

ANALYSIS OF RISK FACTORS CONTRIBUTING TO PREECLAMPSIA AMONG PREGNANT WOMEN: A LITERATURE REVIEW

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ABSTRACT

Background: Preeclampsia remains one of the pregnancy complications that significantly contributes to increased maternal and fetal morbidity and mortality in various countries, including Indonesia. Numerous studies indicate that its occurrence is not influenced by a single factor but results from the interaction of multiple risk factors such as maternal age, parity, history of hypertension, nutritional status, obesity, and the quality of antenatal care services. **Objective:** This study aims to analyze the relationship between maternal age and parity with the incidence of preeclampsia based on a review of 16 national and international scientific articles published between 2007 and 2025. **Methods:** A literature review with a descriptive analytical approach was used, incorporating various research designs including cross-sectional, case-control, retrospective descriptive, narrative review, and other literature-based studies. **Results:** The findings show that most studies report a significant relationship between maternal age and preeclampsia, particularly among women aged under 20 years and over 35 years, who have a higher risk compared to those aged 20–35 years. Parity also demonstrates a meaningful association, as primiparous women are more frequently affected by preeclampsia than multiparous women, although some studies report inconsistent results. **Conclusion:** Overall, maternal age and parity are associated with the occurrence of preeclampsia; however, given the multifactorial nature of this condition, early detection and optimal pregnancy monitoring are required to prevent further complications.

Keywords: preeclampsia, maternal age, parity, risk factors, literature review.

INTRODUCTION

Preeclampsia is one of the pregnancy complications characterized by hypertension and proteinuria after 20 weeks of gestation, occurring in approximately 3–4% of all pregnancies worldwide. This condition is a major cause of maternal and fetal morbidity and mortality, particularly in countries with limited antenatal care services. Each year, around 50,000 women worldwide die due to preeclampsia, indicating that this disease remains a serious global health problem. Globally, hypertensive disorders in pregnancy remain one of the leading causes of maternal death. The World Health Organization (WHO) reports that pregnancy complications, including preeclampsia, contribute significantly to global maternal mortality. In Indonesia, around 30% of maternal deaths are caused by hypertensive disorders in pregnancy, including preeclampsia. This condition is also a serious health issue in North Sumatra, where maternal mortality is still influenced by cases of preeclampsia.

Preeclampsia not only affects the mother but also the fetus. Its impacts may include intrauterine growth restriction (IUGR), low birth weight, preterm delivery, and even fetal death. Therefore, early detection and appropriate management are essential to prevent further complications. Several risk factors are associated with the occurrence of preeclampsia, including maternal age and parity. Women who are too young (<20 years) or too old (>35 years) have a higher risk of experiencing pregnancy complications, including preeclampsia. In addition, parity also plays a role, where primigravida women are more at risk of developing preeclampsia compared to multigravida women.(Emilio 2022)

METHODS

This study used a literature review method with a descriptive analytical approach to analyze the relationship between maternal age and parity with the incidence of preeclampsia based on previous research findings.

The data used were secondary data from 16 relevant scientific articles, including both national and international journals published between 2007 and 2025, with research designs such as cross-sectional, case-control, retrospective descriptive, and other literature study designs

RESULTS

The following is a summary of the 16 articles that were successfully collected and reviewed, including the research design, the presence or absence of interventions, and the main findings of each.

No	Author/Year	Title	Study Design and Sample	Intervention/Variables	Results
1	(Veri et al. 2024)	<i>Preeclampsia: Pathophysiology, Diagnosis, Screening, Prevention, and Management</i>	Literature Review. No sample was included because the study reviewed scientific literature and clinical guidelines.	No direct intervention. Discussed prevention and management strategies including low-dose aspirin, supplements, blood pressure control, and magnesium sulfate.	Preeclampsia is defined as hypertension occurring after 20 weeks of gestation accompanied by organ dysfunction. Early screening, prevention, and appropriate management can reduce maternal and fetal complications.
2	Rahmawati, L., Amalia, F.E., Kahar, M., et al. (2022)(Pada et al. 2022)	<i>Literature Review: Risk Factors for Preeclampsia in Pregnant Women</i>	Literature Review of 5 studies (4 cross-sectional and 1 case-control) obtained from Google Scholar.	Review of risk factors associated with preeclampsia.	Risk factors included history of hypertension, previous preeclampsia, maternal age, BMI, parity, stress, knowledge level, ANC completeness, dietary patterns, and cigarette smoke exposure. Hypertension history was the most common risk factor.
3	(Andriani et al. 2022)	<i>Association Between Maternal Characteristics and Preeclampsia Among Pregnant Women</i>	Quantitative analytic survey with cross-sectional design. Population: 2,736 pregnant women. Sample: 349 respondents selected using systematic	Gravidity, multiple pregnancy, history of hypertension, and maternal age were analyzed using Chi-square test.	Significant associations were found between gravidity ($p=0.004$), multiple pregnancy ($p=0.037$), hypertension history ($p=0.000$),

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			random sampling.		maternal age (p=0.000), and preeclampsia. High-risk age was the strongest risk factor (OR=7.402).
4	(Cahyani et al. 2024)	<i>Narrative Review: The Effect of Anemia and Preeclampsia on Low Birth Weight (LBW)</i>	Narrative Review of 12 selected articles from 840 identified studies.	Literature review on anemia and preeclampsia as risk factors for LBW.	Anemia increased the risk of LBW by approximately 1.49 times. Preeclampsia was also significantly associated with LBW incidence.
5	(Silvana, Ramayanti, and Dimar Ramadhina 2023)	<i>Association Between Maternal Age, Gravida Status, and History of Hypertension with Preeclampsia</i>	Analytic observational cross-sectional study. Sample: 132 pregnant women selected through purposive sampling.	Maternal age, gravida status, and hypertension history.	Significant associations were found between maternal age (p=0.001; OR=4.508), gravida status (p=0.002; OR=3.077), hypertension history (p=0.008; OR=2.571), and preeclampsia.
6	(Arnani, Yunola, and Anggraini 2022)	<i>Association of Hypertension History, Obesity, and Antenatal Care Frequency with Preeclampsia</i>	Cross-sectional study. Sample: 133 third-trimester pregnant women.	Hypertension history, obesity, and ANC frequency.	Significant associations were found between hypertension history (OR=4.274), obesity (OR=5.135), inadequate ANC visits (OR=11.368), and preeclampsia.

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7	(Kurniasari, Amalia, and Handayani 2023)	<i>Association of Antenatal Care, Birth Spacing, and Preeclampsia with Low Birth Weight</i>	Analytic survey with cross-sectional approach. Sample: 81 newborns using total sampling.	ANC, birth spacing, and preeclampsia.	No association between ANC and LBW ($p=0.642$). Significant associations were found between birth spacing ($p=0.008$) and preeclampsia ($p=0.013$) with LBW.
8	(Masrurroh et al. 2022)	<i>Recognizing and Preventing Preeclampsia During Pregnancy in Wonokromo, Surabaya</i>	Community service project. Sample: 30 participants (pregnant women and health cadres).	Health education, seminar/webinar, early detection of preeclampsia, pre-test and post-test.	Knowledge increased from 40% during pre-test to 77.1% during post-test, indicating effective educational intervention.
9	(Annafi, Jumsa, and Budyono 2022)	<i>Profile of Severe Preeclampsia with Complications at NTB Provincial Hospital, 2018–2019</i>	Retrospective descriptive study. Sample: 87 women with severe preeclampsia.	No intervention; medical record review.	Complications occurred in 36.8% of cases. HELLP syndrome was the most common complication (21.8%), followed by eclampsia (18.4%). Maternal mortality was 4.6%.
10	(Annisa et al. 2024)	<i>Differences in Urea and Creatinine Levels Between Preeclampsia and Severe Preeclampsia</i>	Retrospective analytic cross-sectional study. Sample: 60 women (30 PE and 30 severe PE).	Comparison of urea and creatinine levels.	Significant differences were observed in urea ($p=0.000$) and creatinine ($p=0.001$), with higher levels in severe preeclampsia.
11	(Rahman et al. 2023)	<i>Association Between Maternal</i>	Retrospective descriptive	Gravida status.	No significant association was

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		<i>Gravida Status and Preeclampsia/Eclampsia</i>	cross-sectional study. Sample: 293 mothers with PE, severe PE, or eclampsia.		found between gravida status and PE/severe PE/eclampsia (p=0.056).
12	Sitohang, Y.M.R., et al. (2023)(Emilio 2022)	<i>Association of Gestational Age, History of Abortion, and Parity with Severe Preeclampsia</i>	Case-control study. Sample: 110 respondents (55 severe PE and 55 controls).	Gestational age, abortion history, and parity.	Significant associations were found between gestational age (p=0.008), abortion history (p=0.041), parity (p=0.038), and severe preeclampsia.
13	(Dini Kurniawati et al. 2023)	<i>Signs and Symptoms of Pregnancy with Preeclampsia in an Agricultural Area of Jember</i>	Descriptive analytic cross-sectional study. Sample: 150 pregnant women with preeclampsia.	Questionnaire and Maternal and Child Health Book assessment.	Hypertension was found in 80.7% of participants, while 55.3% had no proteinuria. The most common symptoms were headache (53.3%) and body aches (48%).
14	(Damayanty S et al. 2025)	<i>Factors Influencing the Occurrence of Preeclampsia Bhayangkara Hospital, Riau</i>	Quantitative retrospective cross-sectional study. Sample: 60 women with preeclampsia.	Maternal age, parity, nutritional status, and gestational age.	Significant associations were found for maternal age (p=0.004), parity (p=0.019), and nutritional status (p=0.000). No association was found with gestational age (p=0.120).

No.	Author/Year	Title	Study Design and Sample	Intervention/Variables	Results
15	Hutahaeen, N. (2022)	<i>Association Between Maternal Age and Parity with Preeclampsia at Martua Sudarlis Primary Clinic, Medan</i>	Analytic cross-sectional study. Sample: 30 women giving birth.	Maternal age and parity.	Significant associations were found between maternal age ($p=0.001$), parity ($p=0.030$), and preeclampsia.
16	Mariati, P., et al. (2022)	<i>Factors Associated with Preeclampsia Among Third-Trimester Pregnant Women</i>	Analytic observational cross-sectional study. Sample: 284 third-trimester pregnant women selected using systematic random sampling.	Maternal age, parity, and BMI.	Significant associations were found between maternal age ($OR=6.909$), parity ($OR=2.939$), BMI ($OR=95.467$), and preeclampsia. BMI was the strongest risk factor.

DISCUSSION

Based on the results of the review of 16 analyzed journals, preeclampsia remains one of the pregnancy complications that significantly contributes to maternal morbidity and mortality across various regions. Most studies indicate that preeclampsia is a hypertensive disorder in pregnancy influenced by multiple risk factors, particularly maternal age and parity. In addition, several studies also identify other contributing factors such as a history of hypertension, obesity, BMI, frequency of antenatal care, and pregnancy conditions such as multiple gestation. However, the two most frequently studied and consistently reported factors across the literature are maternal age and parity.

Regarding maternal age, the majority of studies show a significant association between maternal age and the incidence of preeclampsia. Women aged under 20 years or over 35 years have a higher risk of developing preeclampsia compared to those in the healthy reproductive age group of 20–35 years. This finding is consistent with studies by Andriani et al. (2022), Silvana et al. (2023), Hutahaeen (2022), and Damayanty et al. (2025), all of which reported p -values < 0.05 . Physiologically, younger maternal age is associated with incomplete reproductive organ development, while advanced maternal age is linked to decreased vascular elasticity and an increased risk of comorbid conditions such as hypertension.

Furthermore, studies by Rahmawati et al. (2022) and several others also confirm that age is a major risk factor for preeclampsia, although some studies report different findings.

These variations may be influenced by sample characteristics, research methods, and confounding factors such as nutritional status and medical history. Nevertheless, in general, age can be considered an important contributing

factor to the occurrence of preeclampsia in pregnant women.

In terms of parity, most studies indicate a relationship between parity and the incidence of preeclampsia. Primiparous women tend to have a higher risk compared to multiparous women. This is because, in the first pregnancy, the maternal immune system is still adapting to the fetal conception, making it more vulnerable to complications such as preeclampsia. Studies such as Hutahaeen (2022), Silvana et al. (2023), and Damayanty et al. (2025) support this association with p-values < 0.05 .

However, some studies report no significant relationship between parity and preeclampsia, such as Rahman et al. (2023). This indicates that parity is not the sole determinant of preeclampsia, but is also influenced by other factors such as hypertension history, obesity, nutritional status, and quality of antenatal care. Therefore, parity remains an important risk factor but is part of a multifactorial mechanism in the development of preeclampsia.

Overall, the synthesis of various studies shows that preeclampsia is a complex disease with multifactorial causes. In addition to age and parity, factors such as hypertension history, obesity, high BMI, multiple pregnancy, and inadequate antenatal care also play important roles in increasing risk. Some studies even show that a combination of multiple risk factors significantly increases the likelihood of preeclampsia compared to a single factor alone.

These findings are consistent with the theory that preeclampsia results from impaired placental implantation leading to endothelial dysfunction and systemic vasoconstriction. This condition subsequently triggers hypertension, proteinuria, and other organ dysfunctions in pregnant women. Therefore, early detection of risk factors is essential in midwifery care to prevent more severe complications.

Clinically, this review highlights the importance of regular antenatal monitoring, especially for women at risk (<20 years or >35 years) and primiparous women. Healthcare providers should provide education, early detection, and routine blood pressure monitoring to prevent preeclampsia. In addition, a comprehensive approach involving other factors such as nutritional status and medical history is also necessary.

In conclusion, although not all studies show consistent results, overall maternal age and parity remain associated with the occurrence of preeclampsia. Differences across studies indicate that preeclampsia cannot be explained by a single factor alone but rather results from the interaction of multiple interconnected risk factors.

CONCLUSIONS

Based on the review of various analyzed journals, it can be concluded that preeclampsia remains one of the major pregnancy complications contributing significantly to maternal and fetal morbidity and mortality. This condition is not caused by a single factor but results from the interaction of multiple interrelated risk factors.

In general, maternal age and parity show a fairly consistent association with the occurrence of preeclampsia. Women of high-risk reproductive age (<20 years and >35 years) and primiparous women are more frequently reported to experience preeclampsia compared to women of healthy reproductive age and multiparous women. Although some studies have reported different findings, most of the literature supports the important role of these factors in increasing the risk of preeclampsia.

Furthermore, several other factors, including a history of hypertension, nutritional status, obesity, and the quality of antenatal care, have also been identified as contributors to the increased risk of preeclampsia. These findings indicate that preeclampsia is a multifactorial condition that requires special attention through early detection and careful pregnancy monitoring. Therefore, improving maternal education, implementing routine screening, and providing optimal antenatal care are essential strategies for preventing and reducing the incidence of preeclampsia.

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AUTHOR CONTRIBUTIONS

1. Vika Anasyah Sipayung: Conceptualization, literature search, data collection, data analysis, manuscript drafting, and final manuscript preparation.
2. Cut Sarisanthiya Juwita: Supervision, methodology development, manuscript review, and editing.
3. Rosmiati: Literature screening, data extraction, and manuscript writing.
4. Santi Sagala: Data organization, literature analysis, and manuscript revision.
5. Ernamari: Reference management, proofreading, and formatting of the manuscript.

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