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REVIEW ARTICLE

Self-medication among the elderly population; a systematic review

Rubiaan S. Almadi[1]*, Khalid A. Aladwani[1], Mohammed N. Alqahtani[1], Ali A. Bin Nouh[1], Khalid H. Alanazi[1]

ABSTRACT

Background: The elderly population is at an increased risk of several diseases and is more prone to be affected by adverse drug reactions. Self-medication is a practice that involves the administration of non-prescribed medication. Although self-medication of some medicines can be safe and is accepted globally, it may result in severe complications, especially among elders, as the metabolism of drugs can be changed due to aging. It is necessary to understand and find out the prevalence rate of self-medication among the elderly population.

Aim: We aimed to assess the prevalence of self-medication among the elderly population.

Methods: We searched for articles related to the current subject by exploring Google Scholar and PubMed databases starting from 2015 to 2021. The searching process involved using various terms to obtain all related articles; the terms used were a combination of "Self-medication and elderly population," "self-medication and prevalence," "self-medication and elders," and "prevalence of self-medication and elders." The inclusion criteria included full-text original articles conducted on the elderly population and conducted between 2015 and 2021.

Results: A total of 90 articles were obtained; however, only 8 articles were eligible for the inclusion criteria. The 8 studies were from Iran, India, and 14 European countries, and included a total number of 33,739 participants.

Conclusion: Self-medication is highly prevalent among the elderly population, and analgesics were the most commonly used medications. The leading cause for self-medication was a headache, whereas the significant driver of self-medication was financial problems.

Keywords: Self-medication, elders, prevalence.

Introduction

Self-medication refers to using medication with no prescription from a qualified professional with the purpose of alleviating or treating the symptoms perceived by the patient [1]. Self-medication is practiced based on a previous prescription or sharing medicines with relatives and friends [2]. Self-medication also involves the use of leftover medications at home to treat the self-diagnosed disease of symptoms [3].

Over-the-counter (OTC) medicines have been defined by the US Food and Drug Authority as "drugs that are effective and safe for use by the general population without seeking treatment by a health professional" [4]. OTC medicines were estimated to be equal to or more than 100,000 drugs in the pharmaceutical markets [5,6].

The use of OTC medicines with no prescription is considered as responsible self-medication, and it is an acceptable practice globally [7]. However, the use of prescribed drugs with no prescription is unsafe self-medication as these drugs can lead to dangerous and severe outcomes [7]. Hence, self-medication is a potentially harmful practice to health [8].

Self-medication and OTC have some advantages such as reducing the number of visits to physicians, saving

Correspondence to: Rubiaan S. Almadi
*Pharmaceutical Care Division MBC 11, King Faisal Specialist Hospital and Research Centre (KFSHRC), Riyadh, Saudi Arabia.
Email: ralmadi@Kfshrc.edu.sa
Full list of author information is available at the end of this article.
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time, and reducing costs; however, the misuse of these drugs may result in several complications and harmful consequences such as overdosing, drug-drug interactions, and side effects that affect the individual negatively [9]. Increased intake of multiple drugs increases the risk of developing adverse drug reactions [10,11].

Older individuals are more prone to resort to self-medication due to their comorbidities. They consume more medications than previously prescribed or OTC for self-medication, and hence the risk of adverse health events increases [12]. The elderly population is more susceptible to Adverse Drug Reactions (ADRs) due to the physiological changes in metabolism associated with aging [13]. The incidence of ADRs is very high among the elderly population [14-17]; however, several events can be prevented with adequate prevention strategies [18]. Moreover, the use of non-prescribed medicines can cause damage to the mental and physical health of the elderly due to the alteration of the process and mechanisms of the medications [18,19]. This systematic review was carried out to investigate the prevalence, pattern, causes, and associated factors of self-medication among the elderly population by reviewing the findings of the previous studies between the years 2015 and 2021.

Method

Search strategy

In this systematic review, we followed the PRISMA checklist guidance for systematic review and meta-analysis [20]. Searching for articles through the electronic databases was carried out to select eligible studies between the years 2015 and 2021. Two databases were involved in the searching process: PubMed and Google Scholar databases.

The searching process involved using several keywords, including a combination of "self-medication and elderly population," "self-medication and prevalence," "self-medication and elders," and "prevalence of self-medication and elders." All the titles and abstracts that resulted from this primary research were revised; then we selected the original articles of related titles that reported the self-medication or factors related to self-medication among the elderly population. The selected papers were then included in the second stage.

Eligibility criteria

The second step was deciding on the inclusion criteria to select the eligible studies included the inclusion of articles written in English, and then the abstracts were assessed manually to determine the relevant papers for revision. The inclusion criteria were cross-sectional, descriptive, and observational studies conducted on the elderly population. The final stage involved gathering information from the eligible articles and summarizing them in a table. Studies with overlapped data, incomplete data, dissatisfying data, and review articles were excluded. Also, unavailable full-text articles or locked articles that were not available online were excluded. The scheme of the search strategy is shown in Figure 1.

Data review and analysis

In this stage, each included article was reviewed, and the data were extracted in an Excel sheet. Chosen data from eligible research articles were then revised via the excel sheet. The combined data was then transferred to a table that summarized the reports under seven specific titles.

Results

This systematic review included eight articles that met the inclusion criteria [13,21-27]. Regarding the study design, three were descriptive cross-sectional studies [13,21,24], four studies were cross-sectional [22,23,25,26], and one was cross-sectional, observational, and descriptive [27]. The aims of the studies included investigating factors affecting self-medication [21,24,27] and assessing the prevalence and pattern of self-medication among the elderly population [13,22,23,25,26]. There was only one study [21] that was conducted recently during the COVID-19 pandemic.

There was only one study that reported the prevalence and pattern of self-medication among the elderly population in 14 European countries [23], whereas 4 studies were reported from Iran [21,24,25,13], and 3 studies were from India [22,26,27].

There were six studies that used questionnaires as the tool for data collection [13,21,22,24-26], whereas the one study that included 14 European countries used micro-data from the European health interview survey [23], and one study used a pre-designed pre-tested data capturing sheet [27]. The least number of patients included was 108 [27], and the highest number was 31,672 [23]. The total number of elders in the included studies was 33,739, with an age ≥60 years [26] and a mean age of 66.2 years [21] and 64 years [13]. There were two studies that did not mention the age of the participants [24,25], and the remaining three studies reported an age of ≥65 years [22,23] and >60 years [27].

The prevalence of self-medication ranged from 100% [22] to 26.3% [23]; there were five studies that reported a high prevalence of more than 50% [21,13,22,25,26], whereas only three studies reported a prevalence less than 30% [23,24,27]. The factors associated with self-medication among the elderly were reported in five studies [13,21,23,24,25]; these factors varied as each study investigated different factors. The major factors reported included education [13,21,23,25], insurance coverage [13,21], gender [23,25,13], younger age [23], marital status [23,25,13], long-standing illness and physical pain [23], and employment status [24].

The drivers for self-medication were reported in six studies [13,21,22,24-26]; the major drivers included prevention of the disease, home quarantine, financial problems, experience, and advice of others [21]; these factors were reported during the COVID-19 pandemic.

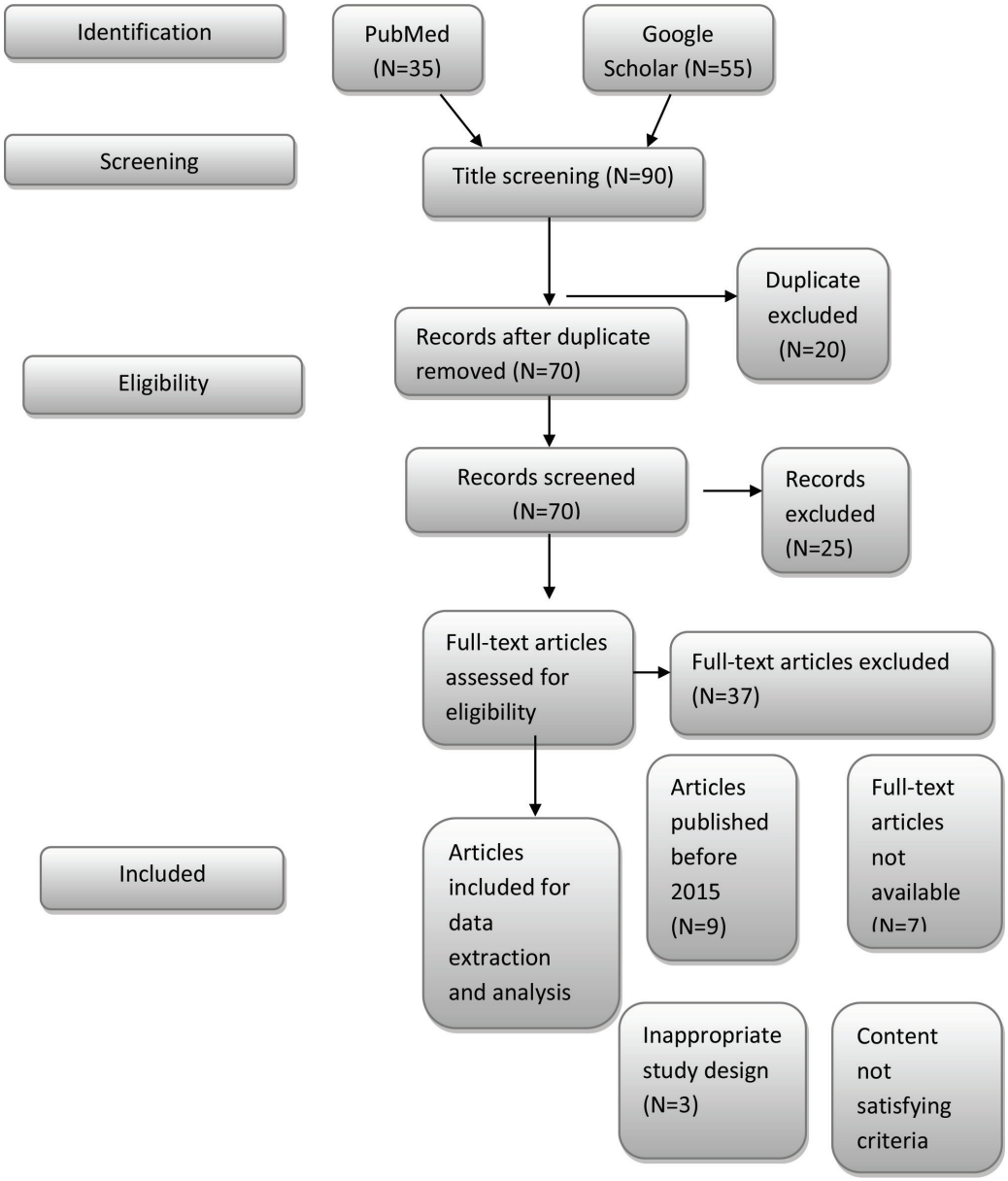

Figure 1. *Planning of the eligible criteria.*

The other factors before the era of COVID-19 included saving time [22], no need to visit the doctor for a minor illness [22,13], previous use of and experience of medication [13,21,22,25], economic and financial problems [22,24-26], difficulties in scheduling a doctor's appointment [24,13], and the certainty of its safety [13].

A few studies reported the causes of self-medication among elderly [22,25,26] and the main causes included fever [22], headache [22,25,10], cough and cold [22,25], abdominal pain, and diabetes [10]. The medications used for self-medications among elderly individuals were reported in six studies [13,27,22,24-26]. The most reported medications were analgesics [13,21,24,25], vitamins [13,21], anti-cold [13,21,24], antibiotics [13,21], anti-histamine [22,25], anti-diabetic [22], antipyretic [22], cardiovascular drugs [24], non-steroidal anti-inflammatory drugs [25], digestive drugs [13], and paracetamol (analgesic) [13].

Discussion

Self-medication is a global phenomenon, and it is more common in developing countries where individuals can buy medication without prescription and with no advice from physicians [3]. This is very obvious in the current systematic review, where among 8 studies included, 1 study [23] was from 14 European countries, whereas the remaining 7 studies were from Iran and India [21,22,24-27]. Moreover, the study from Europe reported the least practice of self-medication among the elderly population, 26.3% [23], whereas, in other studies, the prevalence of

Table 1. *A summary of the reports under seven specific titles*

Author and publication year	Study design	Aim	Country of the study	Method of data collection	Number and age of participants	Results and main findings
Heshmatifar et al. 2021 [21]	Descriptive cross-sectional	To investigate factors affecting the self-consumption of drugs for COVID-19 prevention in the elderly	Iran	Online self-medication questionnaire	-342 elderly -Mean age = 66.2	The frequency of self-medication to prevent COVID-19 was 190 (55.5%). Analgesics, vitamins, anti-cold, and antibiotics were the most common drugs used. The major factors associated with self-medication in the COVID-19 pandemic were disease prevention, home quarantine, financial problems, experiencing previous self-medication, and others' advice. There was a significant relationship between self-medication and education and insurance coverage. No significant relationship was observed between gender, occupation, and marital status and self-medication. Self-medication in the COVID-19 epidemic is notable as a crisis threatening the elderly's health.
George et al. 2020 [22]	Community-based cross-sectional	To analyze the prevalence and pattern of self-medication and the various socio-demographic factors that influence self-medication in elderly patients	India	Modified structured questionnaire	-320 participants -age ≥65 years	Pharmacist (79.30%), self-decision (30.93%), and caretakers (25%) were the most common source for information about self-medication. Antipyretic (58.5%), anti-histamine (34.68%), and anti-diabetic (19.68%) were most commonly used self-medicating drugs. Self-medication was more common for fever (66.25%), headache (54.68%), and cough and cold (38.43%). Time-saving (68.75%), no need to visit doctor for minor illness (61.25 %), previous use of medication (55.93%), and economic (53.43%) were the major reasons for self-medication. Self-medication is widespread among elderly and 100% of elderly people from the study population practiced self-medication without consulting the physician.

Continued

Author and publication year	Study design	Aim	Country of the study	Method of data collection	Number and age of participants	Results and main findings
Brandao et al. 2020 [23]	Cross-sectional	To estimate the prevalence of self-medication among older adults across Europe and to identify its predictive factors.	Europe (14 European countries)	Micro-data from the European Health Interview Survey (2006–2009)	-31,672 community-dwelling individuals - age ≥65 years	The mean self-medication prevalence was 26.3 %. The highest prevalence was in Poland (49.4 %) and the lowest in Spain (7.8 %). Self-medication was greater among women, younger age, divorced, and having a high educational degree. Self-medication possibility also increased with the presence of long-standing illness and physical pain or not using prescribed medication. A wide variation in the odds of self-medication between countries was observed. Self-medication is a prevalent problem among older Europeans; dangers tend to be greater with advancing age.
Dehvan et al. 2019 [24]	Descriptive and analytical cross-sectional	To evaluate self-medication and related factors in the elderly population of Sanandaj, Iran	Iran	Questionnaire of self-medication	-275 elderly individuals	28.5% of the elderly subjects used self-medication in the past 3 months The most commonly used drugs were analgesics (43.1%), cold tablets (26.4%), and cardiovascular drugs (20.8%). The most important causes of self-medication among the elderly population included financial problems and difficulties in scheduling doctor appointments. There was a correlation between being employed and living with the spouse and children with self-medication. There was a high prevalence rate of self-medication among the elderly population.
Shayeste et al. 2018 [25]	Cross-sectional	To determine prevalence and pattern of self-medication among the elderly in Gorgan, Iran	Iran	Questionnaire consisting of 14 questions	-550 elderly subjects	The overall prevalence of self-medication was 76.2% among the elderly people. Analgesics (67.1%) and non-steroidal anti-inflammatory drugs (58.5%) were the most frequently used drugs for self-medication. Moreover, the most common reasons of self-medication were common cold and cough (48%) and headache (38.9%). Self-medication was more frequent in women (82.2%), married elderly (78.2%), and those with low education level (81.3%). Main drivers of self-medication were previous experience with the medication (63.7%) and the high cost of doctor's visit (54.5%).

Continued

Author and publication year	Study design	Aim	Country of the study	Method of data collection	Number and age of participants	Results and main findings
Jafari et al. 2015 [13]	Descriptive cross-sectional	To assess the prevalence of self-medication and its related factors among the elderly in Kermanshah-Iran	Iran	Self-medication questionnaire	-272 elderly subjects - Mean age = 64	The prevalence of self-medication was 83%. The most common drugs used for self-medication were analgesics (92%), cold drugs (74%), vitamins (61%), digestive drugs (54%), and antibiotics (43%). The most common reasons for self-medication were certainty of its safety (93%), prior consumption of the drug (87.6%), busy offices of physicians (82%), non-seriousness of the illness (77.8%), and prior experience of the disease (73%). There was a significant correlation between self-medication and gender, education level, drug information, marital status, and medical insurance
Parmar et al. 2015 [26]	Cross-sectional	To evaluate the prevalence and pattern of use of self-medication among elderly individuals	India	A questionnaire	-200 elderly subjects - age ≥60 years	88.5% reported self-medication in 6-month recall period; 21% reported frequent self-medication. Allopathic medicines (55%), mainly paracetamol (13.5%), were most frequently used, followed by home remedies (23%) and ayurvedic (17%). Most common reasons for self-medication were convenience (69.5%) and cost (56%). None of respondents were aware of risks of self-medication Causes for self-medication included abdominal pain (16%) and headache (14%), which were the most common symptoms, and diabetes (7%). Self-medication is highly prevalent in elderly people who are unaware of the risks involved.
Biswas et al. 2015 [27]	Cross-sectional observational, descriptive	To describe and analyze the demographic and pharmacological characteristics of self-medication trends among a geriatric urban population in a community	India	Predesigned pretested data capturing sheet	-108 elderly individuals -Age >60	[a] 26.86% practiced self-medication. Self-medication trends in elderly are a disturbing problem that needs to be carefully addressed.

self-medication reached 100%, as reported from India [22].

A previous systematic review assessed the prevalence of self-medication among elders, and it included 28 articles from more developed countries such as the US, Brazil, Mexico, Denmark, China, and Australia [28]. It was found that the prevalence of self-medication varied and ranged between 4% and 87%, also reflecting a high prevalence of self-medication among elders even among the elderly population from more developed countries compared to countries included in our study. So, practicing self-medication by elders is a global phenomenon, with high prevalence throughout the whole world. It should be noted that the previous systematic review was published in 2014, so our current work is more recent, and the high prevalence of self-medication still exists.

One systematic review [12] investigated ADRs among elders related to self-medication; the review included only four studies, and it was found that the prevalence of ADRs ranged from 26.7% to 75%. The consequences of self-medication among the elderly population may exacerbate in the current duration during the COVID-19 pandemic. One of our included studies reported self-medication during the COVID-19 pandemic, and more than one-half of the patients reported self-medication for the prevention the viral infection [21]. Elders are known to have low immunity with self-medication during COVID-19; this may exacerbate the consequences of self-medication.

As stated before that self-medication is a global phenomenon; however, the high rate of practicing self-medication seems to be a general phenomenon not restricted to the elderly population only. One study conducted on 344 participants within the age range of 16-26 years and more reported a prevalence of self-medication of 68% [29], and it reached 96% as reported from Egypt [30].

The main drivers for self-medication among elders included economic and financial problems, followed by previous use and experience of medication. The financial problem can be explained by the fact that the studies included in this systematic review were from Iran and India, so a large number of elders may do not have medical insurance and may be too poor to visit the doctor. This suggestion can be confirmed by the findings from China, where only 15% reported that they did not want to buy expensive medicines [31]. Moreover, a study from Egypt revealed that more than one-half of the participants reported that they practiced self-medication to save cost [30]. This problem can be solved by providing medical insurance to the elderly population and provide a free consultation if possible.

Regarding the causes for self-medication, the main cause was a headache, followed by cold; this explains the reason that analgesics, followed by anti-cold, were the majorly used medication among elders in this systematic review. Headache can be considered the master-leading cause for self-medication as several studies reported that headache was the cause for self-medication among the different populations [1,29,30]. Also, analgesics were reported in several studies among different populations to be the major medication used for self-medication [3,28,30,32]. So, the irrational use of analgesics can be a further problem besides the problem of irrational use of antibiotics.

In the current work, we found that female gender, educational level, and marital status were associated with practicing self-medication. However, there was conflict regarding educational level, where one study reported that higher self-medication was associated with high education degree [23], whereas another study reported that self-medication was more common among individuals with lower education [25]. Also, a previous systematic review [28] found that self-medication among elders was positively associated with the female gender.

Conclusion

Self-medication is highly prevalent and highly practiced by the elderly population; this is alarming for taking a quick response as the elderly population is more susceptible to adverse drug reactions. Increasing awareness among elders can be effective due to the self-medication among this population. Self-medication among this population was found to be associated with education, gender, and marital status. The major cause of self-medication among the elderly population was a headache, and the most commonly used medication was analgesics. Another important finding was detecting the major drivers for self-medication among the elderly population, and the major driver was economic and financial problems. However, this can be solved by the medical insurance granted for such population or providing free consultation for such population.

List of Abbreviations

ADRs	Adverse Drug Reactions
COVID-19	Coronavirus disease of 2019
OTC	Over the counter
US	United States

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate

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Ethical approval

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Author details

Rubiaan S. Almadi[1], Khalid A. Aladwani[1], Mohammed N. Alqahtani[1], Ali A. Bin Nouh[1], Khalid H. Alanazi[1]

1. Pharmaceutical Care Division MBC 11, King Faisal Specialist Hospital and Research Centre (KFSHRC), Riyadh, Saudi Arabia

References

1. Pereira Colares KT, Ramos Barbosa FC, Mota Marinho B, Ribeiro Siva RA. Prevalence and factors associated with self-medication in nursing students. J Nurs UFPE. 2019;13:2. https://doi.org/10.5205/1981-8963.2019.239756
2. Alhomoud F, Aljamea Z, Almahasnah R, Alkhalifah K, Basalelah L, Alhomoud FK. Self-medication and self-prescription with antibiotics in the Middle East-do they really happen? A systematic review of the prevalence, possible reasons, and outcomes. Int J Infect Dis. 2017;57:3–12. https://doi.org/10.1016/j.ijid.2017.01.014
3. Mahzari YI, Aldhfyan YM, Aldossary AM, Alghamdi EA, Alsubaie ML, Aldossari MA. Self-medication in Saudi Arabia-a cross-sectional study. Indo Am J Pharm Sci. 2019;6(2):2868–76.
4. U.S. Food and Drug Administration. Drug applications for over-the-counter(OTC)drugs;2015.Availablefrom:https://www.fda.gov/drugs/developmentapprovalprocess/howdrugsaredevelopedandapproved/approvalapplications/over-thecounterdrugs/ default.htm
5. Fakeye TO, Adisa R, Olatunji E. Self medication among hospitalized patients in selected secondary health facilities in south western Nigeria. Pharm Pract. 2010;8(4):233. https://doi.org/10.4321/S1886-36552010000400005
6. Rolita L, Freedman M. Over-the-counter medication use in older adults. J Gerontol Nurs. 2008;34(4):8–17. https://doi.org/10.3928/00989134-20080401-08
7. Aljadhey H, Assiri GA, Mahmoud MA, Al-Aqeel S, Murray M. Self-medication in Central Saudi Arabia: community pharmacy consumers' perspectives. Saudi Med J. 2015;36(3):328. https://doi.org/10.15537/smj.2015.3.10523
8. Silva FM, Goulart FC, Lazarini CA. Characteristics of self-medication practice and associated factors among nursing undergraduate students. Rev Eletrônica Enferm. 2014;16(3):644–51. https://doi.org/10.5216/ree.v16i3.20850
9. Sansgiry SS, Bhansali AH, Bapat SS, Xu Q. Abuse of over-the-counter medicines: a pharmacist's perspective. Integr Pharm Res Pract. 2017;6:1. https://doi.org/10.2147/IPRP.S103494
10. Curry LC, Walker C, Hogstel MO, Burns P. Teaching older adults to self-manage medications: preventing adverse drug reactions. J Gerontol Nurs. 2005;31(4):32–42. https://doi.org/10.3928/0098-9134-20050401-09
11. Golden AG, Preston RA, Barnett SD, Llorente M, Hamdan K, Silverman MA. Inappropriate medication prescribing in homebound older adults. J Am Geriatr Soc. 1999;47(8):948–53. https://doi.org/10.1111/j.1532-5415.1999.tb01289.x
12. Locquet M, Honvo G, Rabenda V, Van Hees T, Petermans J, Reginster JY, et al. Adverse health events related to self-medication practices among elderly: a systematic review. Drugs Aging. 2017;34(5):359–65. https://doi.org/10.1007/s40266-017-0445-y
13. Jafari F, Khatoni A, Rahmani E. Prevalence of self-medication among the elderly in Kermanshah-Iran. Glob J Health Sci. 2015;7:360–5. https://doi.org/10.5539/gjhs.v7n2p360
14. Bayoumi I, Dolovich L, Hutchison B, Holbrook A. Medication-related emergency department visits and hospitalizations among older adults. Can Fam Phys. 2014;60(4):e217–22.
15. Salvi F, Marchetti A, D'Angelo F, Boemi M, Lattanzio F, Cherubini A. Adverse drug events as a cause of hospitalization in older adults. Drug Saf. 2012;35(1):29–45. https://doi.org/10.1007/BF03319101
16. Budnitz DS, Lovegrove MC, Shehab N, Richards CL. Emergency hospitalizations for adverse drug events in older Americans. N Engl J Med. 2011;365(21):2002–12. https://doi.org/10.1056/NEJMsa1103053
17. Pretorius RW, Gataric G, Swedlund SK, Miller JR. Reducing the risk of adverse drug events in older adults. Am Fam Phys. 2013;87(5):331–6.
18. World Health Organization (WHO). The role of the pharmacist in self-care and self-medication. Report of the 4th WHO Consultive Group on the Role of the Pharmacist. Geneva, Switzerland: World Health Organization; 1998.
19. Simons LA, Simons J, Powell I, Tett S, Lauchlan R, McCallum J, et al. Multiple medication use in the elderly: use of prescription and non-prescription drugs in an Australian community setting. Med J Aust. 1992;157(4):242–6. https://doi.org/10.5694/j.1326-5377.1992.tb137127.x
20. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. J Clin Epidemiol. 2009;62(10):e1–34. https://doi.org/10.1016/j.jclinepi.2009.06.006
21. Heshmatifar N, Davarinia Motlagh Quchan A, Mohammadzadeh Tabrizi Z, Moayed L, Moradi S, Rastagi S, et al. Prevalence and factors related to self-medication for COVID-19 prevention in the elderly. Iran J Ageing. 2021;16(1):112–27. https://doi.org/10.32598/sija.16.1.2983.1
22. George ST, Pradeep N, Gupta B. Assessment of self-medication pattern in elderly. Indian J Public Health Res Dev. 2020;11:7
23. Brandão GR, Teixeira L, Araújo L, Paúl C, Ribeiro O. Self-medication in older european adults: prevalence and predictive factors. Arch Gerontol Geriatr. 2020;91:104189. https://doi.org/10.1016/j.archger.2020.104189
24. Dehvan F, Ghorbani M, Gheshlagh RG, Dalvand S, Moradi B, Faramarzi P, et al. Evaluation of self-medication and related factors in elderly population of Sanandaj, Iran. SJNMP. 2019;4(4):46–57.
25. Shayeste Y, Jafari D, Hosseinpour R, Daie S. Prevalence of self-medication among the elderly in Gorgan, North of Iran. J Clin Basic Res. 2018;2(4):1–7. https://doi.org/10.29252/jcbr.2.4.1
26. Parmar Z, Malhotra SD, Patel VJ. Prevalence and pattern of self-medication in elderly individuals. Int J Basic Clin Pharm. 2015;4(6):1095. https://doi.org/10.18203/2319-2003.ijbcp20151338

27. Biswas A, Sen S, Pal A, Das J, Das S, Tripathi SK. Self-medication trend among the urban elderly-a cross-sectional, observational study. Asian J Med Sci. 2015;6(5):66–8. https://doi.org/10.3126/ajms.v6i5.11725

28. Jerez-Roig J, Medeiros LF, Silva VA, Bezerra CL, Cavalcante LA, Piuvezam G, et al. Prevalence of self-medication and associated factors in an elderly population: a systematic review. Drug Aging. 2014;31(12):883–96. https://doi.org/10.1007/s40266-014-0217-x

29. Mekuria AB, Birru EM, Tesfa MT, Geta M, Kifle ZD, Amare T. Prevalence and predictors of self-medication practice among teachers' education training college students in Amhara region, Ethiopia: a cross-sectional study. Front Pharmacol. 2020;11:4. https://doi.org/10.3389/fphar.2020.593764

30. Zeid W, Hamed M, Mansour N, Diab R. Prevalence and associated risk factors of self-medication among patients attending El-Mahsama family practice center, Ismailia, Egypt. Bull Nat Res Cent. 2020;44(1):1–5.

31. Lei X, Jiang H, Liu C, Ferrier A, Mugavin J. Self-medication practice and associated factors among residents in Wuhan, China. Int J Environ Res Public Health. 2018;15(1):68. https://doi.org/10.3390/ijerph15010068

32. AlGhofaili F. Patterns of self-medication in Qassim Province, Saudi Arabia: a cross-sectional study. Ann Med Surg. 2021;64:102207. https://doi.org/10.1016/j.amsu.2021.102207