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The Prevalence of Pre-eclampsia Among Iranian Pregnant Women: A Systematic Review and Meta-analysis

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Abstract

Introduction

Preeclampsia is clinically diagnosed with increased maternal hypertension associated with proteinuria after two weeks of pregnancy. This study aimed to determine the overall prevalence of preeclampsia among Iranian pregnant women.

Methods

We performed this study according to PRISMA instructions. Major electronic databases were searched using Mesh terms (prevalence, incidence, preeclampsia and Iran). We searched in international databases of PubMed, Scopus and Science Direct. In addition, we searched the following national databases: Science Database, Magiran and Iran Medex. Two authors performed data collection, and screened credit evaluation independently the title and abstract of the retrieved studies and reviewed complete texts to extract studies that met the inclusion criteria for this meta-analysis. Stata software (11 Stata Corp., College Station, TX, USA) was used for data analysis.

Results

A total of 4 studies including 23710 pregnant women were included. The overall prevalence of pre-eclampsia among Iranian pregnant was 3% (95% CI: 3%-3%, I²: 98%) ranging from 1.9% in Iranshahr to 5.5% in Zanjan

Conclusion

The prevalence of preeclampsia has been increasing in recent years, while the prevalence of eclampsia has been declining. It seems that in the future, preeclampsia and its complications will become a serious public health problem in Iran. This issue should receive special attention from policymakers. In addition, despite numerous studies aimed at the prevalence of preeclampsia, a national study is needed to estimate the exact prevalence of preeclampsia and eclampsia in the country. Establishing a risk assessment system during pregnancy in Iran can provide valuable data on the prevalence of maternal and child health problems such as preeclampsia and eclampsia.

Keywords: prevalence, pre-eclampsia, Iran

Introduction

Preeclampsia is clinically diagnosed with increased maternal hypertension associated with proteinuria after two weeks of pregnancy. The pathophysiology of preeclampsia is not fully known; it is not clear whether it should be followed in early pregnancy (1) or during pregnancy. Preeclampsia is the second most common cause of maternal mortality in Iran and constitutes 14% of maternal mortality cases (2). The prevalence of preeclampsia in the world is 3 to 10%, but in developing countries, it is reported to be 20%. The World Health Organization estimates that preeclampsia directly involves 10% of maternal mortality in Asia. Kharghani et al. estimate the prevalence of preeclampsia in Iran by 5% (3). A study conducted by Tucker et al. (2017) showed that potential risk factors for preeclampsia are personal or family history, first pregnancy, presence of anti-phospholipids, history of diabetes, multiple pregnancies, hypertension or its increase during pregnancy, high body mass index before or during pregnancy and maternal age (more than 40 years). There is evidence that the risk of preeclampsia increases with the interval between pregnancies of ten years or more, autoimmune disease, kidney disease, and chronic hypertension (4). In his research, Almogabil has shown that these cases can also contribute to the development of preeclampsia: low level of maternal literacy, delivery in autumn and winter, maternal blood type and low maternal weight (5). Fetal complications include, as reported, low Apgar score, NICU hospitalization, stillbirth, preterm birth and death (6) and maternal complications including increased rate of cesarean section, vaginal bleeding, liver disorders, PRES syndrome, DIC syndrome, HELLP, premature placental abruption and pulmonary edema (7). Factors such as obesity, hypertension, and changes in carbohydrate metabolism in women of childbearing age cause a range of diseases from anovulation to gestational diabetes and preeclampsia (8). In Leo's study, increased BMI, maternal age, living in small towns, and the cold season were among the risk factors for preeclampsia (9).

According to the research of Shahidifar et al., performed as a control case in Amol hospitals in 2014, 205 people were in the case group, and 250 people were in the control group. The preeclampsia occurred mostly in autumn and then in winter (10). In the Mahsob study, preeclampsia was more common in people with blood type O (11). Bergis's research, however, is more common in people with AB-negative blood type (12). In another study, people with a non-O blood type were less likely to develop preeclampsia (13). Some studies found no association between preeclampsia and blood type (14). The incidence of preeclampsia is different in different regions. In different studies, different blood groups have been mentioned for preeclampsia patients. On the other hand, although many studies have been conducted on the relationship between the causal and epidemiological causes of preeclampsia around the world, due to the role of demographic and regional factors, indigenous and periodic studies are necessary to study these factors in the population of Iran and compare it with other countries. This study aimed to determine the overall prevalence of preeclampsia among Iranian pregnant women.

Method

We performed this study according to PRISMA instructions.

Search for studies:

Major electronic databases were searched using Mesh terms (prevalence, incidence, preeclampsia and Iran). We searched in international databases of PubMed, Scopus and Science Direct. In addition, we searched the following national databases: Science Database, Magiran and Iran Medex.

Inclusion and Exclusion Criteria: All studies were descriptive, cross-sectional, prospective or retrospective. The prevalence or accumulation of preeclampsia was reported in Iranian hospitals and was retrieved after January 1, 2017. Due to the short duration of pregnancy, the "prevalence or cumulative occurrence" of preeclampsia was considered the "prevalence" of preeclampsia.

Cross-sectional studies were used to determine the prevalence of preeclampsia and eclampsia, and prospective or retrospective cohort studies were used for the cumulative occurrence of preeclampsia and eclampsia. The pregnant Iranian population, regardless of age, was considered the study population. Primary and secondary outcomes were considered regarding the prevalence of preeclampsia and eclampsia, respectively. We excluded case-control studies, randomized clinical trials, and quasi-experimental studies.

Two authors performed data collection, and screened credit evaluation independently the title and abstract of the retrieved studies and reviewed complete texts to extract studies that met the inclusion criteria for this meta-analysis. Any dispute was resolved by the judgment of the third author. The variables extracted for data analysis included the journal's author, year, province, study plan, the total number of participants, number of outcomes, age and gestational age.

Selected studies were used to evaluate the quality of the studies. These include: 1) Provide key elements of study design. 2) Defining eligibility criteria. 4) Explain how the study sample was obtained. 5) Description of relevant settings, places and dates 6) Provide data sources and details of evaluation and statistical methods.

Heterogeneity and diffusion bias:

We evaluated Statistical heterogeneity with the Chi-square test, inconsistency through the results of studies with I-square statistic, and variance between studies with tau-square statistic. Stata software (11 Stata Corp., College Station, TX, USA) was used for data analysis. We performed a meta-analysis to obtain criteria for the "prevalence" of preeclampsia and eclampsia in the Iranian pregnant population. Data were analyzed, and results were reported using a random effects model.

Results

Study selection

A total of 447 articles were extracted through initial searches in various databases. Out of 349 essential studies identified by analyzing titles and abstracts, 132 studies were omitted due to irrelevant titles. 327 articles were removed from 349 existing studies. Out of 327 deleted studies, 110 articles did not have full text, 51 articles were review articles, 27 articles were letters to the editor and 7 articles did not meet the study criteria. Out of the remaining 22 studies, 4 studies met the study criteria. (figure 1)

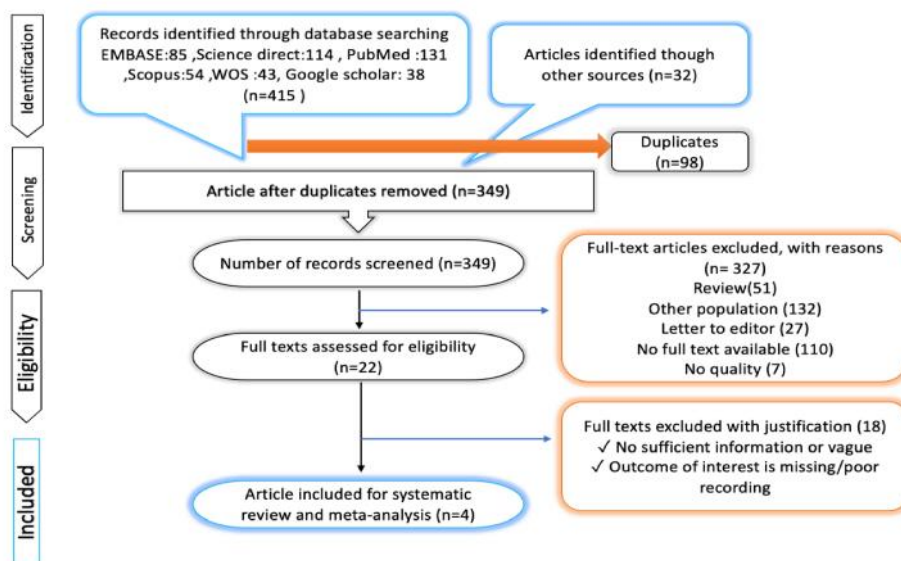


Figure1. PRISMA flow diagram for selection of the studies

Research specifications

A total of 23710 pregnant women were evaluated. A total of 4 studies from 4 provinces that met the inclusion criteria were reviewed. The included studies were form Zanjan, Iranshahr, Jiroft and Yasuj. The risk of bias was low in most studies. The main method of data collection was medical records.

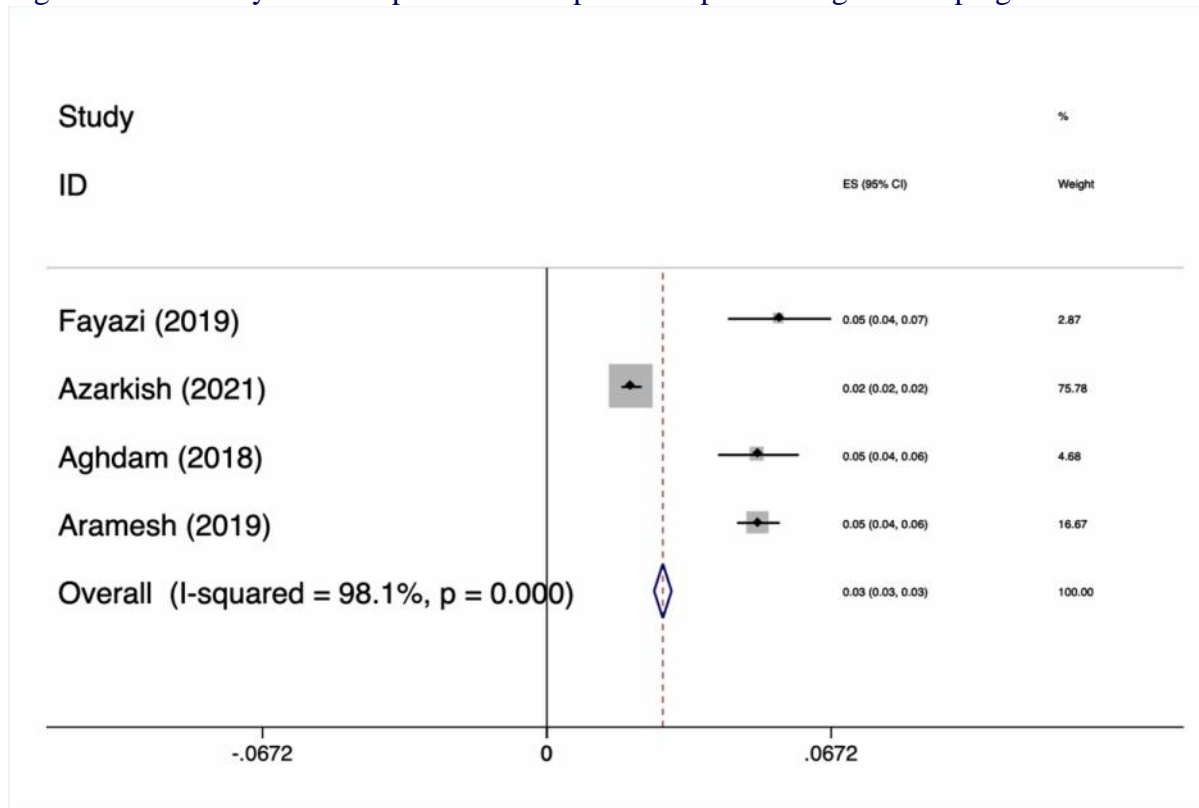
Meta-analysis of the prevalence of pre-eclampsia

The overall prevalence of pre-eclampsia among Iranian pregnant was 3% (95% CI: 3%-3%, I²:98%) ranging from 1.9% in Iranshahr to 5.5% in Zanjan.

Table1. Characteristics of the included studies regarding the prevalence of pre-eclampsia

| Author | Year | Province | Design | Sample size | Mean age | Prevalence of pre-eclampsia |
|----------|------|-----------|--------|-------------|-----------|-----------------------------|
| Fayazi | 2019 | Zanjan | Retro | 1340 | 20-35 | 5.5% |
| Azarkish | 2021 | Iranshahr | Retro | 13262 | 29.6±7.2 | 1.96% |
| Aghdam | 2018 | Jiroft | Retro | 2000 | 30.28±7.8 | 4.7% |
| Aramesh | 2019 | Yasuj | Retro | 7108 | N/A | 4.92% |

Figure2. Meta-analysis of the prevalence of pre-eclampsia among Iranian pregnant women



Discussion

Preeclampsia is a potentially dangerous complication in the second half of pregnancy, childbirth, or early postpartum that we can manage. Eclampsia is the final stage of the disorder characterized by generalized seizures. [15] Preeclampsia occurs in about 2-10% of pregnancies worldwide. [16] The results of this study showed that the prevalence of preeclampsia in pregnant women was percent and has increased in recent years.

The prevalence of eclampsia is also 0.23% and has been declining in recent years. Therefore, this study supports the increase in preeclampsia and the decrease in the prevalence of eclampsia in the world [17]. We should consider the increasing prevalence of preeclampsia as a serious warning that threatens the health of the mother, fetus and baby shortly. Special attention is paid by health policymakers and planners who plan prevention and control programs. The combined prevalence of preeclampsia in sub-Saharan Africa was 4.1%. This finding is consistent with the prevalence of preeclampsia in Africa (5.3%) (18), the United States (3% to 5%) (19 and 20), and the global estimate (1.8% - 4.4%) (21).

According to the study, the prevalence of eclampsia was 1.5%, similar to the study conducted in Africa (1.47%) (12). But global estimates (0.2% - 9.2%) (21) are slightly higher than a survey conducted in China (0.9%). The prevalence of multi-country surveys by the WHO (22) is 0.3%. This difference may be due to racial differences. In addition, this diversity may be attributed to differences in ethnicity, age distribution, socioeconomic status, equality, and method of study (23,24).

Limitations:

Most articles do not report the relevant baseline demographics; this is not considered in the meta-analysis; it limits the evaluation of confounding factors. Coexistent factors such as maternal age and ethnicity, recognized as associated with preeclampsia and adverse pregnancy outcomes, may play a role in causing bias, but their relative

effects are unknown. Quantitative studies reported control data. Therefore, it was not possible to compare the results between women with preeclampsia and women with normal blood pressure directly.

Conclusion

The prevalence of preeclampsia has been increasing in recent years, while the prevalence of eclampsia has been declining. It seems that in the future, preeclampsia and its complications will become a serious public health problem in Iran. This issue should receive special attention from policymakers. In addition, despite numerous studies aimed at the prevalence of preeclampsia, a national study is needed to estimate the exact prevalence of preeclampsia and eclampsia in the country. Establishing a risk assessment system during pregnancy in Iran can provide valuable data on the prevalence of maternal and child health problems such as preeclampsia and eclampsia.

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