

Analysis of risk factor of preeclampsia: A literature review

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Abstract

Introduction: Preeclampsia is an obstetric illness that coexists with other pregnancy-related hypertension diseases on a spectrum. Preeclampsia, in addition to hemorrhage and infection, is a major cause of maternal death worldwide.

Method: This research method used literature reviews from Pubmed, ScienceDirect, and Google Scholar published between 2012 and 2022. The research design is case-control, cross sectional, and cohort research and the journal is original and full text.

Results and Discussion: Six articles included in the review. Risk factors associated with the prevalence of preeclampsia included the age of pregnant women, multiple pregnancy, nulliparity, medical history (chronic hypertension), antenatal care (ANC) visit, weight gain, obesity, diabetes, inappropriate ANC examination, primigravida, heredity factor, preeclampsia history.

Conclusion: By identifying and treating modifiable risk factors, preeclampsia as complications of the mothers and newborns health could be prevented.

Keywords: Preeclampsia; Risk factor; Hypertension; Maternal

1. Introduction

Preeclampsia/eclampsia is defined as hypertension (≥ 140 mmHg systolic or ≥ 90 mmHg diastolic) usually begins after 20 weeks of pregnancy, followed by proteinuria, and/or edema. In some situations, it might result in coma [1,2]. In world wide, the maternal mortality rate is still high. Controlling maternal mortality is still a challenge. According to WHO report, preeclampsia and eclampsia during pregnancy are two of the key problems that cause up to 75% of all maternal deaths [3].

Preeclampsia have the potential to have severe short- and long-term effects on the health of the maternal and fetal. This includes a 1,5-fold increased risk of stroke, two to four greater risk of long-term hypertension, a doubling of the risk of cardiovascular death and significant adverse cardiovascular events. This pertains to the antenatal risks of intrauterine growth restriction (IUGR), premature birth (more frequently caused by iatrogenic [2]).

Prenatal corticosteroid therapy and magnesium sulfate infusions are largely intended to prevent the negative effects of preterm. Optimizing the timing of delivery is another step in preventing negative fetal outcomes [2]. Preventing severe preeclampsia complications for both maternal and neonatal well-being also can prevent by intervening in controllable risk factors [4].

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2. Material and methods

The literature review method was used in this study. We only refer to publications that have been published during the last ten years. We use journals from PubMed, ScienceDirect, and Google Scholar, among others. The keywords used to search for articles were "preeclampsia" and "risk factors" and continued to select articles before finally being used for review material.

3. Results and discussion

Based on a search of the articles collected and the author's analysis, it was found that:

Table 1 List of articles

No	Author	Research Title	Country	Method	Instrument	Result
1.	Honesty Pujiyani ^[10]	Risk Factors for Preeclampsia	Indonesia	Observational with case control	Medical record	History of hypertension, diabetes mellitus, and preeclampsia. Multiple logistic regression analysis revealed that history of preeclampsia, hypertension, and diabetes mellitus were the risk factors for preeclampsia that most significantly influenced the incidence of preeclampsia.
2.	Saraswati N. dan Mardiana ^[5]	Risk Factors Associated with the Incidence of Preeclampsia in Pregnant Women (Case Study at Brebes District Hospital in 2014)	Indonesia	Observational with case control	Medical Record	According to research using the chi-square test, the factors associated with the incidence of preeclampsia were age, gravid status, history of heredity, antenatal check-up, history of preeclampsia, and history of hypertension. The unrelated covariates included the type of job, educational attainment, a history of diabetes mellitus, and a history of numerous pregnancies.
3.	Yingying Yang, Isabelle Le Ray, Jing Zhu, Jun Zhang, Jing Hua, and Marie Reilly ^[5]	Preeclampsia Prevalence, Risk Factors, and Pregnancy Outcomes in Sweden and China	Sweden and China	Cross sectional	Medical Record	The mean of maternal ages in Swedish and Chinese pregnancies were 30.9 (5.3) years and 28.6 (4.6), respectively. Although the total prevalence of preeclampsia in Sweden and China was 16 068 (2.9%) and 1803 (2.3%), respectively, 5222 cases (32.5%) and 1228 cases (68.1%), respectively, were classified as severe. Obesity was a higher risk factor in China than in Sweden. Obesity was defined as BMI 28 in China and BMI 30 in Sweden. In Sweden compared to China, nulliparity

						had a substantially greater link with severe preeclampsia. The total stillbirth rate for singletons in China was 10 times higher among preeclamptic women and more than 3 times higher than in Sweden.
4.	S.T. Rahmawati Hamzah, Aminuddin, Irfan Idris, and Muhammad Rachmat. ^[8]	Antenatal care parameters that are the risk factors in the event of preeclampsia in primigravida	Indonesia	Case-control	Medical Record	The incidence of hypertension in trimester 1 in primigravida mothers had a greater risk for preeclampsia than mothers without a history of hypertension in trimester 1, irregular antenatal visits are more likely to develop preeclampsia than regular antenatal visits, and weight gain in primigravida mothers of 1–10 kg has a greater risk of developing preeclampsia than the weight gain in the age group 29–49 years.
5.	A. Fahira Nur, Adhar Arifuddin ^[6]	Risk Factors for Preeclampsia in Pregnant Women at Anutapura General Hospital, Palu City	Indonesia	Observational with case control	Questionnaire	Preeclampsia risk for primigravida was found to be OR = 4.654 (1.594-13.593), obesity risk was found to be OR = 5.632 (2.028-15.640), hypertension risk was found to be OR = 1.591 (0.652-3.883), and pregnancy/ANC visits were shown to be risk factors for preeclampsia.
6.	Yusef S. Khader, Anwar Batieha, Rania Ali Al-njadat & Sa'ad S. Hijazi ^[7]	Preeclampsia in Jordan: incidence, risk factors, and its associated maternal and neonatal outcomes	Jordan	Cohort	Interview and Questionnaire	Preeclampsia was more common in women 20–35 years old (OR 14 3.7; 95% CI: 1.7, 7.8) than in those >35 years old. Preeclampsia is much more likely to occur in those who are obese (OR142.6) and have high blood pressure (OR1411.9).

Based on the 6 selected articles described in the following paragraphs, the discussion section will discuss factors that increase the risk of preeclampsia:

3.1. Age

Research conducted by Saraswati, et al (2016) at Brebes District Hospital in 2014 stated that regarding the relationship between age and the incidence of preeclampsia, respondents aged <20 and >35 years had a risk of preeclampsia with OR = 15.731 and p value = 0 ,0001.

Research conducted by Khader, et al (2017). also states that there is a relationship between age and the incidence of preeclampsia, where respondents aged <20 years and 20-35 years have a higher risk of experiencing preeclampsia than those aged >35 years with a p value value = 0.000.

According to studies conducted by Hamzah, et al. at HM Djafar Harun Hospital and Benyamin Guluh Hospital in 2014–2018, primiparous between the ages of 14 and 28 were more at risk than those between the ages of 29 and 49. With a p value 0.002, it was determined that a mother's age affects her chance of developing preeclampsia in primigravida women, indicating a connection between maternal age and the prevalence of preeclampsia in these women.

Preeclampsia risk were present in women under the age of 35 in both Sweden and China, according to research conducted by Yang, et al. (2021) on [555.446 and 79.243 samples taken from the Swedish Medical Birth Register and the China Labor and Delivery survey. (Mild Preeclampsia : OR, 1,07; 95% CI, 1,02-1,13 dan OR, 2,06; 95% CI, 1,22-3,48; Severe Preeclampsia : OR , 1,14; 95% CI, 1,06-1,22 dan OR, 2,04; 95% CI, 1,59-2,63).

3.2. Multiple Pregnancy

Research conducted by Saraswati, et al. (2016) stated that there was no relationship between multiple pregnancies and the incidence of preeclampsia with a p value = 0.584.

Multiple pregnancies are associated with a higher risk of preeclampsia in Sweden and China, according to research by Yang et al. (mild PE: OR, 4.42; 95% CI, 4.04-4.85; and OR, 2.57; 95% CI, 1.49-4, 46; severe PE: OR, 5.76; 95% CI, 5.12-6.47; and 95% CI, 6.21; OR, 4.60-8.38).

3.3. Nulliparous

According to research from Yang, et al., nulliparas in Sweden had a 3–4 times increased risk of preeclampsia (OR, 2,97; 95% CI, 2,84-3,10 dan OR, 3,91; 95% CI, 3,65-4,18).

3.4. Hypertension

According to research conducted by Pujiyani, H (2018) hypertension significantly affects preeclampsia incident. Statistical test results multivariate obtained p-value = 0.000 ($p < 0.05$) and OR= 46.882. Hypertension increase the risk of occurrence preeclampsia as many as 47 times in mothers pregnant.

Research conducted by Saraswati, et al. (2016) stated that there was a relationship between a history of hypertension and the incidence of preeclampsia in pregnant women with p value = 0.0001 and OR = 6.026.

According to research by Hamzah, et al. (2021), the incidence of hypertension in the 1st trimester increases the risk by 3,045 times when compared to a pregnant women without hypertension with a risk range of 2,164-5,358. Inferred from this, hypertension in a pregnant woman is a risk factor for preeclampsia, with a p value of (0,000) indicating that there is a connection between hypertension in the first trimester and preeclampsia in a pregnant woman.

The results of a study conducted by Nur, et al (2017), showed that there was a relation between a history of hypertension and the incidence of preeclampsia with an OR = 1.591. This can be interpreted that a history of hypertension is 1.591 times more at risk of experiencing preeclampsia compared to people who do not have a history of hypertension.

3.5. Antenatal Care (ANC) Visit

Research conducted by Saraswati, et al. (2016) stated that pregnant women who did not carry out ANC had a 17.111 times risk of preeclampsia compared to pregnant women who did ANC with OR = 17.111 and p value = 0.0001.

Research conducted by Hamzah, et al. (2021) found that irregular ANC visits had a risk that was 1.095 times higher than regular ANC visits, which had a risk range of 0.970–1.831. As a result, ANC examinations in primigravida women increase the risk of preeclampsia because the p value (0.076) > 0.005 shows a connection between ANC visits and preeclampsia.

The results of a study conducted by Nur, et al (2017) with an OR of 7.933. This showed that the ANC visit is a risk factor for preeclampsia.

3.6. Weight Gain

According to research by Hamzah, et al. (2021), a weight gain of 1 to 10 kilograms carried a risk of 1.540, while a gain of 10 to 20 kilograms carried a risk range of 1.074 to 2.207. Therefore, it may be stated that weight growth increases

the probability of developing preeclampsia, as shown by the p value (0.000) < 0.005 that shows a connection between preeclampsia incidence in primigravida women and increased body weight.

Research from Yang, et al., also showed that there was a connection between being overweight and the incidence of preeclampsia (Mild PE: OR, 1,71; 95% CI, 1,63-1,80 dan OR, 3,14; 95% CI, 1,98-4,99; Severe PE: OR, 1,35; 95% CI, 1,26-1,45 dan OR, 2,29; 95% CI, 1,59-3,30).

3.7. Obesity

Research conducted by Yang, et al. preeclampsia incidence in Sweden and China is correlated with obesity. (Mild PE: OR, 3,23; 95% CI, 3,07-3,40 and OR, 4,86; 95% CI, 3,64-6,51; Severe PE: OR, 2,10; 95% CI, 1,94-2,27 and OR 4,46; 95% CI, 3,27-6,07).

Research conducted by Khader, et al (2017), showed that the p value between preeclampsia and obesity was 0.000. The p-value is less than 0.005 which means there is a relationship between preeclampsia and obesity in Jordan.

The results of research conducted by Nur, et al (2017), showed that obesity is a risk factor for preeclampsia. The results obtained were OR = 5.632, which means that obesity has a 5.632 times greater risk of experiencing preeclampsia compared to mothers who are not obese.

3.8. Diabetes

Based on the results of research conducted by Pujiyani, H (2018), diabetes mellitus significantly affected preeclampsia incident. Statistical test results multiple logistic regression obtained p value = 0.057 (p < 0.05) and OR = 6.279. Mother with diabetes mellitus at risk experienced preeclampsia 6 times greater than pregnant women without risk factors for diabetes mellitus.

Based on research conducted by Saraswati, et al. (2016), there was no significant relationship between a history of diabetes mellitus and the incidence of preeclampsia in pregnant women. It based on p value = 0.235 where the p value is greater than 0.05 (0.235 > 0.05) which means that there is no relationship between a history of diabetes mellitus and the incidence of preeclampsia in pregnant women.

According to research by Yang et al., gestational diabetes and a history of diabetes in pregnant women associated with preeclampsia in Sweden (odds ratio [OR]: 4.62; 95% confidence interval [CI]: 4.04-5.29; 5.36; 4.47-6.43; and OR: 2.97; 95% CI: 2.63-3.35; and OR: 2.29; 1.88-2.80). However, in the Chinese study, diabetes only associated with severe preeclampsia (history of diabetes: OR, 3.15; 95% CI, 1.37-7.27; gestational diabetes: OR, 2.13; 95%).

3.9. ANC Examination

Research conducted by Hamzah, et al. (2021) showed that an inappropriate ANC examination has a risk of 1.333 times greater than an appropriate ANC examination with a range of 0.970-1.831. Thus could be concluded that ANC examination has a risk of preeclampsia in primigravida women where the p value (0.076) > 0.005 indicates a relation between ANC examination and the incidence of preeclampsia.

3.10. Primigravida

Research conducted by Saraswati, et al. (2016) stated that there was a significant relation between gravida status and the incidence of preeclampsia in pregnant women. It based on p value = 0.009 where the p value is less than 0.05 (0.009 < 0.05) which means that there is a correlation between gravid status and the incidence of preeclampsia in pregnant women and OR = 2.173 means that respondents who are primigravidas have a risk of 2.173 times experiencing preeclampsia compared to respondents who are multigravidas.

The results of research conducted by Nur, et al (2017) showed that the statistical test results obtained that primigravidas were a risk factor for preeclampsia with OR = 4.654. This shows that primigravidas are a risk factor for preeclampsia or which means that primigravidas are 4.654 times more likely to experience preeclampsia than multigravidas.

3.11. Heredity factor

Research conducted by Saraswati, et al. (2016) stated that there is a significant relationship between heredity with preeclampsia in pregnant women with p value = 0.033 and OR = 2.618 means that respondents who have a family history 2,618 times the risk of preeclampsia compared with respondents with no history.

3.12. Preeclampsia history

Based on the results of research conducted by Pujiyani, H (2018), history of preeclampsia significantly influences the incidence of preeclampsia. The results of the multiple logistic regression statistical test obtained a significant value or p-value = 0.047 ($p < 0.05$) and OR = 3.263. Women with a history of preeclampsia are 3 times more likely to have preeclampsia in their next pregnancy than women without a history of preeclampsia. Women who have a history of preeclampsia in the first pregnancy, known riskier for preeclampsia in the next pregnancy.

Research conducted by Saraswati, et al. (2016) stated that there is a significant relation between history of preeclampsia and preeclampsia in pregnant women with p value = 0.0001 and OR = 20.529 means that respondents who have a previous history of preeclampsia have a risk of 20.5 times experiencing incidence of preeclampsia compared with respondents without preeclampsia history.

4. Conclusion

Risk factors associated with the prevalence of preeclampsia include the age of pregnant women, multiple pregnancy, nulliparity, Medical history (chronic hypertension), visit anc, gain weight, obesity, diabetes, inappropriate ANC examination, primigravida, heredity factor, preeclampsia history. Therefore, it hoped that health workers could actively participate in educating them about the risk factors of preeclampsia, such as periodic pregnancy checks by trained medical personnel and health facilities to detect early signs and symptoms of pregnancy complications.

Compliance with ethical standards

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Disclosure of conflict of interest

There are no differences of opinion among the authors on the publication of this paper.

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