the front line of treatment in older adults. The awareness of the current situation enables the policymakers and decision-makers of the health field to intervene with accurate insights into the field of drug prescription and provide the conditions for the optimization and appropriate prescription of drugs for older adults with relevant reforms.[21]

Ethics statement

This study was reviewed and approved by the Deputy of Research Ethics Committee at Tabriz University of Medical Sciences (Ethical ID: TBZMED.REC.1394.1069). Furthermore, informed consent was obtained from all participants, and they were assured of the confidentiality of all provided information.

Disclosure of funding source

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Conflict of interests declaration

The authors declare that they have no competing interests.

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Data availability statement

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

Author contributions

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Consent for publication

Not applicable.

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