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Prevalence of self-medication among the elderly: A systematic review and meta-analysis

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Abstract:

BACKGROUND: Self-medication is the use of unprescribed drugs to treat a disease. Elderly self-medication can be more dangerous compared to other age groups because of changes in organ functions that occur due to senescence. This study aimed to estimate the prevalence of self-medication in the elderly, its related factors, and common drugs used in this regard.

MATERIALS AND METHODS: Electronic databases such as PubMed, Scopus, and Web of Science were searched between January 2016 and June 2021. The search strategy was built on two core concepts: “self-medication” and “aged”. The search was limited to original articles in the English language. A random effect model was used to estimate the pooled prevalence of self-medication. Heterogeneity among studies was assessed using both the I^2 statistic and the χ^2 test. Also, a meta-regression model was used to investigate the potential sources of heterogeneity of the studies.

RESULTS: Out of 520 non-duplicate studies, 38 were included in the meta-analysis. Self-medication in the elderly ranged from 0.3% to 82%. The pooled proportion of self-medication was 36% (95% CI: 27%–45%). The result of the χ^2 test and the I^2 index ($P < 0.001$, $I^2 = 99.90\%$) revealed notable heterogeneity among the included studies in the meta-analysis. The meta-regression showed a significant association between the sample size (adjusted $\beta = -0.01$; $P = 0.043$) and the pooled proportion of self-medication.

CONCLUSION: The prevalence of self-medication in the elderly is high. Education through mass media to raise awareness about the dangers of self-medication can help solve this problem.

Keywords:

Elderly, meta-analysis, prevalence, self-medication, systematic review

Introduction

Self-medication is the use of drugs to treat a disease or self-diagnosed symptoms without a doctor’s prescription.^[1] There are different definitions for self-medication, including using an unprescribed drug, recharging the previously prescribed drug, prescribing a drug for friends and relatives, taking medications remaining from previous prescriptions, and changing the dose of medications.^[2–5] Self-medication may include the use of industrial, traditional, and home remedies and supplements.^[6] The

prevalence of self-medication varies in different populations and countries: It has been estimated at 22% in Spain,^[7] 53% in Mexico,^[8] 50% in India,^[9] 60% in China,^[10] 60%–90% in Nigraya,^[11] and 41% in Iran.^[12] Although self-medication contributes to the reduction of the economic burden on patients, healthcare systems, government agencies, and insurance companies,^[13] its consequences cannot be overlooked since inappropriate use of medications through self-medication may cause important complications, such as bacterial resistance, drug interactions, severe side effects,

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increased fatal disease and malignancy, drug dependence, intentional and unintentional poisoning, and even death, as well as wasting resources, delay in treatment, and undesirable health outcomes.^[14-17] Various studies have shown that self-medication is influenced by several factors, including age, sex, education level, marital status, socioeconomic status, health insurance coverage, place of residence, and availability of medications for individuals.^[18]

Self-medication may occur at any age; however, special attention should be paid to the elderly, who are the most frequent practitioners of self-medication.^[19,20] One reason for the overconsumption of drugs in the elderly is the higher risk of getting many diseases at older age. The elderly suffer from diseases such as diabetes, cardiovascular disease, and cancer. Also, chronic comorbidities are common in this age group which can lead to an increase in drug use.^[20,21] The attitude of the elderly toward diseases, treatment and physicians, unfriendly treatment environment, inefficient health system, and peer influence are among the reported factors associated with self-medication in the elderly.^[1] On the other hand, different pharmacodynamics and pharmacokinetics make drug-related issues more complicated in the elderly compared to other age groups.^[20] Therefore, self-medication is an important health issue among the elderly and requires special attention to detect all forms of self-medication in the elderly, especially in developing countries. This way, healthcare providers can reduce the harmful effects of self-medication.^[1] Nevertheless, there is no comprehensive review showing the self-medication trends and practices in this group. Knowing the overall status of self-medication is necessary to design appropriate educational, regulatory, and administrative measures to reduce the health risks of self-medication.^[22] Therefore, there is a need for evidence on elderly self-medication to help design and implement strategies and interventions to prevent the elderly's irrational use of drugs and consequently to reduce its health risks. This systematic review and meta-analysis was conducted to investigate the prevalence of self-medication in the elderly, its related factors, and common drugs used in this regard.

Materials and Methods

This systematic review and meta-analysis was reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.^[23]

Study design and search strategy

A comprehensive search of three electronic databases (PubMed, Scopus, and Web of Science) was carried out in June 2021. The search strategy was built on two core concepts: "self-medication" and "aged". The search was limited to five years (between January 2016 and June 2021) and original articles in the English language. Table 1 displays the steps for formulating the search query for the PubMed database. The syntax was then customized to the other two databases.

Selection criteria

English, observational studies were included in the review if they provided the frequency or prevalence of self-medication in the elderly (age ≥ 60 years). Case reports with a sample size of one were removed from the meta-analysis. Unrelated studies, interventional studies, duplicate studies, studies with an unclear method, and those with no access to the full text were excluded.

Data collection

Articles were imported into the EndNote reference management software. After the removal of duplicate records, papers were screened at the title and abstract level by two independent researchers (TB and GZ) to reduce bias. Also, in case of disagreement over a study, the head of the group (FR) made the final decision whether to include that study. Records of potentially relevant articles were reviewed for eligibility assessment.

Data extraction

Two authors (SA and ND) were independently responsible for extracting the data from the selected articles and possible disputes were resolved through discussion or judgment by the senior author (FR). Data were extracted using a predefined checklist consisting of the following information: first author name, year of publication, country, study design (e.g., cross-sectional, case series), sample size, sex proportions in the sample, mean age or age range, education, the prevalence of self-medication, period of self-medication, type of non-prescription drugs, and the reason for self-medication.

Quality assessment

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used to assess the risk of bias in the retrieved studies as follows: (a) explanation of the scientific background; (b) presentation of the study design; (c) the eligibility criteria; (d) the sources and methods of participant selection; (e)

Table 1: PubMed search query

Concept	Search strategy in Pubmed
Self-medication	"Self-medication"[Mesh] OR "Self-medication**"[Title/Abstract] OR "Self-treatment"[Title/Abstract] OR "self-curing"[Title/Abstract]
Aged	"Aged"[Mesh] OR "Elderly"[Title/Abstract] OR "Old"[Title/Abstract] OR "Senile"[Title/Abstract] OR "senescent"[Title/Abstract]

description of the location and relevant dates including duration of self-medication; (f) clear definition of the outcome; (g) report of the number of outcomes; and (h) explanation of how the sample size was arrived at. The studies were categorized into having a low risk of bias if they reported all the items, a moderate risk of bias if they reported all of the items except one, and a high risk of bias otherwise.^[24] Two reviewers (SR and FR) assessed the quality of the included studies independently. The value of weighted kappa indicated the proper agreement between the two reviewers (weighted kappa, 86%). All studies with low, middle, and high quality were included in the main analysis.

Definition of self-medication

Self-medication was defined as the use of over-the-counter (OTC) medication, reuse of previously prescribed medication with no healthcare professional supervision, and the use of non-prescription medication (both herbal and synthetic drugs).^[6]

Data analysis

To conduct meta-analysis and calculate the pooled point estimate and 95% CI of self-medication prevalence, the random effect model was performed using the metaprop command in Stata (v. 15.1). Heterogeneity between the studies was assessed using both the I^2 statistics with a cutoff of 50% and the χ^2 test. To investigate the potential sources of heterogeneity, a meta-regression model using Stata's metareg command was applied based on sample size, year of study, research quality, location of research, and duration of self-medication. A two-sided P value < 0.05 was regarded as statistically significant.

Results

Included Studies

A systematic review of articles between 2016 and 2021 was conducted. Based on the search strategy, first, a total of 803 articles were retrieved from three databases. Two hundred eighty-three duplicates among the databases were excluded. Then, the abstract and title of 520 articles were screened based on the inclusion criteria. This time, 514 articles remained for the next step of investigation. Afterwards, the full texts of 214 articles were evaluated. Finally, 44 related articles were included in the qualitative synthesis, out of which 6 were case reports and were not included, while 38 cross-sectional studies were included in the meta-analysis. The process of article selection is shown in Figure 1.

Characteristics of studies

The characteristics of the included studies are listed in Table 2. The reported duration for self-medication prevalence varied between the moment of the study^[25-37] and two years^[38] in the cross-sectional studies and

about two decades in a case report.^[39] Except for 6 case reports that reported self-medication in the elderly, 17 cross-sectional studies included only individuals above 60 years old,^[26,27,29-31,36,38,40-49] and others considered both the young and the elderly. Of the 38 cross-sectional studies, 37 included women and men, and 1 considered only men.^[50] Sample sizes ranged from 1 in case reports to 31,672 in a study on the elderly in 14 European countries.^[45] Of the 44 selected studies, the majority were carried out in the Americas: 7 in USA,^[38,44,51-56] 11 in Brazil,^[26,27,30,34,40,47,50,57-61] and 2 in Peru.^[28,37] Twelve studies were conducted in Asia.^[29,35,36,39,41-43,48,62-65] The remaining were carried out in Europe^[25,31-33,46,66,67] and Africa.^[49,68,69]

Data collection method in one study was observation,^[32] in one study interview and observation,^[29] in 15 studies interview,^[26,27,30,34,42,44-46,49,57-59,63,69] in 21 studies questionnaire,^[25,28,31,33,36-38,40,41,43,47,48,50,53,58,60,64-68] and in 2 studies hospital database without mentioning the data collection method.^[51,64] Of the 38 studies, 8 were categorized as having a low risk of bias, 29 a moderate risk of bias, and one a high risk of bias [Table 2].

Information on self-medication (self-medication prevalence, self-medication duration, drug type, and the reason for self-medication) of the studies included in the systematic review are presented in Table 3. The prevalence of self-medication ranged from 0.3%^[52,70] to 82%,^[62] with a mean prevalence of 36.4% across all studies. The results on reasons for self-medication in older adults could not be systematically retrieved because they were only reported in two studies.^[29,36] Only 9 studies reported some information about the name and type of drugs that the elderly had used;^[26,27,29,31,38,40,44,45,67] the most self-medicated drugs were analgesics,^[26,27,29,31,40,42,44,59] non-steroidal anti-inflammatory drugs (NSAIDs),^[26,27,29,40,59] vitamins,^[26,27,40,42,45] oral glucose-lowering agents,^[29,40,42,59] and lipid-modifying agents.^[26,29,40,59]

Finally, in the 38 studies included in the meta-analysis, the pooled proportion of self-medication was 36% (95% CI: 27%, 45%). The result of the χ^2 test and the I^2 index ($P < 0.001$, $I^2 = 99.90\%$) revealed notable heterogeneity among the included studies in the meta-analysis [Figure 2]. The weights in Figure 2 are from the random-effect analysis.

The multivariate meta-regression model showed a significant association between the sample size (adjusted $\beta = -0.01$; P value = 0.043) and the pooled proportion of self-medication, while there was no significant association between the year of publication (adjusted $\beta = -0.001$; P value = 0.984) and the pooled proportion of self-medication. In addition, there were no significant differences between the pooled proportion of self-medication and place of research (the Americas

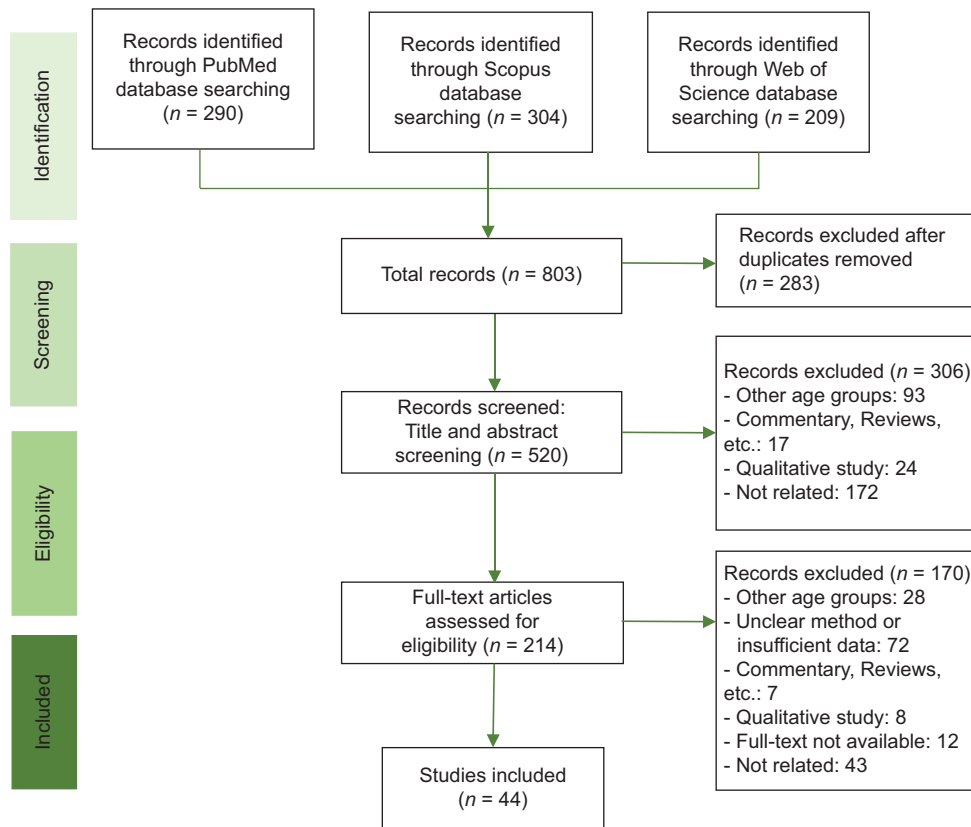


Figure 1: PRISMA flowchart

vs others, adjusted $\beta = 0.098$; P value = 0.268), research quality (adjusted $\beta = 0.075$; P value = 0.477), or duration of self-medication (adjusted $\beta = -0.107$; P value = 0.261).

Discussion

In this systematic review, a total of 38 studies were analyzed, the majority of whom were from the Americas. Elderly self-medication varied from 0.3% to 82%, which can be due to differences in the study populations, the data collection method, and various definitions of self-medication. Among these studies, the highest prevalence of self-medication was reported in a study that included both self-medication and OTC drugs, potentially accounting for the increased prevalence of self-medication. Despite agreement on the significance of self-medication, there is no standard definition that can be internationally applied.^[13]

Also, there was no consensus on the self-medication prevalence period. The period of considered time ranged from “at the moment of study” to “2 years” before the study”. The most common period was about 2 weeks, which appears to be appropriate for self-medication studies in the elderly because a longer period may be associated with recall bias. It is suggested that future research assessing self-medication in the elderly standardize their methods, especially in terms

of the length of prevalence period and self-medication definition. Jerez-Roig *et al.*^[71] recommended the following criteria for research on self-medication in the elderly: consumption of at least one drug without professional prescription (according to the laws and regulations of each country), a 14-day recall period, and considering all types of medications, including vitamins, supplements, and alternative medicine.

Based on our results, most self-medicated drugs were analgesics, NSAIDs, vitamins, and oral drugs for diabetes and hyperlipidemia. These results suggest that there is access to a variety of drugs for the elderly without a professional prescription, which can be a potential health hazard for this age group. Similar to our results, a systematic review^[72] on adolescents revealed that analgesics are the most self-medicated drugs.

The mean prevalence of elderly self-medication was 36%, indicating that a significant proportion of the elderly self-medicate. It can cause serious health-related risks for the elderly who are polymedicated.^[45] Besides, elderly people experience several age-related organ function alterations that could affect the absorption, distribution, metabolism, and elimination of drugs.^[20] The high prevalence of self-medication in older adults can mask the symptoms of a serious illness, which in turn can lead to severe complications, a heavy financial burden, or the

Table 2: Summary of the results of the included studies in the systematic review

First author	Year of publication	Country	Study type	Sample size	Age range	Female proportion	Education*	Research quality
Tajvar ^[41]	2021	Iran	CS	8205	≥ 60	0.467	0.600	High
Muniz ^[60]	2021	Brazil	CR	1	72	1.00	NR	Moderate
Moreira ^[57]	2020	Brazil	CS	144	≥ 65	0.653	0.800	High
Xu ^[43]	2020	China	CS	330	≥ 60	0.527	0.433	High
Siddiqui ^[51]	2020	USA	CS	24151	> 65	male-female	NR	Moderate
Tiguman ^[58]	2020	Brazil	CS	586	≥ 60	male-female	NR	Moderate
Brandão ^[45]	2020	14 European countries	CS	31672	≥ 65	0.604	0.454	High
Eugenia ^[38]	2020	USA, Arizona	CS	190	> 65	0.705	NR	Moderate
Gao ^[48]	2020	China	CS	4366	≥ 60	0.634	0.748	Moderate
Komlanvi ^[49]	2020	Togo	CS	370	≥ 60	0.549	NR	Moderate
Paula ^[61]	2020	Brazil	CR	1	64	1.00	NR	Moderate
Secolji ^[27]	2019	Brazil	CS	2122	≥ 60	male-female	NR	Moderate
Pastor ^[28]	2019	Peru	CS	424	≥ 60	male-female	NR	Moderate
Verulava ^[42]	2019	Georgia	CS	700	≥ 60	0.564	NR	Moderate
da Costa ^[30]	2019	Brazil	CS	143	> 60	0.343	NR	Low
Makarewicz ^[31]	2019	Poland	CS	72	> 65	0.470	NR	Moderate
Hernández ^[37]	2018	Peru	CS	395	≥ 60	male-female	NR	Moderate
Nikolić ^[25]	2018	Serbia	CS	17	≥ 60	male-female	NR	Moderate
Oliveira ^[26]	2018	Brazil	CS	170	≥ 60	0.859	NR	Moderate
Tachi ^[64]	2018	Japan	CS	3820	≥ 65	male-female	NR	Moderate
Tripković ^[66]	2018	Serbia	CS	2968	≥ 65	male-female	NR	Moderate
Wang ^[65]	2018	China	CS	618	> 60	male-female	NR	Moderate
Asiri ^[29]	2018	Iran	CS	381	> 60	male-female	NR	Moderate
Carmona-Torres ^[46]	2018	Spain	CS	26277	> 65	0.620	NR	Moderate
Mehuys ^[32]	2018	Belgium	CS	260	≥ 70	male-female	NR	Moderate
Heidari ^[36]	2018	Iran	CS	300	≥ 60	0.637	0.640	High
Horumpende ^[69]	2018	Tanzania	CS	10	> 60	male-female	0.800	Moderate
Naing ^[63]	2017	Myanmar	CS	81	> 60	male-female	NR	Moderate
Santos ^[40]	2017	Brazil	CS	783	≥ 60	0.621	NR	Moderate
Abraham ^[44]	2017	USA	CS	116	≥ 60	0.650	0.00	High
Costa ^[59]	2017	Brazil	CS	1087	> 65	0.639	0.861	High
Kajeguka ^[68]	2017	Tanzania	CS	22	≥ 60	male-female	NR	Moderate
Lutz ^[47]	2017	Brazil	CS	1446	≥ 60	0.630	0.367	Moderate
Monteiro ^[33]	2017	Portugal	CS	28	≥ 65	male-female	NR	Moderate
Pons ^[34]	2017	Brazil	CS	21556	≥ 60	male-female	NR	Moderate
Gangavalli ^[53]	2017	USA	CS	32	≥ 70	male-female	NR	Moderate
Gupta ^[65]	2017	India	CS	821	≥ 60	male-female	NR	Moderate
Andreoli ^[54]	2017	USA	CR	1	72	0.00	NR	Moderate
Laskey ^[56]	2017	USA, Hartford	CR	1	86	0.00	NR	Moderate
Nagarajaiah ^[62]	2016	India	CS	1612	> 60	male-female	NR	Moderate
Volmer ^[67]	2016	Estonia	CS	323	> 60	male-female	NR	Moderate
Prado ^[50]	2016	Brazil	CS	80	≥ 60	0.00	NR	Moderate
Smiley ^[52]	2016	USA	CR	1	73	0.00	NR	Low
Kumar ^[39]	2016	Oman, Muscat	CR	1	70	0.00	NR	Moderate

*The proportion of illiterate and literate people; Abbreviation: CS=Cross section, CR=case report, NR=not reported

loss of life. In addition, inappropriate drugs, improper dosage, incorrect dose intervals, unawareness of the precautions or contraindications, and related conditions can lead to drug interactions, drug poisoning, and drug abuse.^[62] It is recommended that therapists take the history of self-medication when prescribing medication to the elderly to prevent drug interactions. The prevalence of self-medication in this meta-analysis is comparable with other systematic reviews on self-medication prevalence

in Brazilian adults (35%)^[73] and low and middle-income countries (38.8%),^[74] but it is lower than the reported results of another systematic review in Ethiopia (44%).^[75]

Limitation and Recommendation

To date, no study has meta-analyzed the prevalence of self-medication among the elderly. However, this study had some limitations. First, only studies

Table 3: Information on self-medication in the included studies in the systematic review

First author	Self-medication prevalence	Self-medication period	Drug type	Self-medication reason
Tajvar ^[41]	0.280	2 W	-	-
Muniz ^[60]	1.00	2M	Natural medicine	To improve immunological system
Moreira ^[57]	0.319	2 W	Diuretics, angiotensin II antagonist, lipid modified agents	Having the medicine at home, previous use of medicine
Xu ^[43]	0.352	2 W	-	-
Siddiqui ^[51]	0.003	NR	-	-
Tiguman ^[58]	0.003	1 Y	Antibiotics	-
Brandão ^[45]	0.263	2 W	Vitamins, minerals	-
Eugenia ^[38]	0.064	2 Y	Antibiotic	Antibiotics left over from previous prescriptions; convenience, confidence in self-diagnosis; cost
Gao ^[48]	0.799	2 W	-	-
Komlanvi ^[49]	0.673	1 W	-	-
Paula ^[61]	1.00	6 M	Vitamins	-
Secolji ^[27]	0.328	AMS	Analgesics, anti-inflammatories, vitamins	-
Pastor ^[28]	0.665	AMS	Antibiotics, NSAIDs, gastrointestinal drugs, analgesics/antipyretics/Corticoids, antihistamines/respiratory pathologies, supplement, cardiac pathologies, antiparasitic/antiviral/antimycotic, metabolic disorders, neurological drugs	-
Verulava ^[42]	0.370	4 M	Cardiovascular, analgesic, anti-inflammatory, vitamins, mineral supplements, central nervous system, hypoglycemic agents	-
da Costa ^[30]	0.636	NR	-	-
Makarewicz ^[31]	0.500	AMS	Plant-derived products, analgesics, dietary supplements, homeopathic preparations	-
Hernández ^[37]	0.429	AMS	-	Long wait for doctor visit, mild pains, previous use
Nikolić ^[25]	0.529	AMS	Herbal products	-
Oliveira ^[26]	0.805	2 W	Central-acting muscle relaxants, NSAID, antirheumatic agents, analgesics and antipyretics, psychostimulants, antivertigo preparations, opioids, antacids, drugs for peptic ulcer and gastroesophageal reflux disease, drugs for constipation, multivitamins, mineral supplements, antispasmodics in combination with analgesics, antihistamines, antithrombotic agents, lipid modifying agents, diuretics, thiazides, potassium-sparing agents, ACEIs, topical antibiotic, corticoids, other antibacterial agents, antimycotics, genitourinary system and sex hormones, systemic corticoids	-
Tachi ^[64]	0.027	6 M	Nutrient drinks, gastrointestinal drugs, cold medicines	-
Tripković ^[66]	0.203	2 W	Analgesics, tranquilizers, sleeping pills, antibiotics, digestive Laxatives	-
Wang ^[65]	0.807	1 Y	-	Experienced know how to treat, Mild disease, Hospitals are too expensive, cumbersome and far away, time-saving
Asiri ^[29]	0.357	AMS	Anti-hyperlipidemia, NSAID, cardiovascular, supplements, anti-hypertensive, analgesics, anti-diabetes.	Previous use of the drug, minor symptoms; recommendation of non-specialists; pharmacy recommendation; ensuring drug safety, time-saving, lack of affording, distrust in

Contd...

Table 3: Contd...

First author	Self-medication prevalence	Self-medication period	Drug type	Self-medication reason
Carmona-Torres ^[46]	0.100	2 W	-	doctors, belief in traditional medicine
Mehuys ^[32]	0.620	AMS	Paracetamol, ASA, oral NSAIDs, analgesics, opioids, triptans, ergots, relaxants, anti-epileptics, antidepressants	-
Heidari ^[36]	0.760	No time limitation	-	Insisting family, physician unavailability, lack of affording, mild illness, previous experience, time-saving, lack of health insurance
Horumpende ^[69]	0.400	28D	Antibiotics, antiprotozoa	Emergency illness, close to pharmacy, health facility charges
Naing ^[63]	0.222	2 W	-	-
Santos ^[40]	0.357	4 M	Antihypertensives, diuretics, anti-arrhythmic, analgesics, relaxants and NSAIDs, oral glucose-lowerings, antidepressants SSRIS, vitamins, nutrients, anti-anemics and appetite stimulants, cardiotonics, anticonvulsants, lipid-lowerings, thyroid hormones, anti-ulcerative drugs, antibacterial, anti-asthma, antipsychotics, oral anticoagulants, anti-anxiety drugs, bone resorption inhibitors, hormones, ophthalmic products, insulin, antiplatelet aggregation agents, antihistamines, antineoplastic drugs.	-
Abraham ^[44]	0.560	1 Y	Antihistamine, Melatonin, Analgesic	-
Costa ^[59]	0.278	30 D	Analgesics and antipyretics, oral hypoglycemic medicines, NSAIDs, ACEIs, antidepressants, hypolipidemic agents, medicines for peptic ulcer and gastroesophageal reflux disease, beta-blockers, diuretics, antiepileptics, muscle relaxants, antithrombotic agents, thyroid preparations, anxiolytics medicines, iron preparations, calcium channel selective blockers, beta-lactams antibacterials, penicillins.	Previous use, having it at home, Knows someone who has already used it, easy access to the medicine
Kajeguka ^[68]	0.636	12 M	Antibiotic and antimalarial	Emergency illness, time-saving, proximity to the pharmacy, distance to the health facility, cost,
Lutz ^[47]	0.64	15 D	-	-
Monteiro ^[33]	0.393	AMS	NSAID	-
Pons ^[34]	0.092	15 D	-	-
Gangavalli ^[53]	0.094	6 W	Opioids, analgesic	Insufficient prescription
Gupta ^[35]	0.217	AMS	Eye drugs	-
Andreoli ^[54]	1.00	10 Y	Antidiuretic	-
Laskey ^[56]	1.00	2 W	Natural medicine	-
Nagarajaiah ^[62]	0.823	6 M	OTC drugs	Nonavailability of doctors, cost, time-saving
Volmer ^[67]	0.114	2 M	-	-
Prado ^[50]	0.043	3 D	Analgesics and anti-inflammatories	-
Smiley ^[52]	1.00	NR	Herbal therapies	-
Kumar ^[39]	1.00	20 Y	Steroids	-

*W=weak, D=day, AMS=at the moment of study, NR=not reported, OTC=over the counter

published in English were included in the meta-analysis, which can be considered a source of bias. Variability of reports and method of implementation in the studies, not including unpublished studies, reviewing only cross-sectional studies, and unavailability of the full text of some articles were other limitations.

Conclusions

Elderly self-medication ranged from 0.3% to 82%, which may be affected by several factors such as the socio-cultural differences of the study populations and the method of studies. Based on the results

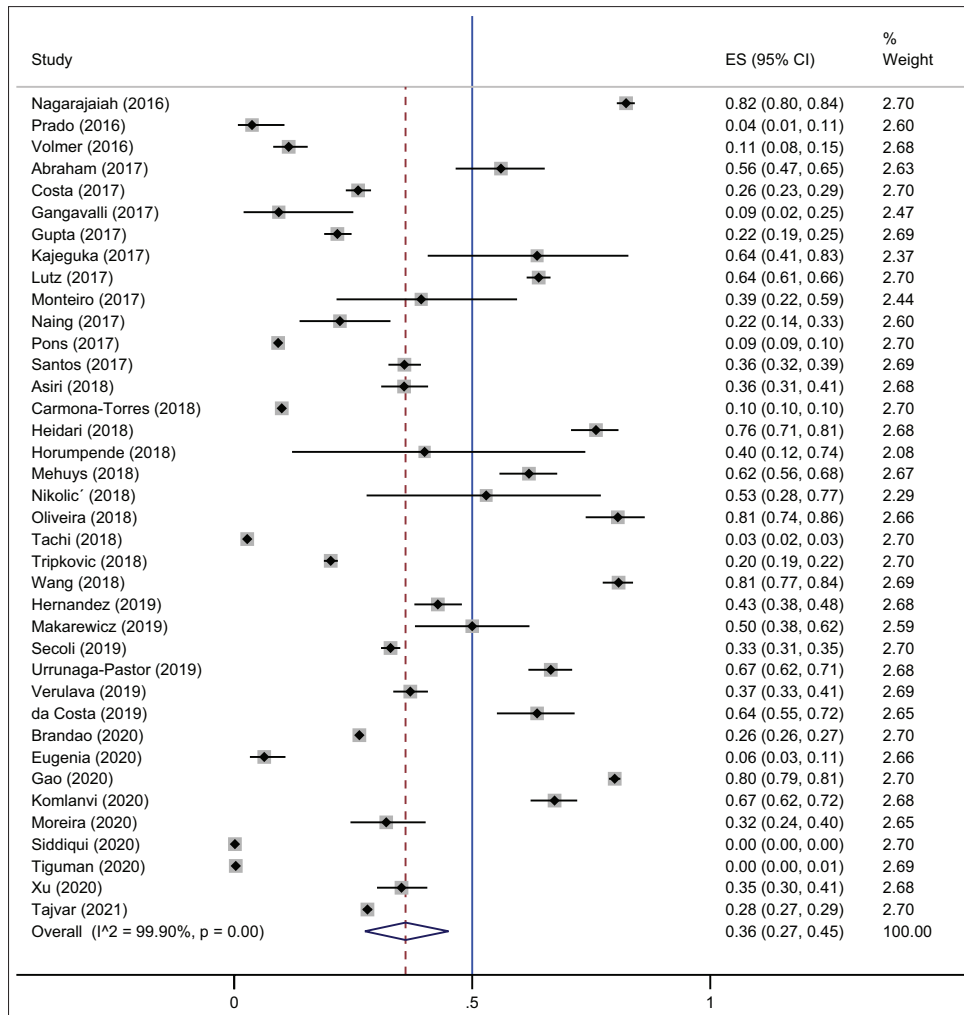


Figure 2: Forest plot of the pooled proportion of self-medication

of the current study, the pooled proportion of self-medication was 36%, which is relatively high and could cause health problems in this population. Therefore, healthcare workers should provide the necessary training to the elderly about the risks of self-medication. It is suggested that future studies use a standard methodology.

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Ethical considerations

This study was approved by the Ethics Committee of Jiroft University of Medical Sciences, Jiroft, Iran (code: IR.JMU.REC.1400.004).

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Conflicts of interest

There are no conflict of interest.

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