

SYSTEMATIC REVIEW

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Prevalence and causes of self-medication for oral health problems: a systematic review and meta-analysis

Katayoun Katebi¹, Hosein Eslami¹ and Saba Jabbari^{1*}

Abstract

Introduction Self-medication, particularly for oral and dental health problems, stands as a significant health and social concern. Therefore, the current systematic review and meta-analysis study was conducted to evaluate the prevalence and underlying causes of self-medication for oral and dental health problems.

Method Articles published until August 30, 2023, were searched in Scopus, PubMed, and Web of Science databases. A manual search was also done in Google Scholar, references, citations, and Gray literature. The screening of articles was done independently by two members of the research team. The quality of reporting in the articles was evaluated using the JBI Critical Appraisal Checklist For Analytical Cross-Sectional Studies. Meta-analysis was performed using the fixed effects model in Stata software (StataCorp, version 16).

Results The results of 37 studies involving 12,110 participants with a mean age of 32 years and 48% male were analyzed. Most of the studies were conducted in low- and middle-income countries. The overall prevalence of self-medication was estimated at 59% [95%CI: 55–63%], with 58% [95% CI: 53–63%] among dental patients, and 60% [95% CI: 52–67%] in the general public. Analgesics (60%) and antibiotics (19%) were the most commonly used drug categories. In terms of the mean proportion, having previous experience, unbearable pain, and lack of time had the highest percentages, and in terms of the number of repetitions among the reviewed articles, economic problems, lack of time, and limited access were the most repeated reasons. The most significant related factors in self-treatment were female gender, higher education, and occupation. Pharmacies were the primary source of self-treatment medications.

Conclusion The results showed a very high prevalence of self-medication for oral health problems, necessitating prompt and effective interventions. It is recommended to focus on regulating the consumption of analgesics and antibiotics, addressing financial issues, and overseeing the pharmacy operations.

Keywords Prevalence, Self-treatment, Oral health, Meta-analysis

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Introduction

The use of various forms of medications has been recognized as one of the tools in fighting the disease [1]. However, excessive drug use and self-medication are considered one of the biggest social, health, and economic challenges across many societies. Studies show a discrepancy between drug prescriptions and the actual needs of the population, often attributed to self-medication practices [2]. The World Health Organization has defined self-medication as the choosing and consumption of medications without a medical prescription to manage a disease or reduce symptoms. The reuse of previously prescribed medications for similar signs and symptoms is also included in this definition [3]. In some cases, self-treatment may exacerbate or mask symptoms, change the results of diagnostic tests, and delay patients seeking professional care [4, 5]. Also, inappropriate or incomplete use of medicines can affect the health of society as well as the individuals, including numerous adverse effects and allergic reactions. Self-treatment in infectious diseases can also increase antibiotic resistance and complicate the issue [4, 6, 7].

Dentistry is one of the fields of medicine where the prevalence of self-medication is notably high leading to adverse consequences. According to the studies, the prevalence of self-treatment for oral and dental health problems is very high [8–12]. The results of the study by Khazir et al., which was conducted in India in 2022, showed that among 500 adults who were referred for dental care, 445 had a self-treatment experience with analgesics being the most frequently used medicine [13]. Similarly, the results of a study by Idowu et al. (2019) in Nigeria showed that self-medication was 41.5% among adults visiting outpatient dental clinics [14]. Considering the high frequency of self-medication and its risks, urgent measures are warranted to mitigate its impact. One of the main requirements in this field is to have accurate and reliable information on the prevalence, causes, and other dimensions of self-treatment for oral and dental health problems. While recent years have seen a surge in studies on this topic, many have been limited by small-scale settings and sample sizes, hindering their ability to offer robust insights for decision-makers. Therefore, a systematic review and meta-analysis are crucial to consolidate and present a comprehensive overview of the current landscape, aiding informed decision-making and strategic planning in addressing self-medication in oral health effectively.

Method

This study is a systematic review and meta-analysis conducted in 2023 to estimate the prevalence, causes, and other aspects of self-treatment for oral and dental health

problems. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used for reporting [15].

Research question

The research question was formulated using the JBI approach for systematic reviews and meta-analyses of prevalence studies.

Population

The population included all groups except for special patients (such as diabetics or children with special disorders), divided into two categories: general population and dental patients.

Context

All countries.

Condition

The prevalence, causes, and other aspects of self-treatment for oral and dental health problems.

Search strategy

An experienced librarian, guided by a subject expert, developed and implemented the search strategy in Scopus, PubMed, and Web of Science databases (Appendix 1 - Search strategy). Articles published until August 30, 2023, were searched using related free and MeSH terms. Manual searches were conducted in reputable journals and Google Scholar to identify more published articles. Reference, citation, and gray literature checks were also performed to increase the confidence in identifying and reviewing existing articles.

Inclusion and exclusion criteria

Inclusion criteria: All studies published in English that reported the prevalence, causes, and other aspects of self-treatment for oral health problems.

Exclusion criteria:

- Studies that focused on only one specific drug, such as antibiotics.
- Studies that did not specifically examine the topic of self-treatment for oral health problems.
- Studies and reports lacking full text or not being able to access their full text.
- Articles whose target group was specific patients (diabetes, cancer).
- Studies presented at conferences.

Selection/screening of studies

All stages of selection and screening of articles were conducted independently by two members of the research

team. First, the titles of all articles were reviewed and the articles that were not compatible with the objectives of the study were excluded. The disputed cases were resolved by discussion, and if necessary, referred to a third researcher. In the next steps, the abstract and the full text of the articles were studied to identify and discard the articles with exclusion criteria or irrelevant to the study objectives. Endnote X5 resource management software was used for organizing, reading titles and abstracts, and identifying duplicates. PRISMA flowchart was used to report the results of the selection and screening process.

Assessing the reporting quality of articles

The reporting quality of all articles was evaluated independently by two evaluators using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross-Sectional Studies. The evaluation tool, adapted for this study, included seven questions, excluding question three (Was the exposure measured in a valid and reliable way?), which was not applicable. This tool includes Yes, No, Unclear, and Not applicable options. Articles were scored between 0 and 7 based on the number of “yes” responses. According to the study design (cross-sectional studies), no article was excluded from the study due to the quality assessment score. The final evaluation score for each article was given by agreement between two evaluators and disagreements between evaluators were referred to a third evaluator.

Data extraction

A data extraction form was designed manually in Microsoft Word 2013, including information such as author, year, country, participants, sample size, mean age, male percentage, prevalence of self-medication (%), drug groups, significant associated factors, causes of self-medication, and most common drug sources. First, the data from five articles were extracted for these forms, and the deficiencies and problems in the initial form were resolved. The information was extracted by two researchers independently, and ambiguous cases were resolved by consulting the third member.

Data analysis

Meta-analysis using the fixed effects model was performed to estimate the prevalence of self-medication, with Stata software (StataCorp, version 16). Forest plots were used to report the results, where the size of each square represents the sample size, and the lines drawn on each side of the square represent the 95% confidence interval for each study. The I^2 index was used to measure the heterogeneity, with I^2 less than 50% considered low, I^2 between 50 and 74 medium, and above 75% high heterogeneity [16].

Meta-regression was performed based on mean age (years) and percentage of men. Subgroup analysis was performed based on the participants. Meta-regression was conducted based on the mean age and percentage of men, and subgroup analysis was performed based on participants. Funnel plots, Galbraith diagrams, and Egger's regression test at a significance level of 0.1% were used to assess publication bias [17]. Since the probability of publication bias was low, the Trim and Fill test was not used. Other information was summarized and reported using descriptive statistics (mean, percentage, and frequency) in Microsoft Excel 2010 software, which was also used for graph creation.

Results

A total of 423 studies were extracted by searching the databases. After removing duplicate articles using Endnote software, 314 articles entered the screening stage. In this phase, 240 articles were excluded since they were not relevant, and the full text of 3 articles was not accessible. In the second phase of screening, the researchers reviewed the full text of the remaining articles. After reviewing the full text of the articles, 34 other articles were excluded from the study due to being unrelated and not meeting the inclusion criteria, and finally, 37 articles were included in the study [9–11, 13, 14, 18–49] (Fig. 1).

Study characteristics

The reviewed studies were conducted in 13 different countries, with India having the largest number of studies with 16 studies. Articles were published between 2011 and 2023, with a median publication year of 2018. The total sample size across the 37 articles was 12,110. Dental patients were the focus of 28 studies, while the general public was studied in nine. Participants had an average age of 32.2 years, with 48% being male. Most studies (86.5%) were conducted in middle- and low-income countries (Appendix 2 - Data extraction table).

Prevalence of self-medication for oral health problems

Based on the results of the meta-analysis, the prevalence of self-medication was estimated to be 59% [55–63% with 95% CI] in total. This rate was 58% [53–63% with 95% CI] for dental patients and 60% [67–52% with 95% CI] for the general public (Fig. 2). Cumulative analysis by publication year showed a slight decreasing trend in self-medication prevalence, though not statistically significant (Appendix 3 - Cumulative Forest plot chart). Heterogeneity testing indicated relatively low heterogeneity in study results ($I^2=46.9$, $Q=67.8$, $p=0.00$).

Publication bias was found to be low (Egger test $P=0.122$ $Z=-1.55$) (Appendix 4 Galbraith chart, Funnel Plot). The results of meta-regression with a random

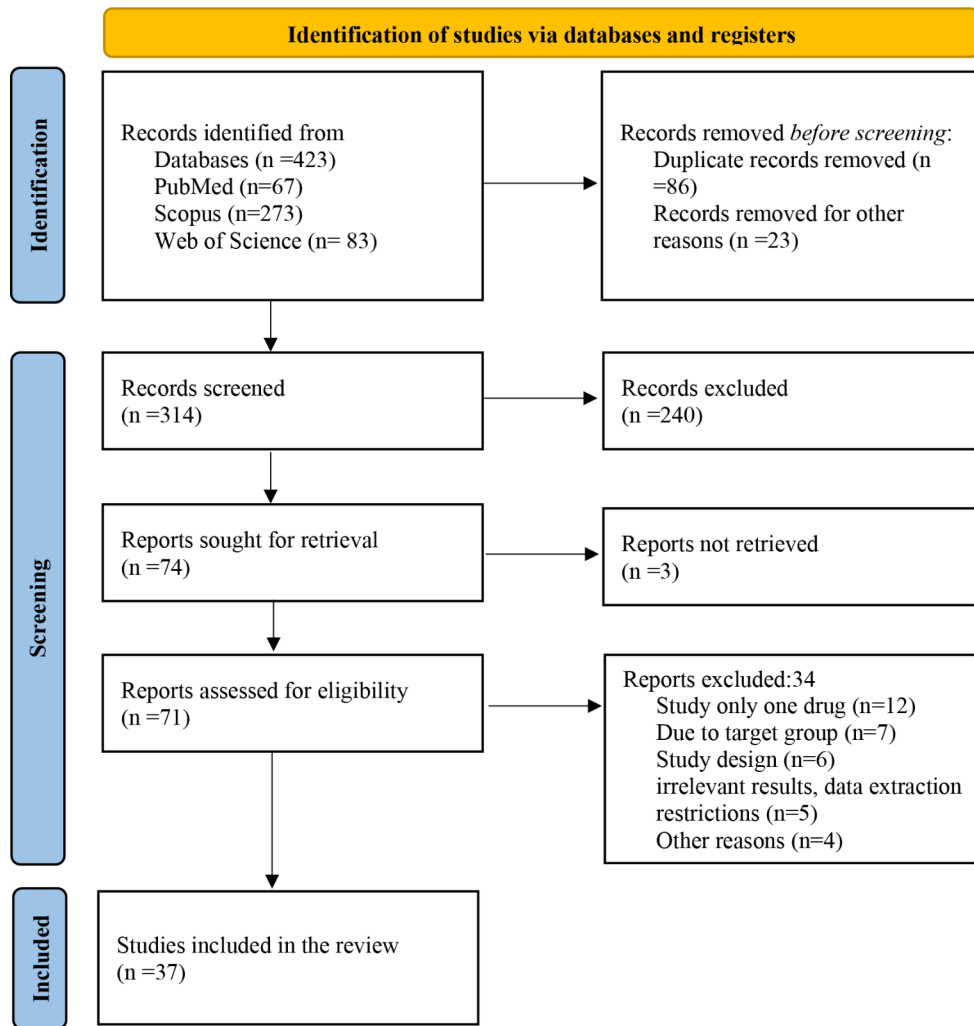


Fig. 1 Screening process of studies related to the prevalence and causes of self-treatment for oral health problems

effects model based on the variables of the mean age (years) and the percentage of men showed that only the average age of the participants significantly predicts the prevalence of self-treatment for oral health problems (R Coefficient=0.010, $P=0.003$).

Medication groups and materials used in self-treatment for oral health problems

Based on the results of the included studies, five drug groups were commonly used for self-treatment in oral and dental health problems. Analgesics had the highest mean proportion of consumption, with about 60%, followed by antibiotics, with about 19% (Fig. 3).

The causes of self-treatment for oral health problems

Based on the results of the reviewed articles, nine of the most important causes of self-treatment for oral health problems were extracted. In terms of the mean proportion, having previous experience, unbearable pain, and

lack of time had the highest percentages, and in terms of the number of repetitions among the reviewed articles, economic problems, lack of time, and limited access were the most repeated reasons (Fig. 4).

Factors influencing self-treatment

From 10 studies, 22 factors (including repeated cases) that were significantly effective in self-treatment for oral and dental health problems were extracted (factors that were not significant were not extracted). The most significant extracted factors included female gender, higher education, and occupation.

Source of medication for self-treatment

Pharmacies emerged as the primary source of medication for self-treatment in 18 out of 19 studies, accounting for 61% of cases. In one study, street vendors were reported as the main drug supply source, comprising about 36% [14].

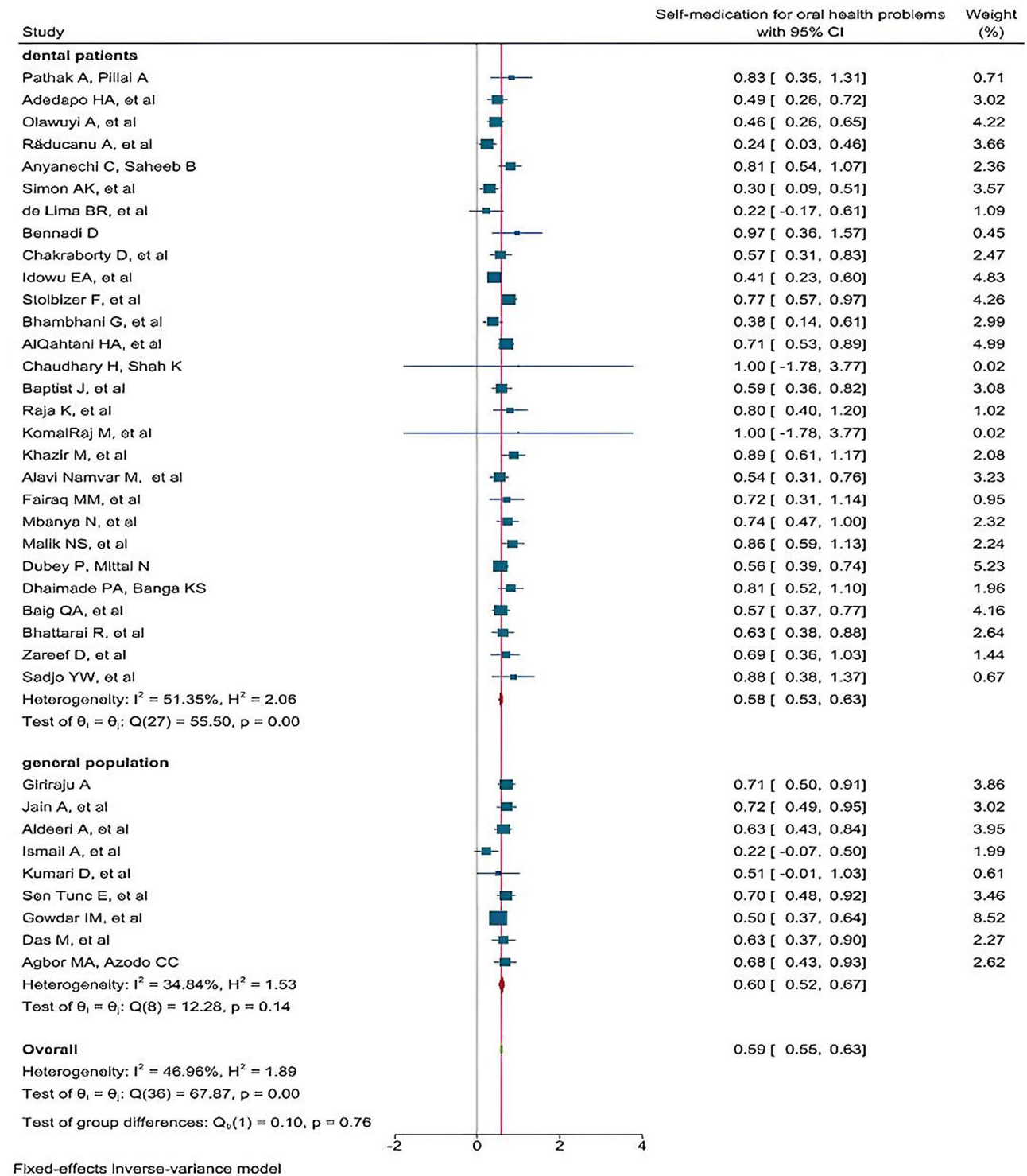


Fig. 2 Meta-analysis of the prevalence of self-medication for oral health problems based on the fixed effects model

The results of evaluating the quality of reporting

The mean score of the reporting quality of the articles was estimated to be 3.82 out of 7 (median=4). The most important weaknesses of the articles were related to confounding variables. Also, most of the articles did not

use appropriate statistical methods to report the results. Most articles relied on descriptive statistics, lacking advanced analytical methods like regression (Appendix 5 - Results of the evaluation of the quality of reporting of articles).

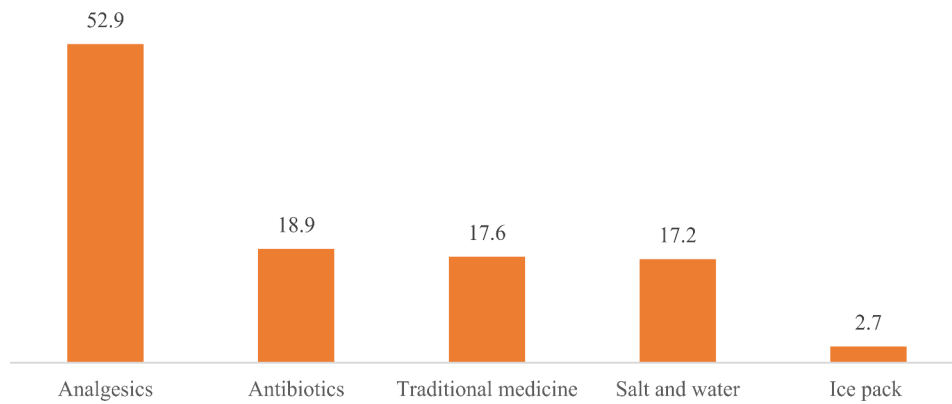


Fig. 3 The frequency of drug categories used in self-treatment of oral and dental health problems

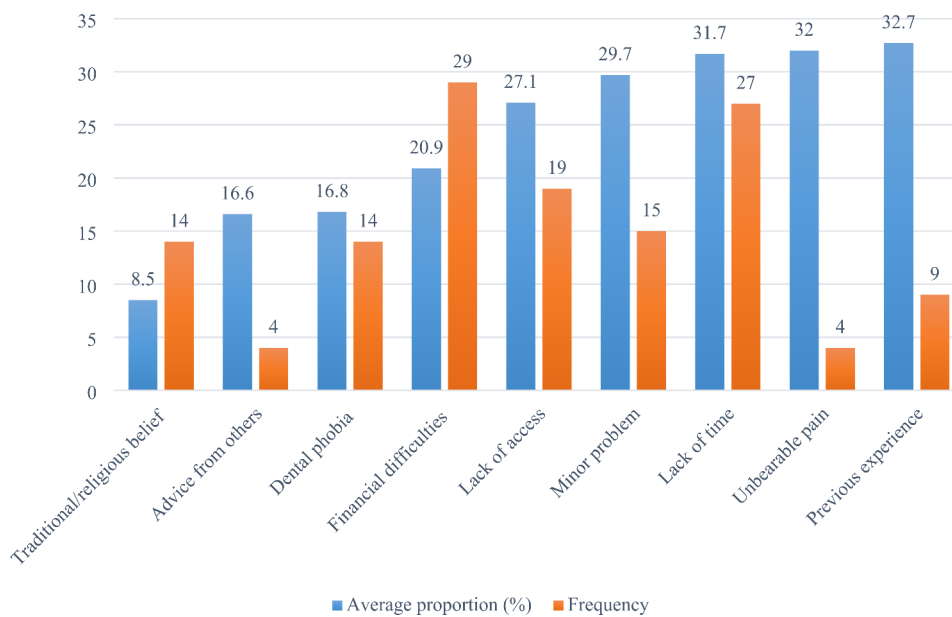


Fig. 4 Mean ratio and frequency of self-treatment causes for oral health problems

Discussion

The overall prevalence of self-medication was estimated at 59%. Analgesics, with about 60%, and antibiotics, with about 19%, were the most common medication categories used in self-medication for oral and dental health problems. In terms of the mean proportion, having previous experience, unbearable pain, and lack of time were the most important reasons for self-treatment, and in terms of the number of repetitions among the reviewed articles, economic problems, lack of time, and limited access were the most repeated reasons. The most significant contributing factors in self-treatment for oral and dental health problems were female gender, higher education, and occupation. Pharmacies were the most important source of medication for self-treatment of oral and dental health problems.

The results of similar systematic review studies in other fields, ethnic groups, and specific countries also show that the prevalence of self-medication is very high, and it is one of the major health and social concerns [50–53]. Therefore, special attention should be paid to designing and implementing effective interventions to reduce this problem. Interventions such as increasing the level of public awareness about the adverse effects of self-medication, regulating policies in pharmacies and drug prescriptions, and promoting the policy of returning unused drugs to pharmacies are among the most important interventions that can be considered by relevant authorities [54–56]. Most of the studies reviewed in this study were conducted on the prevalence of self-medication for oral health problems in low- and middle-income countries. The systematic review studies of Limaye, in 2017, which examined 154 articles related to self-medication [57],

Gualano et al. (2015), which examined the prevalence of self-medication among adolescents [58], and the study by Shaghghi et al. (2014) who investigated the behaviors that determine self-treatment [59], also reported the same results. This issue can have two major possible reasons; one is that countries with high income are facing less of such a problem, or at least they were able to solve this problem to some extent. Second, due to the existence of strong information systems in these countries, up-to-date and accurate statistics are available, and researchers are less willing to conduct prevalence studies to estimate the extent of this problem. However, considering the high prevalence of self-medication in low- and middle-income countries and its high complications, it is recommended that coherent and efficient online information systems for collecting, analyzing, and continuously reporting information related to self-medication be designed.

In this study, based on the results of the reviewed articles, nine of the most important causes of self-treatment for oral health problems were extracted. Examining the pattern of these causes with other studies shows the high similarity and overlap of these cases [60]. An important point that should be noted is that many of these causes, regardless of the socio-economic factors, culture, and healthcare systems of the countries, are to a large extent similar between all countries, and therefore, using the experiences of the leading countries in controlling and reducing self-treatment can result in successes in this field.

The results of the present study showed that analgesics and antibiotics were the most commonly used drug groups in self-treatment for oral and dental health problems. This finding is consistent with the results of previous systematic review studies [50, 59, 61–63]. In addition to the easy access to these drugs in most countries, which are considered Over-the-counter (OTC) drugs, the public's belief in the harmlessness of these drugs can be another important factor in the widespread arbitrary use of these drug groups. Therefore, increasing people's awareness about the side effects of taking these medications without a prescription seems necessary. Due to severe toothache and the urgent need to reduce the pain, people take this type of medicine arbitrarily.

In the field of oral and dental health problems, it seems that, along with other important causes, economic problems are very important, and this issue can have two main reasons; one is that, as mentioned, most of the studies were conducted in middle and low-income countries and therefore, people are facing economic problems. The second reason for this could be the high costs of dentistry in these countries and the lack of adequate insurance coverage for these services. This issue has been reported in high-income countries as well [64–66].

Similar to many studies, the results of this study showed that pharmacies are the most important source of self-medication. This issue can be an indicator of extensive flaws in drug distribution networks in various countries, especially in low- and middle-income countries. Therefore, greater control and sensitivity by pharmacies in the field of providing drugs without a prescription and informing people about the side effects of self-medication can have a great impact on the management of this issue.

The most significant effective factors in self-treatment for oral and dental health problems included female gender, higher education, and occupation, which are highly similar to other studies conducted in other fields and groups [62, 67].

The present study had several limitations. Therefore, it is recommended to interpret the conclusions with caution. One of the most important of them is the limitation of searches to English. If the results of studies published in other languages were included in the analysis, the results might have been different. One of the problems in the reporting of the articles was the limited and sometimes ineffective statistical methods. Few studies have used advanced statistics such as odds ratio. Therefore, in addition to the need for more studies on the effective factors and the mechanism of their impact in the field of self-treatment, focusing on the identified factors can increase the effectiveness of interventions and self-treatment control programs.

Conclusion

The results of the present study showed that the prevalence of self-treatment for oral and dental health problems is high. Analgesics and antibiotics were the most commonly used drug groups. Having previous experience, unbearable pain, and lack of time were the most important reasons for self-treatment. Pharmacies were the most important source of medications for self-treatment. Effective and comprehensive interventions should be designed and implemented to manage this problem. In the implementation of these interventions, it is recommended to focus on analgesics and antibiotics, financial issues, and controlling the pharmacies. It is recommended to identify more contributing factors and use effective and more advanced statistical methods in future studies.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-024-04900-8>.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

Supplementary Material 5

Author contributions

Hosein Eslami searched databases, screened studies, extracted and analyzed data. Katayoun Katebi and Saba Jabbari designed the study, searched databases, screened studies, extracted and analyzed data, and wrote the first draft of the study and served as reviewers. All authors have read and approved the final manuscript.

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Data availability

All data generated or analyzed during this study are included in this published article [and its supplementary information files].

Declarations**Ethics approval and consent to participate**

Not applicable.

Consent for publication

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Competing interests

The authors declare no competing interests.

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