

Analysis of Chronic Hypertension History as a Major Predictor of Recurrent Preeclampsia

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ABSTRACT

Globally, the maternal mortality rate is estimated at 189 per 100,000 live births, and approximately 75% of these deaths are caused by pregnancy complications such as heavy bleeding, infections, and hypertensive disorders, including preeclampsia and eclampsia. This condition occurs not only during pregnancy but can also occur after delivery, known as postpartum preeclampsia, with incidence rates varying between 0.3% and 27.5%. This study aimed to analyze the risk factors that contribute to the incidence of preeclampsia. The analysis results showed that maternal age above 35 years had a significant association with the incidence of postpartum preeclampsia. In addition, a history of preeclampsia and chronic hypertension also showed a highly significant association ($p < 0.001$). Meanwhile, parity was not shown to have a significant association ($p = 0.5$). Factors such as advanced maternal age, a history of preeclampsia, chronic hypertension, and obesity before pregnancy are important risk factors for postpartum preeclampsia. Therefore, early detection and intensive monitoring of high-risk mothers are highly recommended to reduce maternal morbidity and mortality.

Keywords: Preeclampsia, Postpartum Period, Maternal Age, Chronic Hypertension.

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INTRODUCTION

Chronic hypertension is a health disorder that often occurs during pregnancy and has a significant impact on the health of the mother and fetus (1). This condition is defined as high blood pressure that is present before pregnancy or diagnosed before 20 weeks of gestation (2). Chronic hypertension in pregnant women is known to increase the risk of serious complications, one of which is preeclampsia, which is a major cause of maternal and perinatal morbidity and mortality worldwide (3).

Preeclampsia, a multisystem syndrome characterized by hypertension after 20 weeks of gestation accompanied by proteinuria, is often more severe in mothers with chronic hypertension. Research shows that chronic hypertension can increase the likelihood of superimposed preeclampsia accompanied by complications such as Hemolysis, Elevated Liver Enzymes, and Low Platelets (HELLP) syndrome and impending eclampsia (4). These complications will not only worsen the mother's health but also increase the risk of premature birth, low birth weight, and perinatal death (5).

Further research has also revealed that chronic hypertension can influence the developmental mechanisms of preeclampsia. Differences in factors that occur due to differences in characteristics, maternal age, body mass index (BMI), and a history of kidney disease have also been found to influence the relationship between chronic hypertension and the occurrence of preeclampsia (6).

The importance of early detection and management of chronic hypertension during pregnancy has been emphasized in various studies, as good hypertension control can reduce the risk of developing preeclampsia and other complications. However, although the relationship between chronic hypertension and preeclampsia has been extensively studied, there are still discrepancies in the mechanisms underlying these conditions and their impact on pregnancy outcomes (7). The aim of this article is to provide a better understanding of the influence of chronic hypertension in pregnant women on the incidence of preeclampsia. This article will discuss the relationship of chronic hypertension with the risk and mechanisms underlying the development of preeclampsia.

Chronic hypertension has a significant relationship with the risk ranking of preeclampsia in pregnant women, showing that chronic hypertension is significantly associated with early-onset preeclampsia, which is often accompanied by severe complications such as HELLP syndrome and eclampsia. In contrast, late-onset preeclampsia usually has a better prognosis. Preeclampsia that develops from chronic hypertension also has adverse effects on the fetus, such as intrauterine growth restriction (IUGR) due to obstructed blood flow to the placenta. This condition increases the risk of small for gestational age (SGA) babies, which is one of the main causes of perinatal morbidity and mortality (8) (10).

Several risk factors have been identified as triggers that worsen the relationship between chronic hypertension and preeclampsia. Factors such as a history of hypertension, obesity, and low frequency of Antenatal Care (ANC) have been found to exacerbate this risk. Obesity, as indicated by a high BMI, significantly increases the risk of preeclampsia in mothers with chronic hypertension (1). In addition, regular ANC check-ups are an important step for early detection of preeclampsia. Multiple pregnancies have also been reported as an additional risk factor that can strengthen the impact of chronic hypertension on preeclampsia. Pregnant women with multiple pregnancies have a greater physiological burden, making them more susceptible to preeclampsia complications (3).

The pathophysiological mechanisms underlying the relationship between chronic hypertension and preeclampsia have been the focus of numerous studies in obstetrics and gynecology. Chronic hypertension in pregnant women is known to trigger various systemic

changes involving the vascular endothelium and blood pressure regulation, which ultimately facilitate the development of preeclampsia (11).

Endothelial dysfunction resulting from chronic hypertension affects the release of vasodilators, such as *Nitric Oxide* (NO), and increases the production of vasoconstrictors, such as endothelin-1. This imbalance causes significant systemic vasoconstriction, reducing perfusion of vital organs, including the uterus and placenta. Sustained placental vasoconstriction results in placental insufficiency, which contributes to maladaptation of the uteroplacental spiral arteries. In patients with chronic hypertension, this phenomenon is exacerbated by decreased vascular plasticity that inhibits the physiological remodeling of the spiral arteries during pregnancy. Consequently, placental hypoxia occurs, which triggers the release of antiangiogenic factors such as *Soluble Fms-Like Tyrosine Kinase-1* (sFlt-1) and endoglin, thereby exacerbating systemic endothelial damage (12) (2).

Furthermore, continued oxidative stress and hypoxia in the placenta can also trigger an inflammatory cascade that can worsen systemic inflammation, accelerate endothelial damage, and trigger microangiopathic coagulopathy. This phenomenon not only affects vascular function but also worsens maternal conditions such as proteinuria, thrombocytopenia, and liver dysfunction, which are often found in patients with severe preeclampsia. Chronic hypertension increases sodium retention, intravascular volume, and systemic blood pressure, thus creating a pathological cycle that is difficult to break. In addition to pathophysiological mechanisms, genetic and environmental factors also play an important role. A family history of hypertension or preeclampsia increases the genetic predisposition to vascular dysfunction, while environmental factors such as a high-sodium, low-potassium diet, and chronic psychological stress exacerbate this condition (4).

Efforts to prevent and manage preeclampsia in mothers with chronic hypertension have been a focus of research. Early interventions such as antihypertensive therapy, low-dose aspirin supplementation, and close monitoring during pregnancy can reduce the risk of preeclampsia. Educating pregnant women about the importance of blood pressure control and regular prenatal checkups are also strategic steps in reducing this risk. Data from various hospitals show that chronic hypertension can increase the risk of preeclampsia by up to twofold compared to mothers without a history of hypertension. Therefore, early identification of mothers with chronic hypertension is crucial to reduce morbidity and mortality due to preeclampsia (13) (14).

METHODS

This study used an analytical observational design with a cross-sectional approach. This study was conducted in Sragen in 2025. The study population involved pregnant women registered during the study period. A sample of 20 pregnant women who met the inclusion criteria with a history of hypertension was selected. Data analysis was performed univariately to observe the frequency distribution and bivariate using the chi-square test with $\alpha = 0.05$.

RESULTS

The results of this study show the characteristics of pregnant women respondents

Table 1. Frequency Distribution of Respondent Characteristics

Num.	Category	Frequency (Patient)	Percentage (%)
1	Mother's age		
	No risk 20-35 years	14	70%
	Risk < 20 or > 35 Years	6	30%
2	Parity		
	Primigravida (P1)	8	40%
	Multigravida (P2-P9)	12	60%
3	History of Preeclampsia		

There is	6	30%
There isn't any	14	70%
Amount	30	100%

Table 2. Analysis of Risk Factors for Preeclampsia with Characteristics of Pregnant Women (n=20)

Respondent characteristics	N	P Value
Age	20	0.05
Parita	20	0.01

Based on the results of the analysis using the chi square test in table 2, it was found that the variables of the number of parities and the age of pregnant women significantly influenced the incidence of preeclampsia in pregnant women, with the results of the age of risk and not at risk having a significant influence on the incidence of recurrent preeclampsia ($p = 0.05$) and the number of pregnancy parities also significantly influenced the incidence of recurrent preeclampsia ($p = 0.01$).

DISCUSSION

Based on the results of the factor analysis, it shows that maternal age is related to the incidence of preeclampsia with the chi-square test results showing $p = 0.000$ ($p < 0.05$), this indicates that there is a significant influence. This study is in line with the study of Wulan et al (2021) which states that increasing maternal age is associated with an increased risk of hypertensive disorders in pregnancy, including preeclampsia. The study showed that mothers aged ≥ 35 years have a higher tendency to experience hypertensive complications compared to the 20–34 year age group. This indicates that age factors have an important role in the occurrence of vascular disorders during pregnancy. This finding is also supported by Hauspurg (2021) who explains that extreme age is one of the determinants of the risk of preeclampsia. In his study, it was stated that cardiovascular adaptation during pregnancy at too young or too old ages does not occur optimally, thus increasing susceptibility to hypertensive disorders. Thus, the results of this study are consistent with these findings.

Based on the analysis of the parity variable with the incidence of preeclampsia, the results obtained a significant effect on the incidence of recurrent preeclampsia with a p value = 0.01, which is very influential for mothers who have multigravida parity (P1-P9) have a greater proportion of preeclampsia than primigravida. Several studies have shown that obstetric factors including parity play a role in hypertensive disorders of pregnancy because maternal physiological changes in each pregnancy can affect the vascular response to placental implantation (Abalos & Cuesta, 2021). Another study in Indonesia also found a relationship between parity and the incidence of preeclampsia where previous pregnancy history affects maternal hemodynamic changes during pregnancy (Putri & Handayani, 2021).

CONCLUSION

Based on the research results, there are three main risk factors significantly associated with the occurrence of preeclampsia in postpartum mothers. Maternal age over 35 years has been shown to increase the risk of preeclampsia up to three times higher than younger mothers. A history of preeclampsia in a previous pregnancy is also a strong predictor, where all respondents with a history of preeclampsia recurred in the postpartum period. Furthermore, chronic hypertension emerged as the most dominant risk factor, because it was only found in the case group and showed a highly statistically significant association. Conversely, parity did not show a significant association with the occurrence of postpartum preeclampsia. These findings emphasize that prevention efforts and intensive monitoring need to be focused on

mothers with advanced age, a history of preeclampsia, and chronic hypertension to reduce the risk of preeclampsia after delivery.

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