



Factors Influencing the Incidence of Preeclampsia at Tiley Health Center

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Abstract. Preeclampsia is a pregnancy complication that contributes significantly to maternal and perinatal morbidity and mortality, especially in developing countries. Despite various preventive measures, preeclampsia is still frequently found at the primary health care level. This study aims to analyze the factors influencing the incidence of preeclampsia in pregnant women at the Tiley Care Community Health Center. This study used an observational analytical design with a cross-sectional approach. The study population was all pregnant women who visited antenatal care at the Tiley Care Community Health Center, with a sample of 60 respondents selected using a total sampling technique. Data were collected through a review of medical records and KIA books, then analyzed univariately and bivariately using the Chi-Square test with a significance level of $\alpha = 0.05$. The results showed that maternal age, history of hypertension, nutritional status based on body mass index, and adherence to antenatal care visits had a statistically significant relationship with the incidence of preeclampsia. Meanwhile, parity did not show a significant relationship with the incidence of preeclampsia. This study concluded that the incidence of preeclampsia is influenced by various maternal factors and maternal health behaviors during pregnancy. These findings underscore the importance of implementing risk-based antenatal care through early screening, ongoing monitoring, and increased adherence to antenatal care visits as a preventative measure for preeclampsia at the primary healthcare level.

Keywords: Antenatal Care; Preeclampsia; Pregnant Women; Primary Health Care; Risk Factors.

1. INTRODUCTION

Preeclampsia is one of the most serious pregnancy complications and remains a leading cause of maternal and perinatal morbidity and mortality worldwide. Globally, preeclampsia is estimated to occur in approximately 2–8% of pregnancies and contributes significantly to maternal mortality, particularly in low- and middle-income countries (World Health Organization [WHO], 2019). This condition not only increases the risk of maternal death but also impacts the fetus, including premature birth, fetal growth restriction, low birth weight, and perinatal death (Magee et al., 2022). Despite progress in antenatal care, the burden of preeclampsia remains alarming, particularly in areas with limited access to and quality of maternal health services.

At the national level, preeclampsia remains a leading cause of maternal death in Indonesia. Data from the Indonesian Ministry of Health shows that hypertensive disorders in pregnancy, including preeclampsia and eclampsia, consistently rank among the top three causes of maternal death, along with hemorrhage and infection (Ministry of Health, 2023). The Indonesian Demographic and Health Survey (SDKI) and routine maternal health service reports also indicate that preeclampsia is more common in primary care facilities, particularly community health centers (Puskesmas), which are the first point of reference for pregnant women with complications (BKKBN et al., 2023). This confirms that prevention and early

detection of preeclampsia at the primary care level play a strategic role in reducing maternal morbidity and mortality.

Clinically, preeclampsia is a multisystem syndrome characterized by new-onset hypertension after 20 weeks of gestation, accompanied by proteinuria and/or other maternal organ dysfunction (American College of Obstetricians and Gynecologists [ACOG], 2020). The pathophysiology of preeclampsia is complex and multifactorial, involving impaired trophoblast invasion, inadequate spiral artery remodeling, systemic endothelial dysfunction, and an exaggerated inflammatory response and oxidative stress (Phipps et al., 2019). An imbalance of angiogenic and antiangiogenic factors, such as increased soluble fms-like tyrosine kinase-1 (sFlt-1) and decreased placental growth factor (PlGF), is a key mechanism explaining the clinical manifestations of preeclampsia (Staff et al., 2022).

Various studies have shown that the incidence of preeclampsia is influenced by a combination of maternal, obstetric, and social factors. Frequently reported risk factors include extreme maternal age (<20 years or >35 years), primigravida, a history of preeclampsia, obesity, chronic diseases such as hypertension and diabetes mellitus, and too close or too long a spacing of pregnancies (Brown et al., 2018; Hutcheon & Lisonkova, 2019). Furthermore, sociodemographic factors such as education level, economic status, and access to quality antenatal care also contribute to the high risk of preeclampsia (Duley et al., 2021). This interaction between biological factors and social determinants of health makes preeclampsia a complex public health problem.

In Indonesia, several studies have examined factors associated with the incidence of preeclampsia, but the results still show regional variation. Studies at several referral hospitals reported a significant association between maternal age, parity, and a history of hypertension with the incidence of preeclampsia (Sari et al., 2019; Wulandari & Susanti, 2021). Other research at the community health center level found that adherence to antenatal visits, maternal nutritional status, and anemia also play a role in increasing the risk of preeclampsia (Putri et al., 2022). However, most research has focused on advanced healthcare facilities, so empirical evidence from primary care, particularly community health centers in rural areas, remains limited.

The research gap is evident in the lack of comprehensive studies that simultaneously analyze various risk factors for preeclampsia at the primary care level, particularly in areas with specific geographic and social characteristics. Tiley Care Community Health Center, as a primary referral health facility, serves pregnant women from diverse social, economic, and healthcare backgrounds. To date, local data on the factors influencing the incidence of

preeclampsia in the Tiley Care Community Health Center's work area has not been systematically documented, even though such information is crucial for planning promotive and preventive interventions based on the local context.

The urgency of this research is further strengthened by the role of midwives and health workers in community health centers (Puskesmas) as the frontline in early detection and early management of preeclampsia. Identifying risk factors during antenatal care allows for close monitoring, education of pregnant women, and timely referral before life-threatening complications occur (Magee et al., 2022). By understanding the key determinants of preeclampsia at the Puskesmas level, prevention strategies can be tailored to local needs and conditions, potentially reducing the incidence and adverse effects of preeclampsia.

Based on this background, this study aims to analyze the factors influencing the incidence of preeclampsia at the Tiley Care Community Health Center. The results are expected to provide contextual scientific evidence as a basis for strengthening risk-based antenatal care, improving the quality of midwifery services, and formulating more effective maternal health policies at the primary care level.

2. RESEARCH METHOD

Research Design

This study used an observational analytical design with a cross-sectional approach, aiming to analyze the relationship between various maternal factors and the incidence of preeclampsia in pregnant women. This design was chosen because it allows researchers to assess the relationship between independent and dependent variables simultaneously at a single measurement point, making it efficient and appropriate for identifying factors influencing the incidence of preeclampsia at the primary healthcare level.

Location and Time of Research

The study was conducted at the Tiley Care Community Health Center, a primary healthcare facility providing care and referral services for pregnant women in its area. Data collection took place from January to March 2024, depending on the availability of antenatal care data and medical records of pregnant women who visited during that period.

Population and Sample

The population in this study was all pregnant women who attended antenatal care (ANC) visits at the Tiley Health Center during the study period. The study sample was determined using a total sampling technique, meaning all pregnant women who met the inclusion and exclusion criteria were included as respondents. Based on these criteria, the sample size

obtained in this study was 60 pregnant women, consisting of pregnant women with and without preeclampsia.

Research Variables

The dependent variable in this study was the incidence of preeclampsia, which was determined based on a diagnosis by healthcare professionals according to clinical standards. Independent variables included maternal age, parity, gestational age, history of hypertension, nutritional status (BMI), and adherence to antenatal care visits. Variable selection was based on clinical theory and previous research demonstrating the role of maternal and obstetric factors in the development of preeclampsia.

Research Instruments

The instruments used in this study were observation sheets and a data collection checklist developed by the researcher. Data were obtained from the medical records of pregnant women, maternal and child health books, and antenatal care records at the Tiley Health Center. The instruments included respondent characteristics, maternal health history, and preeclampsia diagnosis, and were adjusted to meet obstetric service recording standards.

Research Procedures

The research procedure began with official permission from the Tiley Health Center. Next, the researchers identified pregnant women who met the inclusion criteria and collected data through medical records and maternal and child health books. The collected data was verified to ensure completeness and accuracy, then recorded into a prepared research instrument before processing and analyzing the data.

Data analysis

Data were analyzed step by step using statistical software. Univariate analysis was performed to describe the frequency distribution and proportion of each variable. Next, bivariate analysis was used to assess the relationship between the independent variables and the incidence of preeclampsia, using the Chi-Square statistical test at a significance level of $\alpha = 0.05$. The results of the analysis are presented in tabular and narrative form to facilitate interpretation and discussion of the research findings.

3. RESULTS AND DISCUSSION

Results

Characteristics of Research Respondents

This section presents the characteristics of pregnant women who participated in the study at Tiley Health Center. The characteristics analyzed included maternal age, education level, parity, gestational age, and employment status. The aim was to provide a general overview of the respondents before analyzing their relationship to preeclampsia incidence.

Table 1. Distribution of Respondent Characteristics at Tiley Care Community Health Center (n = 60).

Characteristics	Category	n	%
Mother's Age	< 20 years	6	10.0
	20–35 years	42	70.0
	> 35 years	12	20.0
Education	Base	18	30.0
	Intermediate	32	53.3
	Tall	10	16.7
Parity	Primigravida	22	36.7
	Multigravida	38	63.3
Gestational Age	Second Trimester	24	40.0
	Third Trimester	36	60.0
Work	Work	21	35.0
	Doesn't work	39	65.0
Total		60	100

Based on Table 1, most respondents were in the safe reproductive age group, namely 20–35 years, as many as 42 people (70.0%), while pregnant women with a risk age of <20 years and >35 years were 6 people (10.0%) and 12 people (20.0%), respectively. In terms of education, the majority of respondents had a secondary education level of 32 people (53.3%), followed by primary education of 18 people (30.0%) and higher education of 10 people (16.7%). Based on parity, most respondents were multigravida as many as 38 people (63.3%), while primigravida numbered 22 people (36.7%). Based on gestational age, the majority of respondents were in the third trimester as many as 36 people (60.0%), while the second trimester numbered 24 people (40.0%). In terms of employment status, most pregnant women were unemployed as many as 39 people (65.0%), while pregnant women who were employed numbered 21 people (35.0%).

Distribution of Preeclampsia Incidence

This section presents the distribution of preeclampsia incidence among pregnant women attending antenatal care at Tiley Health Center during the study period. This presentation aims to illustrate the proportion of pregnant women with and without preeclampsia as a basis for analyzing the influencing factors.

Table 2. Distribution of Preeclampsia Incidence in Pregnant Women at Tiley Health Center
(n = 60).

Preeclampsia Incident	n	%
Preeclampsia	18	30.0
No preeclampsia	42	70.0
Total	60	100

Based on Table 2, of the 60 pregnant women who participated in the study, 18 (30.0%) experienced preeclampsia, while 42 (70.0%) did not. These results indicate that nearly one-third of pregnant women in the Tiley Care Community Health Center's work area experienced preeclampsia during the study period.

Distribution of Factors Studied

This section presents the distribution of maternal and obstetric factors studied in pregnant women at the Tiley Care Community Health Center. These factors include maternal age, parity, history of hypertension, nutritional status based on body mass index (BMI), and adherence to antenatal care (ANC) visits. This presentation aims to describe the characteristics of the respondents' risk factors before analyzing their relationship to the incidence of preeclampsia.

Table 3. Distribution of Factors Studied in Pregnant Women at Tiley Health Center (n = 60).

Factors Under Study	Category	n	%
Mother's Age	At risk (<20 and >35 years)	18	30.0
	Not at risk (20–35 years)	42	70.0
Parity	Primigravida	22	36.7
	Multigravida	38	63.3
History of Hypertension	There is	20	33.3
	None	40	66.7
Nutritional Status (BMI)	Abnormal (thin/obese)	24	40,0
	Normal	36	60,0
Kepatuhan ANC	Tidak patuh	19	31,7
	Patuh	41	68,3
Total		60	100

Based on Table 3, most respondents were in the non-risk age group (20–35 years), namely 42 people (70.0%), while pregnant women in the risk age group (<20 years and >35 years) numbered 18 people (30.0%). Based on parity, more respondents were multigravida (38 people) compared to primigravida (22 people) (36.7%). A total of 20 respondents (33.3%) had a history of hypertension, while 40 respondents (66.7%) did not have a history of hypertension. In terms of nutritional status, most respondents had a normal BMI (36 people) while 24 people (40.0%) were in the abnormal BMI category. Based on ANC visit compliance, the majority of respondents were compliant (41 people) (68.3%), while 19 people (31.7%) were non-compliant with the ANC visit schedule.

Analysis of the Relationship between Maternal Factors and the Incidence of Preeclampsia

This section presents the results of an analysis of the relationship between maternal and obstetric factors and the incidence of preeclampsia in pregnant women at the Tiley Health Center. The analysis was conducted using the Chi-Square test to assess whether there was a statistically significant relationship between the independent variables and the incidence of preeclampsia.

Table 4. Analysis of the Relationship between Maternal Factors and the Incidence of Preeclampsia at Tiley Health Center (n = 60).

Factor	Category	Preeclampsia n (%)	No Preeclampsia n (%)	p-value
Mother's Age	Risky	10 (55.6)	8 (44.4)	0.003
	No risk	8 (19.0)	34 (81.0)	
Parity	Primigravida	9 (40.9)	13 (59.1)	0.176
	Multigravida	9 (23.7)	29 (76.3)	
History of Hypertension	There is	12 (60.0)	8 (40.0)	0.001
	There isn't any	6 (15.0)	34 (85.0)	
Nutritional Status (BMI)	Abnormal	11 (45.8)	13 (54.2)	0.021
	Normal	7 (19.4)	29 (80.6)	
ANC Compliance	Not obey	10 (52.6)	9 (47.4)	0.008
	Patuh	8 (19.5)	33 (80.5)	

Based on Table 4, there is a statistically significant relationship between maternal age and the incidence of preeclampsia ($p = 0.003$), where the proportion of preeclampsia is higher in mothers with risk age compared to non-risk age. A history of hypertension also shows a significant relationship with the incidence of preeclampsia ($p = 0.001$), with a greater proportion of incidents in pregnant women with a history of hypertension. Nutritional status based on BMI is significantly associated with the incidence of preeclampsia ($p = 0.021$), where mothers with an abnormal BMI have a higher proportion of preeclampsia than mothers with a normal BMI. In addition, adherence to ANC visits shows a significant relationship with the incidence of preeclampsia ($p = 0.008$), with a higher proportion of preeclampsia in mothers who are not compliant with ANC visits. Meanwhile, parity does not show a significant relationship with the incidence of preeclampsia ($p = 0.176$).

Discussion

This study provides a comprehensive overview of the factors associated with the incidence of preeclampsia in pregnant women at the Tiley Care Community Health Center. The analysis showed that maternal age, history of hypertension, nutritional status based on body mass index (BMI), and adherence to antenatal care (ANC) visits were statistically significantly associated with the incidence of preeclampsia, while parity showed no significant association. These findings confirm that preeclampsia is a multifactorial condition influenced by a combination of biological, clinical, and behavioral factors during pregnancy.

Maternal age has been shown to be significantly associated with the incidence of preeclampsia, with a higher proportion of preeclampsia in mothers at risk (<20 years and >35 years). Clinically, extremes of age are associated with the unpreparedness of the vascular and metabolic systems to adapt to the physiological changes of pregnancy, which can trigger endothelial dysfunction and increased blood pressure (Cunningham et al., 2018). These findings align with a large cohort study reporting an increased risk of preeclampsia in older mothers due to decreased blood vessel elasticity and increased chronic comorbidities (Laine et al., 2021). In the context of primary care, these results underscore the importance of age-based risk screening from the initial ANC visit.

A history of hypertension was the factor most strongly associated with the incidence of preeclampsia in this study. Pregnant women with a history of hypertension had a significantly higher proportion of preeclampsia than those without. Pathophysiologically, chronic hypertension contributes to endothelial damage and impaired placental perfusion, which exacerbates the systemic inflammatory response during pregnancy (Roberts & Hubel, 2019). These results are consistent with a meta-analysis that found that hypertension before pregnancy increases the risk of preeclampsia by up to threefold (Bartsch et al., 2016). These findings emphasize the urgency of close blood pressure monitoring and ongoing counseling for pregnant women with a history of hypertension at the community health center level.

Nutritional status based on BMI also shows a significant association with the incidence of preeclampsia, where mothers with an abnormal BMI (underweight or obese) have a higher risk. Obesity is associated with insulin resistance, chronic low-grade inflammation, and increased oxidative stress, which play a role in the pathogenesis of preeclampsia (Spradley et al., 2018). Meanwhile, poor nutritional status can disrupt placental adaptation and angiogenic balance. Research in developing countries shows that nutritional imbalance, both excess and deficient, increases maternal susceptibility to hypertensive complications during pregnancy (Kumari et al., 2020). This reinforces the importance of appropriate and individualized nutritional interventions during antenatal care.

Adherence to antenatal care (ANC) visits is also significantly associated with the incidence of preeclampsia. Pregnant women who are non-compliant with antenatal care (ANC) visits have a higher proportion of preeclampsia than those who are. Clinically, regular antenatal care (ANC) visits allow for early detection of signs of preeclampsia, such as increased blood pressure and proteinuria, allowing for earlier intervention (Tessema et al., 2020). Studies in various primary care settings have shown that the quality and continuity of antenatal care (ANC) play a crucial role in reducing pregnancy complications, including preeclampsia

(Afulani et al., 2019). These findings are relevant to midwifery practice, as midwives play a key role in improving antenatal care (ANC) adherence through education and a family-based approach.

In contrast, parity did not show a significant association with the incidence of preeclampsia in this study. Although some literature suggests that primigravidas have a higher risk of developing preeclampsia due to an immature maternal immune response to fetal antigens (Redman & Sargent, 2017), the results of this study indicate that other factors such as age, history of hypertension, and ANC adherence have a more dominant influence. This difference may be influenced by population characteristics, sample size, and the context of primary care, as also reported in several community studies that found no significant association between parity and preeclampsia (Berhe et al., 2021).

Overall, the findings of this study have important clinical implications for midwifery practice at the community health center level. Identification of key risk factors such as age at risk, history of hypertension, abnormal nutritional status, and non-compliance with antenatal care (ANC) can serve as a basis for strengthening risk-based antenatal care. Midwives and health workers need to integrate screening for these factors into routine services, along with ongoing, humanistic education for pregnant women and their families. This approach is expected to improve early detection and prevention of preeclampsia, thereby reducing the risk of complications for both mother and fetus.

4. CONCLUSION

This study aimed to analyze the factors influencing the incidence of preeclampsia in pregnant women at the Tiley Care Community Health Center. The results showed that maternal age, history of hypertension, nutritional status based on body mass index, and adherence to antenatal care visits were significantly associated with the incidence of preeclampsia, while parity showed no significant association. These findings confirm that preeclampsia is a multifactorial condition influenced by a combination of biological factors and maternal health behaviors. Scientifically, this study reinforces the importance of a risk-based approach in pregnancy care. Clinically, the results of this study underscore the strategic role of midwives and primary care providers in conducting early screening, ongoing monitoring, and targeted education to prevent and reduce the impact of preeclampsia on the mother and fetus.

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