Prevalence and Reasons of Self-Medication in Pregnant Women: A Systematic Review and Meta-Analysis

Mohammad Mohseni1, PhD; Saber Azami-Aghdash2, PhD; Sepideh Gareh Sheyklo3, MD; Ahmad Moosavi4, PhD; Majid Nakhaee1, PhD Candidate; Fatemeh Pournaghi-Azar5, DMD; Aziz Rezapour6,7, PhD

1Department of Health Services Management, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran; 
2Tabriz Health Services Management Research Center, Health Management and Safety Promotion Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran; 
3Department of Obstetrics and Gynecology, Dezful University of Medical Sciences, Dezful, Iran; 
4Department of Health and Community Medicine, Dezful University of Medical Sciences, Dezful, Iran; 
5Dental and Periodental Research Centre, Tabriz University of Medical Sciences, Tabriz, Iran; 
6Health Management and Economics Research Center, Iran University of Medical Sciences, Tehran, Iran; 
7Department of Health Economics, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran

Corresponding author: Aziz Rezapour, PhD; Health Management and Economics Research Center, Iran University of Medical Sciences, Postal code: 1996713883, Tehran, Iran
Tel: +98 21 88671614; Fax: +98 21 88883334; Email: rezapoor_a57@yahoo.com

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ABSTRACT

Background: Given the importance of having valid information about the prevalence and reasons of self-medication among pregnant women for preventing self-medication during this period, this study aimed to systematically review and perform a meta-analysis on the prevalence and reasons of self-medication during pregnancy.

Methods: This systematic review and meta-analysis was conducted in 2018 to estimate the overall self-medication prevalence based on the database sources PubMed, Scopus, Google Scholar, MagIran, IranMedex and SID. Required data were collected using keywords: medication, self-medication, over-the-counter, non-prescription, prevalence, etiology, and occurrence and pregnant. Descriptive and cross-sectional studies in English and Persian languages were included. There was no time limitation for search. R software was applied for meta-analysis. Random-effects model was applied to estimate the self-medication prevalence with 95% confidence interval. Q statistics and I² were used to measure the heterogeneity.

Results: Out of 490 retrieved articles, finally 13 studies were included in meta-analysis, 6 studies of which reported the cause of self-medication. The overall estimated prevalence of self-medication based on the random effect model was 32% (95% CI, 22% -44% ). The most important reasons of self-medication were previous experience of the disease. The most important group of disease in which patients self-medicated was anemia. Also, the most important group of medication was herbal.

Conclusion: The results of this study showed that the prevalence of self-medication among pregnant women was relatively high and required effective interventions to reduce and prevent self-medication among this group. Providing required information and raising awareness about complications resulting from self-medication, in particular herbal medicines and dietary supplements, should be taken into account.

KEYWORDS: Meta-Analysis, Pregnant, Prevalence, Self-medication

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**Introduction**

Nowadays, the excessive use of medicines and generally self-medication is considered as one of the major health and socio-economic problems in different countries. 1-3 Self-medication is defined as the acquisition and use of one or more medicines without a physician's opinion or diagnosis as well as without prescription or therapeutic monitoring, including the use of herbal or synthetic medicines. 4-6 Currently, self-medication has caused an increase in factors such as bacterial resistance, lack of optimal treatment, unwanted and even deliberate poisoning, side effects, and adverse events. Furthermore, dysfunction of medicines market, loss of financial resources and increase in per capita consumption of medicines in the community. 7-12

Due to extensive complications of self-medication, attention to complications resulting from self-medication among people in a society is a matter of great importance; furthermore, attention to female population due to being in sensitive periods, such as pregnancy and lactation as well as their more contact with family members and being role model for other family members is an additional issue of importance so that it can be said that the occurrence of pregnancy can easily increase the use of medicines and chemicals among women, while self-medication during this period accounts for more than 3% of congenital anomalies. 13-16 On the other hand, various studies showed that women, especially, tend to self-medicate and often frequently use medicines to treat problems such as dysmenorrhea, menopause symptoms, menstrual disorders, mood disorders, prevention of osteoporosis as well as complications during pregnancy and lactation. 17-19

Thus, due to the high prevalence of self-medication during pregnancy and its excessive adverse events during this period for both mothers and infants, 20-22 conducting effective interventions to reduce and prevent self-medication during pregnancy is a matter of great importance. These interventions can include enhancing people's knowledge about the consequences of self-medication, educating physicians and pharmacists about appropriate prescription of medicines, and counseling to medicines users as well as providing brochures and catalogs on a large scale. However, the successful implementation of these interventions requires having accurate information on the prevalence and reasons of self-medication during this period. In recent years, studies have been conducted on the reasons and prevalence of self-medication, although limited, in different countries; however, these studies do not provide a comprehensive and clear view for authorities and policymakers in the health system for decision-making and planning, because these studies were conducted in small areas and with low sample size. In this regard, the results of these studies should be gathered and analyzed systematically. This study aimed to systematically review and perform a meta-analysis of the prevalence and reasons of self-medication during pregnancy around the world.

**Materials and Methods**

The systematic review and meta-analysis was conducted in 2018, using the approach adopted in the book “A Systematic Review to Support Evidence-Based Medicine”. 23 Moreover, we followed the guidelines for conducting and reporting meta-analyses Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). 24 The PRISMA statement consists of a 27-item checklist and a 4-phase flow diagram consisting of identification, screening, eligibility, and inclusion. The key element in this process is to identify the best available studies on the topic of interest by designing a screening protocol with sound eligibility criteria. 25

Review of the Literature (Identification): In order to identify all relevant publications reporting the prevalence of self-medication in pregnant women, data were collected through searching following keywords: medication, self-medication, over-the-counter, non-prescription, prevalence, etiology, occurrence,
pregnant women and pregnant in PubMed, Scopus, Google Scholar, MagIran, IranMedex, and Scientific Information Database (SID). Published articles were studied in English and Persian languages (Table 1 shows the search strategy for PubMed databases). The related journals and websites were searched manually and the reference lists of the selected articles were also checked. Finally, we also searched the gray literature and consulted with experts.

Due to the limited number of studies, there was no time limitation for search. Also, since time limitation had no significant effect on the results, the authors decided not to apply time limitation.

Data extraction (Screening): In the first step of article selection, articles with non-relevant titles were excluded by two reviewers (M.M, S.A.A). Then, in the second step, the abstracts and full texts of the articles were reviewed in order to include those articles matching the inclusion criteria. Reference management (Endnote X5) software was utilized to organize and assess the titles and abstracts and identify duplicate articles. Disagreements in each step were resolved by consensus with a third reviewer (A.M). Abstracts were reviewed by two authors independently (M.M. and S.A.) and selected based on consensus if they met the study criteria. Data were extracted from the included articles, using a standard data collection form and for each study, information about the study characteristics, sample size, self-medication prevalence, drug group, type of disease, and reasons of self-medication was reported.

Quality assessment (Eligibility): Two reviewers (M.N. and S.G.Sh.) evaluated the articles on the basis of the ‘Strengthening the Reporting of Observational Studies in Epidemiology’ (STROBE) checklist. This checklist has 43 questions and the highest score was 45. The studies with a score of over 40 were selected as articles with adequate quality.

Inclusion and exclusion criteria (Included): The studies with adequate quality that focused on prevalence of self-medication in the pregnant women, cross-sectional studies and those published in English or Persian Languages were included. Conference presentations, case reports, interventions, proceedings and qualitative studies were excluded from the analysis. Articles were excluded if they did not meet the inclusion criteria.

Data analysis: R software version 2.14 (R Foundation for Statistical Computing, Vienna, Austria) was applied for meta-analysis; it estimates the overall self-medication prevalence (event rate). The meta-analysis was performed, using a random-effects model to estimate the self-medication prevalence, with 95% confidence interval. Q statistics and I² were used to measure heterogeneity (I² greater than 50% is considered as heterogeneity). To identify and reduce the source of heterogeneity, sensitivity analysis was done. Publication bias was assessed through the funnel plot. Funnel plot is a useful tool to visually assess the potential publication bias. In the funnel plot, the X-axis represents the mean result and the Y-axis shows the sample size or an index of precision. Microsoft Office Excel 2010 was used to draw the graph.

**Results**

In this study, out of 501 articles, finally 13 articles completely related to the study objects

| Set | Strategy | Results |
|-----|----------|---------|
| #1  | (((self-medication [Title]) OR Medication [Title]) OR over-the-counter [Title]) OR non-prescription [Title] | 2987    |
| #2  | (((prevalence OR etiology) OR occurrence) | 9856646 |
| #3  | ((pregnant women [Title]) OR pregnant[Title]) | 38960   |
| #1 AND #2 AND #3 | | 20      |

*Filters activated: Journal Article, Full text, Publication date to 2018/01/01, Humans, English*
Prevalence and reasons of self-medication in pregnant women

Based on the searches in PubMed, out of 20 papers retrieved, 9 were removed due to duplicates. Also, in the title, abstract and full-text screening, 7 cases were also excluded; finally, 4 articles were finally included in the study (Table 1).

The results of the extracted data from the entered articles are summarized in Table 2. In the 13 articles reviewed, 6202 individuals had been studied. The highest prevalence was observed in Nigeria (72.4) and lowest in Iran (2.2). The overall prevalence of self-medication in pregnant women is shown in Figure 2.

The overall prevalence of self-medication in pregnant women based on the random effect model was determined to be 32% (95% CI, 22% - 44%). 95% CI for the prevalence was drawn for each study in the horizontal line format (Q=885.9, df=12, P<0.01, I²= 99, Tau²: 0.84). Due to high heterogeneity of the results, sensitivity analysis was done after excluding Ziayee et al. (2008) and Liao et al.’s (2015) studies. The results showed that after sensitivity analysis, heterogeneity improved considerably (Figure 3). (Q=689, df=10, P<0.01, I²= 99, Tau²: 0.67). After this change, the overall prevalence of self-medication based on the random effect model was determined to be 43%.

To evaluate the publication bias, we applied funnel plot (Figure 4). The result of this funnel plot showed that there was the possibility of publication bias among the studies.

According to the findings, the most common drug groups the pregnant women self-medicated were herbal (48%), nutritional agents (27.1%), analgesics and antipyretic (25%), antibiotics (20.9%), vitamins (19.9), and sedatives and hypnotics (16.5%). Also, the most common diseases for which the pregnant women self-medicated were anemia (55%), respiratory (34%), digestive (27.3%), neurological (24%), cough and cold (19.5%), dermatological (18%), headache (16.3%) and

**Figure 1**: Flow diagram for study selection for systematic review
| Author, year | Country | Sample size | Design | Self-medication prevalence(%) | Drug group(%) | Type of disease(%) | Cause of Self-medication(%) |
|--------------|---------|-------------|--------|-------------------------------|--------------|------------------|-----------------------------|
| Marwa, KJ et al: 2018 | Tanzania | 372 | Cross-sectional | 46.2 | - Antimalarial (24.42) | - Malaria (32.56) |
| | | | | | - Antibiotics (9.58) | - Urinary Tract Infection (9.3) |
| | | | | | - Antiemetic (34.30) | - Morning Sickness (25.55) |
| | | | | | - Analgesics (19.19) | - Heartburn (2.34) |
| | | | | | - Antisthmia (1.74) | - Headache (19.19) |
| | | | | | - Antiepileptic (1.16) | - Asthma (1.74) |
| | | | | | - Antihypertensive (1.16) | - Epilepsy (1.16) |
| | | | | | - Cough & Cold Remedies (0.23) | - Hypertension (1.6) |
| | | | | | - Heartburn (1.74) | - Cough & Cold (5.25) |
| | | | | | - Antihelminitics (1.16) | - Diarrhoea (1.58) |
| Joseph, BN et al: 2017 | Nigeria | 350 | Cross-sectional | 62.9 | - Knowledge about the disease and-how it is treated (31.4) | - Previous use of medication (31.4) |
| | | | | | - Previous use of medication (26.3) | - Treatment for a minor ailment (19.8) |
| | | | | | - Treatment for a minor ailment (19.8) | - Recommendation from friends/acquaintances (7) |
| | | | | | - Serves time (7) | - Cost effectiveness (6.4) |
| Yusuff, KB et al: 2011 | Nigeria | 1650 | Prospective cross-sectional | 63.8 | - Paracetamol (34.3) | - Body pains/fever (30.1) |
| | | | | | - Hematinics + vitamins (33.8) | - Joint pain (14.5) |
| | | | | | - Local herbs (11.7) | - Cough (10.2) |
| | | | | | - Piroxicam (5.6) | - General weakness (9.2) |
| | | | | | - Cough medicines (5.4) | - Indigestion (8.5) |
| | | | | | - Dipyrene (2.7) | - Headache (7.8) |
| | | | | | - Ampicilin (1.9) | - Sleeplessness (7.6) |
| | | | | | - Chloramphenicol (1.6) | - Nausea (7.2) |
| | | | | | - Prednisolone (1.4) | - Heart burn (2.5) |
| | | | | | - Diazepam (0.8) | - Body swelling (2.4) |
| | | | | | - Calcium supplements (0.8) | - accessibility/uncontrolled availability (40) |
| | | | | | | - Long distance to public health facilities (29.6) |
| Bagheri, A et al: 2014 | Iran | 303 | Cross-sectional | 60.5 | - Chemical (2.2) | - Body pains/fever (30.1) |
| | | | | | - Herbal (84.2) | - Joint pain (14.5) |
| | | | | | - Acetaminophen | - Cough (10.2) |
| | | | | | - Amoxicillin | - General weakness (9.2) |
| | | | | | - Antihistamines | - Indigestion (8.5) |
| | | | | | - Cold | - Headache (7.8) |
| | | | | | - Fluoxetine | - Sleeplessness (7.6) |
| | | | | | - Ranitidine | - Nausea (7.2) |
| | | | | | | - Heart burn (2.5) |
| | | | | | | - Body swelling (2.4) | - accessibility/uncontrolled availability (40) |
| | | | | | | - Long distance to public health facilities (29.6) |
| Ziaee, T et al: 2008 | Iran | 180 | Descriptive, Cross-sectional | 2.2 | - Chemical (2.2) | - Body pains/fever (30.1) |
| | | | | | - Herbal (84.2) | - Joint pain (14.5) |
| | | | | | - Acetaminophen | - Cough (10.2) |
| | | | | | - Amoxicillin | - General weakness (9.2) |
| | | | | | - Antihistamines | - Indigestion (8.5) |
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| | | | | | - Ranitidine | - Nausea (7.2) |
| | | | | | | - Heart burn (2.5) |
| | | | | | | - Body swelling (2.4) | - accessibility/uncontrolled availability (40) |
| | | | | | | - Long distance to public health facilities (29.6) |
## Prevalence and reasons of self-medication in pregnant women

| Author, year | Country | Sample size | Design | Self-medication prevalence(%) | Drug group(%) | Type of disease(%) | Cause of Self-medication(%) |
|--------------|---------|-------------|--------|-------------------------------|---------------|-------------------|-------------------------------|
| Shamsi, M and Bayati, A: 2010 | Iran | 400 | Descriptive, Cross-sectional | 12 | - Antibiotics(48) - Cold(43) - Iron tablet(40) - Sedatives(38) - Antipyretic (26) - Acetaminophen(24) - Multivitamins(22) - Folic acid(21) | - anemia (55) - Digestive (46) - Respiratory (34) - Neurological disease(24) - headache(22) - Dermatological (18) | - Ignorance of the disease(58) - Not having health insurance(56) - High costs of visit (54) - Previous experience of disease(51) - Lack of access to physician(44) - Not enough time(40) - Previous use of medication(34) - Convenient Access(32) - Easy to buy without prescription(26) - Ensure the safe medication(24) - Lack of information on the effects of drugs(23) |
| Ghaneie, R et al: 2013, | Iran | 116 | Descriptive, Cross-sectional | 27.6 | - Analgesics(15) - Antibiotics(5) - Vitamins(4) - Digestive(3) | | - No time to see the doctor(13.8) - High costs of visit (22.4) - Underestimate the problem(47.4) - Fear of having a serious illness(11.2) - Lack of physician trust(5.2) |
| Baghianimo-ghadam, M. H. et al:2013, | Iran | 180 | Descriptive-analytic cross-sectional | 35 | | | |
| Sattari, M et al: 2012, | Iran | 400 | Cross-sectional | 44.9 | herbal medicine | | |
| Afshary, P. et al: 2015 | Iran | 801 | Descriptive-analytical | 31 | | | - Convenient Access(5.2) - Mild Disease(19.8) - Previous experience of disease(49) - Ignorance of the disease(4.2) - Costly medical expenses(35.4) - Lack of healthcare insurance(2.1) - Lack of time(2.1) - The drug at home(2.1) - Experiencing good Result from self-medication(15.6) - Lack of physician trust(3.1) |
| Author, year, Country, Sample size | Design | Self-medication prevalence(%) | Drug group(%) | Type of disease(%) | Cause of Self-medication(%) |
|-----------------------------------|--------|-------------------------------|--------------|-------------------|-----------------------------|
| Abasi-ubong, F: Nigeria 2012,     |        | 72.4                          | -fever/pain relievers (41.9) | protection from witches and witchcrafts, preventing pregnancy from coming out, for blood: poor sleep, fever and vomiting and infections. |
| Abeje G, et al: Ethiopia 2015, North-west |        | 25.1                          | -modern medication(68.7) -traditional(21.1) | -Less Costly (6.25) -Underestimate The problem(22.6) - Long Waiting time(11.7) - Previous Use Of medication(11.7) |
| Liao, Sh. et al:2015 China       |        | 2.6                           |              |                   |                             |

Figure 2: The overall prevalence of self-medication in pregnant women according to random effect model

Figure 3: The overall prevalence of self-medication in pregnant women after sensitivity analysis (excluding Ziayee et al. (2008) and Liao et al.’s (2015) studies)
articulur health problems (14.5%).

The most common reason of self-medication are shown in Figure 5.

As shown in Figure 5, the most important self-medication determinant factors were previous experience of disease, lack of access to physicians, and high costs of visit.

**DISCUSSION**

The results of the current study showed that the overall prevalence of self-medication among pregnant women in the world is about 32% although the results show high heterogeneity. However, a sensitivity analysis was done to improve it. This rate is similar to the results of a systematic review which investigated self-medication among the elderly. Results of a review study also showed that the prevalence of self-medication among the adolescents varies from 2 to 92%. Despite the expected higher prevalence of self-medication in pregnant women than other groups, due to pregnancy complications, the results of the current study, compared with findings of the studies conducted in the field, showed that self-medication among pregnant women compared to other groups in general was relatively low. One of the important reasons for this issue could be pregnant women's fear of the effects of self-medication on their fetuses because self-medication in pregnant women due to fetal abnormalities is more sensitive in other people and the consumption of medicines during pregnancy is considered as an important factor for fetal abnormalities. Also, during recent years, initiatives and interventions, such as enhancing knowledge of people about the consequences of self-medication, educating physicians and pharmacists about appropriate prescription of medicines and counseling to medicine users as well as providing brochures and catalogs on a large scale were planned and implemented, in particular for pregnant women, which could be effective in this regard.
However, given the sensitivity and risks of self-medication during pregnancy, 32 percent (more than one third of pregnant women) is a high rate and serious initiatives should be taken into account by authorities and health systems managers as well as families, in turn, in order to prevent and reduce the issue.

Herbal medicines and dietary supplements were the most medicine groups arbitrarily consumed by pregnant women. In a study which investigated self-medication among the elderly, painkillers were the most arbitrarily consumed medicines. In another studies, painkillers were also the most arbitrarily consumed medicines. Also, many other studies reported a significant relationship between female gender and self-medication of painkillers.

Anemia was the most common problem for the treatment of which pregnant women arbitrarily used medicines. Some studies conducted on self-medication also reported anemia as the most important disease for the treatment of which self-medication is common. Anemia was the most common problem for the treatment of which pregnant women arbitrarily used medicines. Some studies conducted on self-medication also reported anemia as the most important disease for the treatment of which self-medication is common.

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During pregnancy, the need to iron for pregnant women’s body significantly increases. During pregnancy, the blood gradually increases up to 50 percent of the normal level. Additional iron is needed to produce enough hemoglobin for this blood volume. During this period, extra iron is required for the fetus and placenta. Given that in this study dietary supplements were the second medicines groups used arbitrarily, pregnant women probably prepared and used iron supplements arbitrarily. Since arbitrary use of dietary supplements, in particular iron without physician consultation, may have a bad effect, dietary supplements, especially iron, should not be available without physician prescription for people and pregnant women; also sufficient trainings in this regard should be provided.

The results of the study showed that the most reasons for self-medication was previous experience of the disease. This issue was similar to the most studies conducted in

the field of self-medication. Given that the majority of diseases and discomforts of pregnancy such as nausea and vomiting are usually repeated periodically, and also some diseases and conditions are experienced during first pregnancies, women often prefer to deal with these similar situations and conditions using previous prescribed medicines.

The results of this study showed that the prevalence of self-medication among pregnant women has been relatively high and requires effective measures and interventions to reduce and prevent self-medication among this group. Providing the required information and raising awareness about complications resulting from self-medication, in particular herbal medicines and dietary supplements should be taken into account. Educating physicians and pharmacists about prescribing proper and adequate quantity of medicines, avoiding the provision of medicines without physician prescription,
increasing pregnant women’s access to maternal care services, reducing the costs of maternal care services and building culture using public media in order to decrease self-medication can be taken into consideration. Due to the importance of publication bias in systematic reviews, it is recommended that researchers apply funnel plot to assess the publication bias.

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