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Global, WHO Regional, and Continental Prevalence of Self-Medication from 2000 to 2018: A Systematic Review and Meta-analysis

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The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

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Conflict of interest
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ABSTRACT

Background: Nowadays, the availability of medicines and populations' increased knowledge of medical sciences and self-medication have increased, which is a challenging issue for the healthcare system. This study aimed to examine the prevalence of self-medication at a global level comprehensively. In addition, effective factors in this regard, including the motives of self-medication, diversity of medicines used, the supply resources, and type of the resulting disease, were evaluated.

Method: English language articles published during 2000-2018 were systematically searched in Embase, PubMed, Web of Science, and Scopus to find relevant research. Studies that met the inclusion criteria were evaluated independently by two researchers. The relevant articles were examined based on the prevalence of the phenomenon and factors such as the study setting, common reasons for self-medication, and common drugs used.

Results: From 951 primarily revealed articles, 69 papers were entered for the final analysis. Overall, 41620 individuals were included in the selected papers, 67% of whom (N=27890) had at least one experience of self-medication. Among the continents, Europe (Eastern) had the highest incidence rate of self-medication (74%, 95% CI, 56%-86%). 71% of the subjects purchased drugs from pharmacies (95% CI, 61-80%). Regarding the condition that led to self-medication, 48% of the patients turned to self-medication due to neurological problems (95% CI, 40-55%). Among the causes of self-medication, "a previous history" and "minor nature of the disease" were the most common reasons.

Conclusion: According to the study results, the mean incidence of self-medication was higher in Eastern Europe and Asian countries compared to other parts of the world. This could be a considerable note for policy-makers of this field. In general, self-medication can lead to short and long-term harmful consequences for society and the healthcare systems, resulting in enormous costs for countries.

Keywords: Prevalence, Self-Medication, Global, Systematic Review.

1. INTRODUCTION

Self-medication is a universal phenomenon that could date back to the creation of humankind. Since ancient times, humans have used various methods to treat themselves without knowledge of medical science. Today, this issue has been extensively observed in societies due to the availability of medicines, increased knowledge about medical sciences, and the busy lives of patients (1-4). The World Health Organization (WHO) defines self-medication as patients' behavior in "the selection and use of drugs to treat symptoms and disorders recognized by the individual" (5). Behaviors such as using over-the-counter

medicines by self-diagnosis, sharing medications with family or friends, and taking drugs that remained from the past diseases arbitrarily are regarded as self-medication.

In most cases, self-medication has adverse effects rather than positive and can result in long-term harmful outcomes (6, 7). However, WHO considers correct self-medication as a necessary and essential element of self-care in addition to nutrition and personal hygiene (8-10). The incorrect use of over-the-counter drugs and the availability of such drugs to people without necessary knowledge and awareness has become a global and public health problem (7, 11-16) prevalent in both developing and developed nations. However, this type of self-medication is more prevalent in developing countries (9, 17, 18).

In recent years, self-medication has increased due to various reasons, such as socioeconomic factors, changing lifestyle, easy access to medications, the inefficiency of healthcare systems, high costs, inaccessibility, and uncontrolled drug distribution (19, 20). Despite the benefits of this issue, e.g., decreased medical expenses, reduced number of referrals to physicians, avoiding spending a long time in physicians' offices, and loss of resources (15, 21, 22), it could be associated with adverse effects, such as drug dependence, drug resistance, potential delay in the correct diagnosis and treatment of serious health problems, hiding the latent symptoms of the disease and complicating the condition, the illegal use of drugs, drug interactions and the unwanted pharmaceutical effects, the excessive use of the drug, the development of resistance to pathogens and the prolonged duration of the disease (23-25).

Studies conducted in this area have shown the existence of various statistics on the incidence of self-medication. For example, the self-medication rate was reported at 27.7% and 69.9% in studies by Knopf et al. in Germany, 2013, (26) and Garofalo et al. in Italy, 2015, (27) respectively. In the study of Azami Aghdash et al. In Iran (2015), the prevalence of self-medication was 53% (28). In other research in Ethiopia, Ayalew et al. reported the self-medication rate as 12.8-77.1% (19). Some reviews have been carried out on self-medication in specific age groups, such as adolescents (29, 30) or the elderly (31), or particular regions of the world, including the Middle East (32) or specific countries (19, 28). Such studies have also evaluated the incidence of self-medication for a particular disease (33) or self-medication with antibiotic drugs (20, 34). Hence, it seems that no integrated study has been performed in this field globally.

This study aimed to evaluate the prevalence of self-medication worldwide comprehensively and assess the effective factors in this regard, including the causes of this phenomenon, the variety of drugs used, the drug supply source, and the type of resulting disease. Such comprehensiveness distinguishes the present research from other studies and reviews. This is mainly due to the fact that the long-term negative impacts of self-medication impose huge costs on the healthcare system. Our findings can be helpful in policy-making, decision-making, and planning to improve the status of self-medication and prevent the related damages, thereby reducing the incidence rate and associated health costs in different communities. On the other hand, the findings can help the researchers in this area because the present research results can be a basis for future studies on the investigation of the issue.

2. METHODS

2.1. Methodology

The current research was registered in PROSPERO at the University of York with registration code of PROSPERO 2019 CRD42019124177, Available from: http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42019124177

2.2. Literature Search

In this research, we searched the international electronic databases of PubMed, Web of Science, Scopus, CINAHL, and Embase. The keywords were determined, and MeSH standardization was applied to search the target research. “Self-care, self-medication, and self-medication” were the MeSH keywords searched for self-medication. We generally searched the English articles and original studies published during 2000-2018 to investigate the phenomenon in the current century. Overall, 951 articles were revealed through electronic database searching. In the next stage, the articles extracted were imported into EndNote software, followed by the elimination of repeated papers.

2.3. Study Selection

In this study, we screened the revealed articles in two phases: articles were evaluated by two authors independently in the first stage. The abstracts and titles were assessed in the primary screening phase, followed by the elimination of studies that were not related to our research regarding the exclusion and inclusion criteria. As such, a total of 84 articles that were related to the present study were entered into the review. In the second phase, the eligibility of the studies was determined by evaluating the complete texts of the articles. In the end, 69 articles were considered eligible (Figure 1).

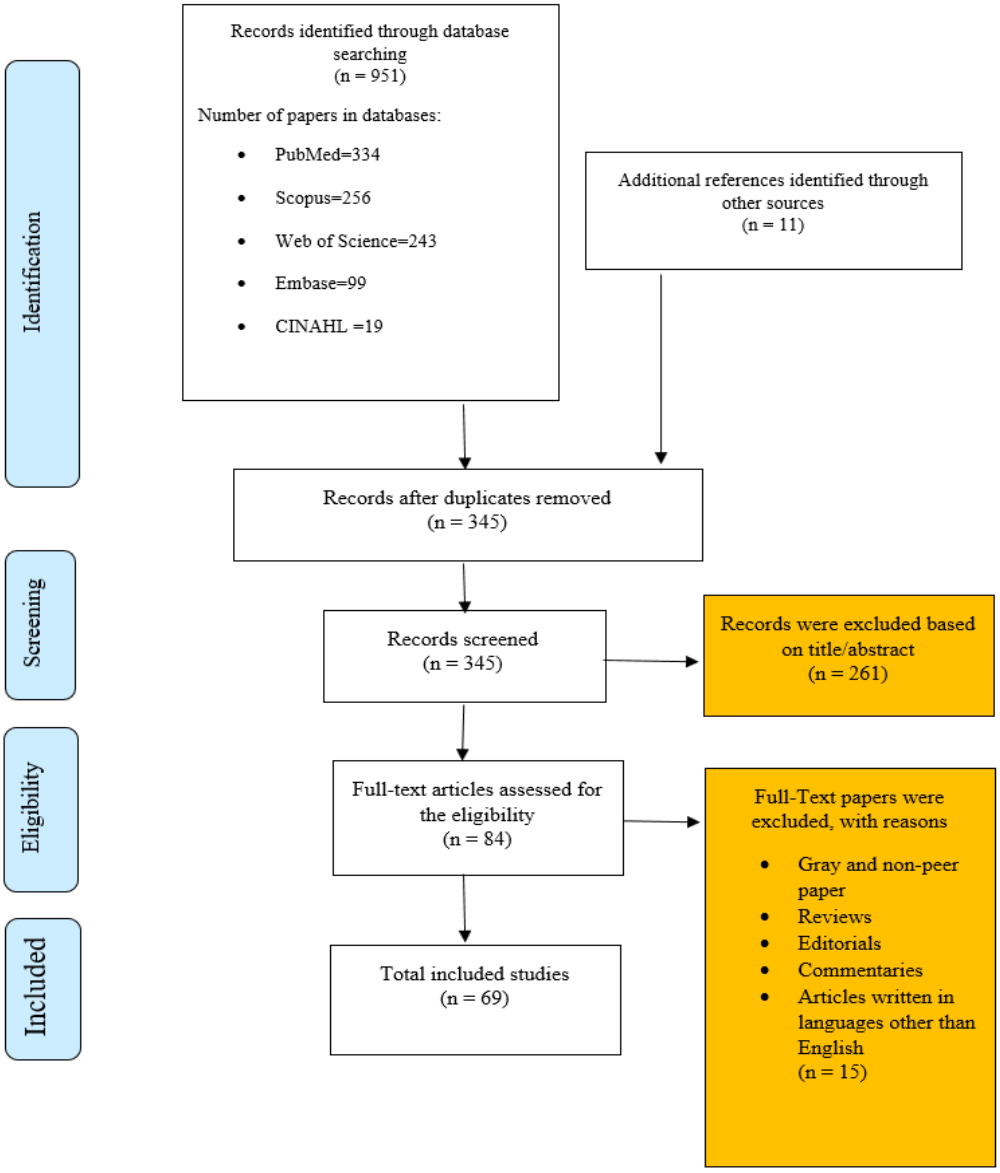


Figure 1. Flow diagram of our review process (PRISMA).

2.4. Inclusion criteria

1. English language; 2. Original research paper; 3. Published during 2000-2018; 4. Availability of full text; 5. Observational studies (cross-sectional, cohort and, case-control, descriptive, prospective studies); 6. The articles presenting a figure of self-medication or the probability of estimating a figure are based on the authors' data, such as some supplementary and other studies with reasonable frameworks.

2.5. Exclusion criteria

1. Review studies, letters to editors, editorials, commentaries, expert opinions, case studies, case series, book chapters, brief reports, RCTs, and thesis; 2. The studies relevant to the treatment topics have been followed up the whole process of clinical decision making. 3. Studies that permitted no prevalence calculation and had no valuable figures or tables.

2.6. Quality of Studies

In order to select the papers, we applied the tool of "Strengthening the Reporting of Observational studies" (STROBE), which encompasses 22 items. The articles were classified into three quality categories based on the tool's items. These categories were studies with low quality (1-7), medium quality (8-16), and high quality (17-22). At this stage, two authors performed the assessment independently. However, the opinion of a third author was asked in case of lack of consensus (35).

2.7. Data Extraction

In this phase, we applied a preliminary data extraction form. The sample size, the prevalence of self-medication, number of male/females, setting, data collection method, reasons for self-medication, drug types and articles general information were extracted (Appendix A).

2.8. Statistical analysis

By applying the Der Simonian-Laird model, the incidence rate was estimated, and the findings were presented on a Forest plot at a confidence level of 95%. According to the sample size and publication year, the I2 test of heterogeneity was carried out along with a meta-regression analysis. In the next stage, the stability of the results was confirmed by performing the sensitivity analysis. Afterward, a subgroup analysis was carried out using research type, geographical place, quality of the study, sample size, gender, and publication year. Furthermore, sample size and year of publication were considered for performing a cumulative meta-analysis. After applying the Egger test to assess publication bias, Comprehensive Meta-Analysis software was exploited to analyze the data.

3. RESULTS

3.1. Search results

The current study results are presented in Figure 1 based on the PRISMA items. After the initial search, 962 articles were obtained from five central databases and other sources of information. However, 345 articles remained after the removal of duplicates. After reviewing the abstract and the full text of the articles, 261 articles were removed, and 84 articles remained. Another 15 articles were eliminated based on the inclusion and exclusion criteria, and a total of 69 studies were entered into the review for the final analysis. The selected studies were published during 2000- 2018. The total number of samples that participated in the studies was 41620, of whom 27890 had at least one experience of self-medication. The major features of these articles are shown in Appendix A.

3.2. Paper distribution based on year of publication

The distribution of the publication year of selected papers during 2000- 2018 is shown in Figure 2, according to which no research was conducted on self-medication in the world during 2000-2004. After that, the number of articles published in this area had an upward trend.

In addition, the figure shows that the most significant number of studies conducted was in 2016, with 15 studies.

3.3. Overview of self-medication incidence

After extracting the main data from 69 studies in the Excel form and primarily analyzing the data, the Random Effect model showed the prevalence of self-medication was 67% (95% CI, 62-73%) and I2=99.80% in the world, thereby demonstrating the strong heterogeneity and significance of the issue (P=0.00) (Figure 3).

3.4. Self-medication incidence based on continent

According to Table 1, Asia had the highest rate of self-medication among other continents with 42 studies and the prevalence of 71% (95% CI, 63-78%), followed by Europe with a prevalence of 74% (95% CI, 56-86%). Furthermore, no research was conducted in North America, and studies were only performed in the eastern European countries, such as Turkey and Slovenia (Table 1).

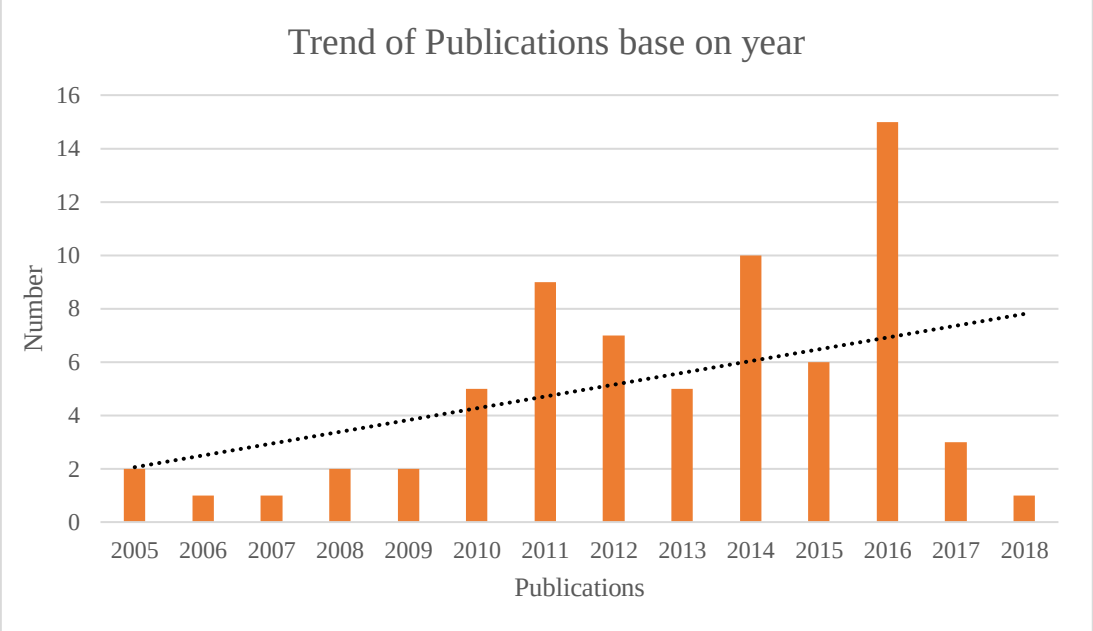


Figure 2. Distribution of articles frequency by publication year.

Table 1: The worldwide incidence of self-medication base on continent.

		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity			
	Group	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared
Continent	Africa	16	0.559	0.424	0.685	0.85	0.4	1728.38	15	<0.001	99.13
	Asia	42	0.712	0.63	0.783	4.73	0	4326.13	40	<0.001	99.08
	Europe	7	0.74	0.562	0.864	2.57	0.01	769.15	6	<0.001	99.22
	South America	4	0.6	0.402	0.77	0.99	0.32	312.34	3	<0.001	99.04

3.5. Self-medication incidence based on WHO region

The results of the data analysis in different WHO regions are shown in Figure 4. As observed, the European and Southeast Asia regions had the highest incidence rate (74%) among other areas. Nevertheless, the Eastern Mediterranean region was ranked second with the highest number of studies and a rate of 72% (95% CI, 63-80%) (Figure 4).

3.6. Self-medication incidence based on reasons

The rate of self-medication incidence based on the reasons for this issue reported in the studies is shown in Figure 5. The results demonstrated that the most common reason for self-medication was the minor nature of the disease and preference for self-medication by patients rather than visiting a physician, as pointed out in 33 articles. In this regard, the rate of self-medication was 51% (95% CI, 44-58%). The second rank belonged to the experiences of self-medication of individuals who experienced a positive outcome in this respect. These individuals used similar medicines in the same way to treat themselves, as mentioned in 33 articles. The rate of this reason was 41% (95% CI, 35-48%). However, the slightest reason was being shy of the disease, avoiding referral to a physician, and employing self-medication, which was only pointed out in two articles (Figure 5).

3.7. Self-medication incidence based on medicine sources

Table 2 shows the results of the analysis of studies on the self-medication incidence based on medicine resources used by individuals. According to the results, purchasing from pharmacies was the most common source of medication for those who seek self-medication, as mentioned in 23 articles. In this regard, the rate of self-medication was 71% (95% CI, 61-80%). The second rank belonged to obtaining drugs from classmates and colleagues, reported in 19 articles, followed by house resources (e.g., drugs remained from previous treatment and prescription) mentioned in 17 articles. The least source of medicine was receiving drugs from healthcare staff which was started in two papers.

Table 2: The worldwide incidence of self-medication base on sources of drugs of self-medication.

Source of Drugs	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity			
	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared
Pharmacy/private pharmacies/Community Pharmacy/Pharmacy shops	23	0.717	0.611	0.804	3.793	0.000	2200.982	22	0.00	99.00
Home/Previous prescription/Drug outlets/Old prescription	17	0.181	0.119	0.265	-6.022	0.000	837.334	16	0.00	98.09
Friends/Friends & classroom colleagues	19	0.157	0.100	0.238	-6.373	0.000	1460.824	18	0.00	98.77
Health staff	2	0.008	0.001	0.111	-3.449	0.001	10.785	1	0.00	90.73
HOSPITAL/Private clinic	5	0.250	0.054	0.660	-1.222	0.222	213.653	4	0.00	98.13
Shops/street/traditional medicine/kiosk/ chemist shops /Herbal store	9	0.147	0.050	0.363	-2.885	0.004	575.352	8	0.00	98.61
Patient medicine store	3	0.323	0.174	0.520	-1.773	0.076	47.043	2	0.00	95.75
others	8	0.146	0.063	0.305	-3.683	0.000	179.461	7	0.00	96.10

3.8. Self-medication incidence based on individual problems

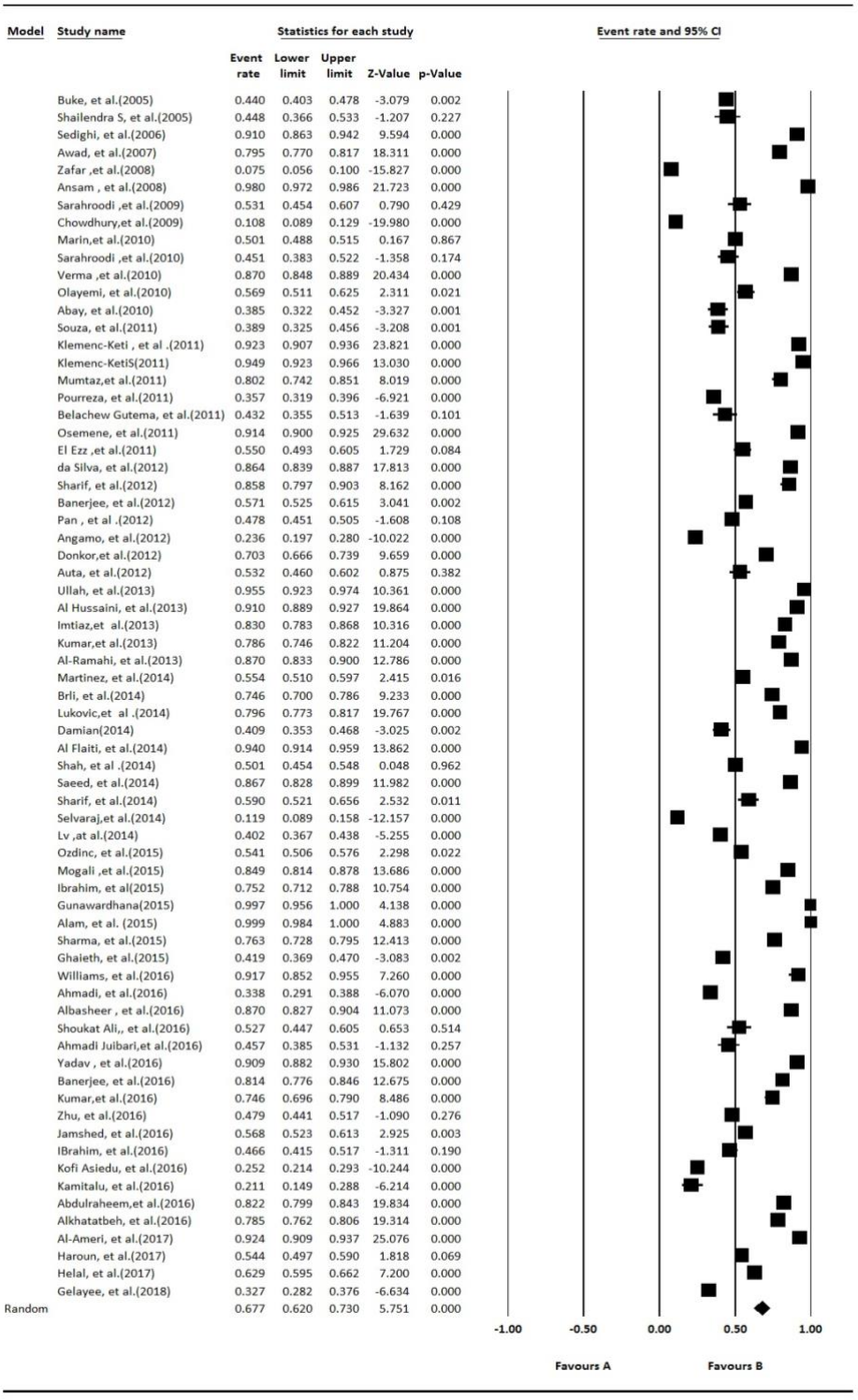
Table 3 shows the common problems of people that lead to self-medication. Among these problems, respiratory (41%, 95% CI, 36-46%, mentioned in 62 articles) and digestive problems (24%, 95% CI, 21-28%, reported in 58 articles) were ranked first and second. On the other hand, only four studies referred to self-medication for allergy, which had the least frequency among other cases.

3.9. Meta-regressions based on year of publication

The results were indicative of a significant relationship between the year (P<0.00) and the incidence rate of self-medication. This rate had an upward trend and increased by 4.5% every year (Figure 6).

3.10. Publication bias

The analyses performed to detect the publication bias shown in the Funnel plot in Figure 7 demonstrated a lack of publication bias in this regard. On the other hand, Egger test findings were (P-value 2tailed=0.7).



Model	Study name	Event rate	Lower limit	Upper limit	Z-Value	p-Value
	Buke, et al.(2005)	0.440	0.403	0.478	-3.079	0.002
	Shailendra S, et al.(2005)	0.448	0.366	0.533	-1.207	0.227
	Sedighi, et al.(2006)	0.910	0.863	0.942	9.594	0.000
	Awad, et al.(2007)	0.795	0.770	0.817	18.311	0.000
	Zafar ,et al.(2008)	0.075	0.056	0.100	-15.827	0.000
	Ansam , et al.(2008)	0.980	0.972	0.986	21.723	0.000
	Sarahroodi ,et al.(2009)	0.531	0.454	0.607	0.790	0.429
	Chowdhury,et al.(2009)	0.108	0.089	0.129	-19.980	0.000
	Marin,et al.(2010)	0.501	0.488	0.515	0.167	0.867
	Sarahroodi ,et al.(2010)	0.451	0.383	0.522	-1.358	0.174
	Verma ,et al.(2010)	0.870	0.848	0.889	20.434	0.000
	Olayemi, et al.(2010)	0.569	0.511	0.625	2.311	0.021
	Abay, et al.(2010)	0.385	0.322	0.452	-3.327	0.001
	Souza, et al.(2011)	0.389	0.325	0.456	-3.208	0.001
	Klemenc-Keti , et al .(2011)	0.923	0.907	0.936	23.821	0.000
	Klemenc-KetiS(2011)	0.949	0.923	0.966	13.030	0.000
	Mumtaz,et al.(2011)	0.802	0.742	0.851	8.019	0.000
	Pourreza, et al.(2011)	0.357	0.319	0.396	-6.921	0.000
	Belachew Gutema, et al.(2011)	0.432	0.355	0.513	-1.639	0.101
	Osemene, et al.(2011)	0.914	0.900	0.925	29.632	0.000
	El Ezz ,et al.(2011)	0.550	0.493	0.605	1.729	0.084
	da Silva, et al.(2012)	0.864	0.839	0.887	17.813	0.000
	Sharif, et al.(2012)	0.858	0.797	0.903	8.162	0.000
	Banerjee, et al.(2012)	0.571	0.525	0.615	3.041	0.002
	Pan , et al .(2012)	0.478	0.451	0.505	-1.608	0.108
	Angamo, et al.(2012)	0.236	0.197	0.280	-10.022	0.000
	Donkor,et al.(2012)	0.703	0.666	0.739	9.659	0.000
	Auta, et al.(2012)	0.532	0.460	0.602	0.875	0.382
	Ullah, et al.(2013)	0.955	0.923	0.974	10.361	0.000
	Al Hussaini, et al.(2013)	0.910	0.889	0.927	19.864	0.000
	Imtiaz,et al.(2013)	0.830	0.783	0.868	10.316	0.000
	Kumar,et al.(2013)	0.786	0.746	0.822	11.204	0.000
	Al-Ramahi, et al.(2013)	0.870	0.833	0.900	12.786	0.000
	Martinez, et al.(2014)	0.554	0.510	0.597	2.415	0.016
	Brli, et al.(2014)	0.746	0.700	0.786	9.233	0.000
	Lukovic,et al .(2014)	0.796	0.773	0.817	19.767	0.000
	Damian(2014)	0.409	0.353	0.468	-3.025	0.002
	Al Flaiti, et al.(2014)	0.940	0.914	0.959	13.862	0.000
	Shah, et al .(2014)	0.501	0.454	0.548	0.048	0.962
	Saeed, et al.(2014)	0.867	0.828	0.899	11.982	0.000
	Sharif, et al.(2014)	0.590	0.521	0.656	2.532	0.011
	Selvaraj,et al.(2014)	0.119	0.089	0.158	-12.157	0.000
	Lv ,at al.(2014)	0.402	0.367	0.438	-5.255	0.000
	Ozdinc, et al.(2015)	0.541	0.506	0.576	2.298	0.022
	Mogali ,et al.(2015)	0.849	0.814	0.878	13.686	0.000
	Ibrahim, et al(2015)	0.752	0.712	0.788	10.754	0.000
	Gunawardhana(2015)	0.997	0.956	1.000	4.138	0.000
	Alam, et al. (2015)	0.999	0.984	1.000	4.883	0.000
	Sharma, et al.(2015)	0.763	0.728	0.795	12.413	0.000
	Ghaieth, et al.(2015)	0.419	0.369	0.470	-3.083	0.002
	Williams, et al.(2016)	0.917	0.852	0.955	7.260	0.000
	Ahmadi, et al.(2016)	0.338	0.291	0.388	-6.070	0.000
	Albasheer , et al.(2016)	0.870	0.827	0.904	11.073	0.000
	Shoukat Ali,, et al.(2016)	0.527	0.447	0.605	0.653	0.514
	Ahmadi Juibari,et al.(2016)	0.457	0.385	0.531	-1.132	0.257
	Yadav , et al.(2016)	0.909	0.882	0.930	15.802	0.000
	Banerjee, et al.(2016)	0.814	0.776	0.846	12.675	0.000
	Kumar,et al.(2016)	0.746	0.696	0.790	8.486	0.000
	Zhu, et al.(2016)	0.479	0.441	0.517	-1.090	0.276
	Jamshed, et al.(2016)	0.568	0.523	0.613	2.925	0.003
	IBrahim, et al.(2016)	0.466	0.415	0.517	-1.311	0.190
	Kofi Asiedu, et al.(2016)	0.252	0.214	0.293	-10.244	0.000
	Kamitalu, et al.(2016)	0.211	0.149	0.288	-6.214	0.000
	Abdulraheem,et al.(2016)	0.822	0.799	0.843	19.834	0.000
	Alkhatatbeh, et al.(2016)	0.785	0.762	0.806	19.314	0.000
	Al-Ameri, et al.(2017)	0.924	0.909	0.937	25.076	0.000
	Haroun, et al.(2017)	0.544	0.497	0.590	1.818	0.069
	Helal, et al.(2017)	0.629	0.595	0.662	7.200	0.000
	Gelayee, et al.(2018)	0.327	0.282	0.376	-6.634	0.000
Random		0.677	0.620	0.730	5.751	0.000

Figure 3. Forest Plot of worldwide incidence of self-medication.

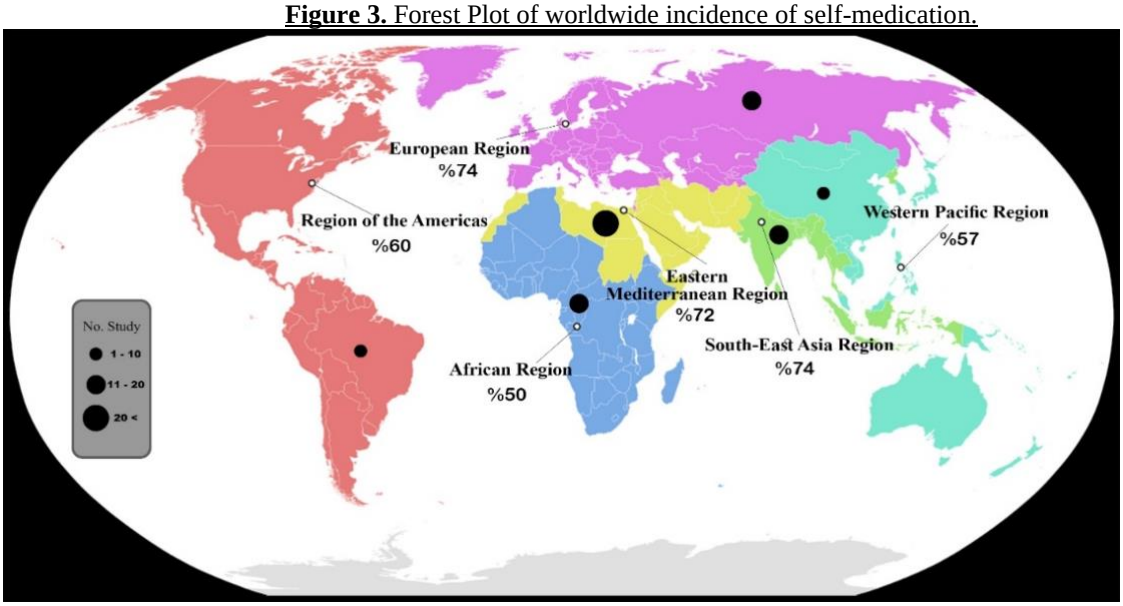


Figure 4. The worldwide incidence of self-medication based on WHO Regions & Number of studies, 2000-2018. (Size of dots indicates number of studies). Figure 2 created with PhotoshopCC, using WHO criteria for political border.

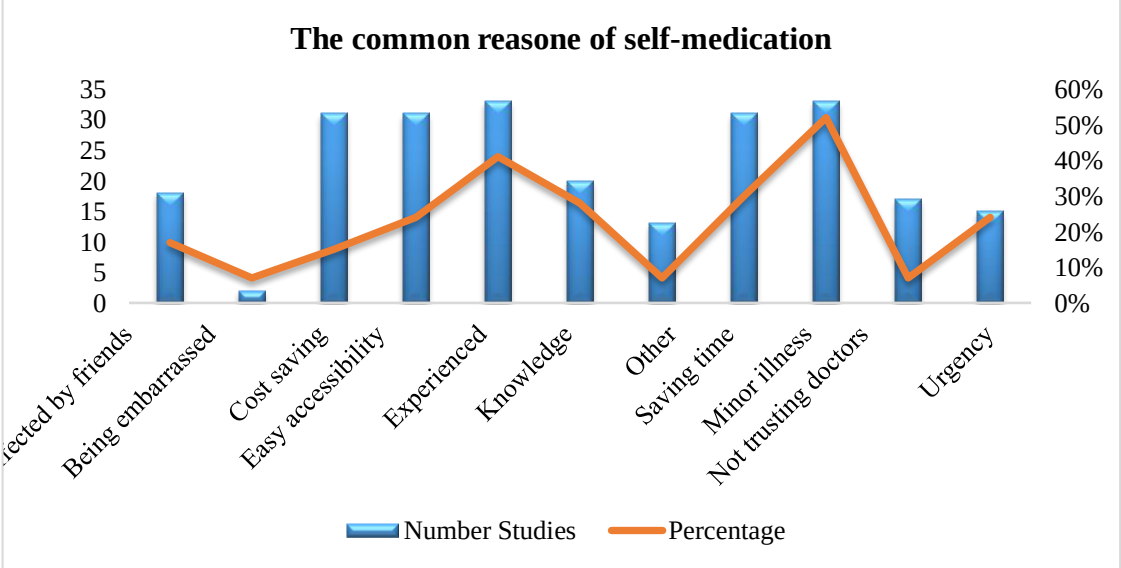


Figure 5. The worldwide incidence of self-medication based on the common reasons of self-medication

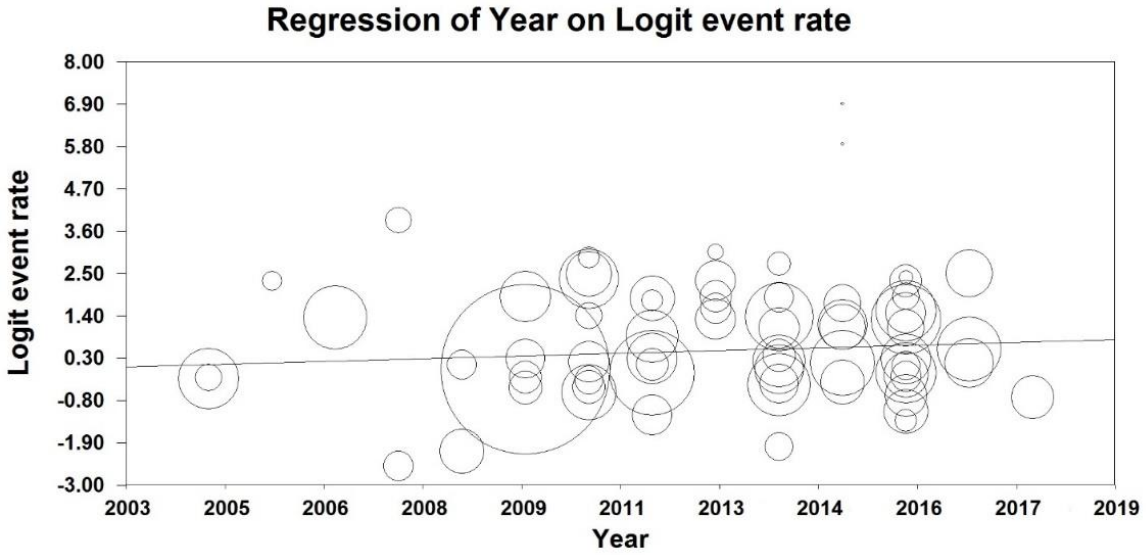


Figure 6. Meta-regressions based on the year.

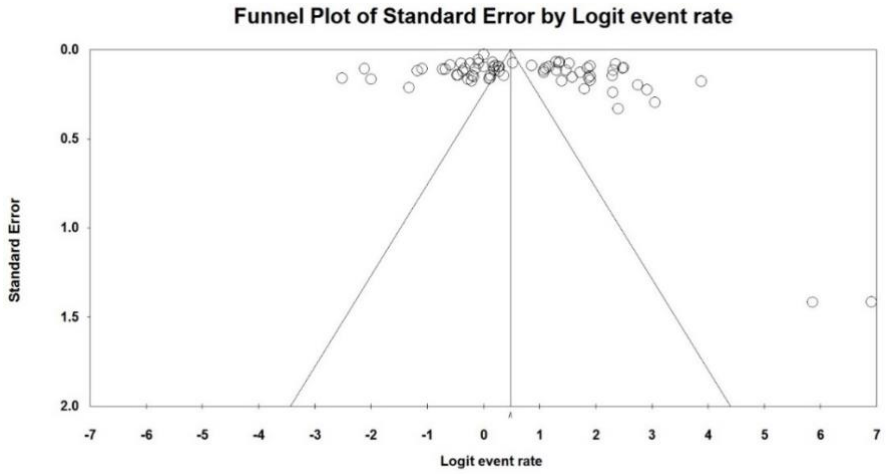


Figure 7. Funnel plot to assess publication bias.

Table 3: The worldwide incidence of self-medication base on individual problems of self-medication.

Problems	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity			
	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared
Allergy	4	0.107	0.041	0.253	-4.003	0.000	47.63	3	<0.001	93.70
ENT diseases	8	0.099	0.022	0.346	-2.753	0.006	914.63	7	<0.001	99.23
Other	13	0.088	0.048	0.155	-7.110	0.000	391.69	12	<0.001	96.94
Mental disorders	20	0.157	0.096	0.246	-5.894	0.000	1543.11	19	<0.001	98.77
Infections	21	0.197	0.131	0.285	-5.650	0.000	1609.53	20	<0.001	98.76
Skin problems	23	0.194	0.131	0.278	-5.951	0.000	1342.45	22	<0.001	98.36
Types of pain	30	0.274	0.194	0.372	-4.230	0.000	1792.85	26	<0.001	98.55
Nervous problems	53	0.481	0.404	0.558	-0.487	0.627	4924.64	52	<0.001	98.94
Digestive problems	58	0.247	0.211	0.287	-10.650	0.000	2424.85	57	<0.001	97.65
Respiratory Problems	62	0.413	0.360	0.468	-3.099	0.002	3439.22	61	<0.001	98.23

4. DISCUSSION

The present study was the first systematic review and meta-analysis that evaluated the incidence of self-medication globally in a comprehensive manner. According to the results, self-medication had a 67% incidence rate in this sample. The analysis results of the present study suggested that the mean self-medication outcomes in these patients are higher in Eastern and Asian European countries, compared to the mean of this notion in this research. For example, in a study conducted in Slovenia, 94.9% of the 410 subjects evaluated experienced self-medication(36). Another research on 500 people in Bangladesh showed that self-medication had a 100% incidence rate (37).

In studies conducted in Oman(5)and Iraq (38) on 450 and 1435 individuals, respectively, the incidence rate of self-medication was reported to be 94% and 92.4%. However, in studies conducted in African countries, the incidence rate was below the mean 67% of the current research. For example, in a study in Ghana (39) on 469 samples, the self-medication incidence rate was 25.2%. Furthermore, an analysis was performed on 213 individuals in Ethiopia (40), reporting a self-medication incidence rate of 38.5%. It could be expressed that the higher incidence rate of self-medication in Asia is due to easier access to medications by people, compared to European countries and the United States. On the other hand, drug trafficking is more common in these countries.

The results of the present study indicated that the most common cause of self-medication was considering the disease minor and using drugs arbitrarily instead of visiting a doctor, which was the dominant cause in studies by El-Ameri(38), Halal (41), Ensam (42), Sharif(43), and Sharma et al. (44). In addition, this result is consistent with our findings. However, in the study by Ezdink et al. (45) and Pourreza et al. (46), the previous experience of using the same medicine in similar situations and achieving the desired result in the past were the leading causes of self-medication among individuals. Regarding the sources of self-

medication, about 71% of self-medicated patients received their medications from pharmacies. In the studies by Zhu(47), Oliami (48), Zafar (49), Magali(50), Sharif (43), Abai (40), Shellindra(51), Avad (25), William(52), and Sharma et al.(44), the most common source of drugs for self-medication were pharmacies and the results were under our findings. This problem is indicative of a faulty system for drug distribution. Therefore, pharmacies that sell medications without a prescription or drug-related laws must be more seriously monitored to solve this problem.

Regarding the situations that lead to self-medication, neurological problems were the most common cause since 48.1% of individuals with this issue turned to self-medication. The second cause of self-medication was respiratory problems, with a rate of 41.3%. In studies by Zhu(47), Alfaliti(5), Haroon (53), Zafar(49), Shokat Ali(54), and Halal et al.(41), the respiratory problems of individuals were the most frequent situations that led to self-medication of patients. However, Headache was reported as the most common cause of self-medication by Suza(55), Enjamo (27), and Gautama et al. (56)

Limitation

The main limitation of this study was the lack of accurate information and even lack of any studies in this area in some countries, mainly Europe, which is an important finding in our study (Self-medication in European countries is very limited. Therefore no study has been done in these countries).

The other limitation of this study was scattered information about some of the variables desired, such as the type of medication used and the status of individuals after self-medication. This is an obstacle to analyzing this information, but on the other hand, we suggest studying these variables in future studies.

Another limitation is high heterogeneity in the available studies that can affect results. This can be due to different diagnosis methods (most studies were cross-sectional and used convenience sampling, while others applied cluster sampling methods). For this reason, policymakers and planners should use the results of this finding with caution.

5. CONCLUSION

The present systematic review and meta-analysis evaluated the incidence rate of self-medication worldwide. This was the first research to assess self-medication from various aspects at this level. This can be a significant point for policymakers in the field. Self-medication can be associated with short and long-term harmful effects for the society and health systems, which will lead to enormous costs for countries. Therefore, the results of studies such as the present research can provide helpful information to prevent self-medication problems and complications. It is suggested that more prospective studies be conducted on self-medication problems in the future.

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AUTHORS' CONTRIBUTIONS

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COMPETING INTERESTS

The authors declare no competing interests with this study.

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