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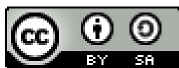

Factors Related to the Incidence of Preeclampsia at RSD Tidore City

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Abstract: *Preeclampsia is a complex illness that can cause health issues and even death for both the mother and the fetus. The three signs of preeclampsia include elevated blood pressure (up to 140/90 mmHg), proteinuria (high protein in the urine), and edema. Preeclampsia is linked to a number of characteristics, including as parity, age, education, occupation, history of hypertension, multiple pregnancies, history of diabetes mellitus, and kidney disease. The purpose of this study is to identify the variables linked to the prevalence of preeclampsia in Tidore Regional Hospital patients who are pregnant or giving birth. This study employs a case control methodology and a descriptive analytical approach. Up to 132 respondents, comprising 66 case groups and 66 control groups, were sampled by accidental sampling. Medical records of moms who had preeclampsia were used as secondary data. A p-value of 0.001 (Sig. <0.05) indicated a relationship between parity and the incidence of preeclampsia; a p-value of 0.001 (Sig. <0.05) indicated a relationship between employment and the incidence of preeclampsia; a p-value of 0.000 (Sig. <0.05) indicated a relationship between the incidence of preeclampsia and a history of diabetes mellitus and kidney disease. preeclampsia at Tidore Regional Hospital with a p-value of 0.042 (Sig. <0.05).*

Keywords: *Blood Pressure; Edema; Parity; Preeclampsia; Proteinuria.*

1. INTRODUCTION

Preeclampsia is a complication associated with health problems and death in the mother, baby, and fetus. Preeclampsia is one of the most common problems encountered in pregnant women, especially those whose gestational age exceeds 20 weeks. Preeclampsia is characterized by a triad of symptoms, including high blood pressure reaching 140/90 mmHg, proteinuria (high protein content in the urine), and with or without edema. According to the WHO in 2016, the global prevalence of preeclampsia ranged from 0.51% to 38.4%. In developed countries, the incidence of preeclampsia is 6-7% and eclampsia 0.1-0.7%. The incidence of preeclampsia in Indonesia tends to be high, at 3.4-8.5% (Ministry of Health of the Republic of Indonesia, 2020). Preeclampsia has a negative impact on both the mother and her fetus. Preeclampsia can lead to placental abruption, prematurity, and even fetal complications such as neonatal respiratory syndrome, cerebral palsy, enterocolitis, necrotizing retinopathy, and perinatal death. Babies born to mothers with preeclampsia tend to have low Apgar scores and a higher risk of seizures. Preeclampsia also negatively impacts the mother, including organ dysfunction, including damage to the kidneys, liver, and central nervous system, cardiomyopathy, pulmonary edema, stroke, respiratory distress syndrome, and even death (Armaly et al., 2018).

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Risk factors influencing the incidence of preeclampsia fall into two categories: internal and external factors. Internal factors include age, weight, pregnancy spacing, genetic history, anxiety, and a history of hypertension. External factors include exposure to cigarette smoke, educational background, antenatal care history, and even maternal nutritional intake. Risk factors influencing the incidence of preeclampsia include age, occupation, and antenatal care (ANC) visits. A study by Putriana & Yenie (2019) found that factors associated with preeclampsia include parity, age, history of hypertension, education, occupation, multiple pregnancies, and a history of diabetes and kidney disease. Women with high parity, i.e., those with up to three pregnancies, experience uterine stretching, which can lead to excessive ischemia and preeclampsia. Mothers who conceive between the ages of 20 and 35 are more susceptible to pregnancy complications. The more educated an individual is, the easier it is to understand and receive information. Pregnant women who work are more susceptible to severe preeclampsia because they experience greater stressors when pregnant and working than those who do not. Working pregnant women tend to have higher stressors than those who do not work. Multiple pregnancies contribute to the incidence of preeclampsia due to uterine muscle strain, which can lead to uterine ischemia.

The overall incidence of preeclampsia in North Sulawesi province in 2020 was 36.80% (North Sulawesi Provincial Health Office, 2018). The preeclampsia rate in Tidore Regency in 2018 was 24% (Tidore Regency Health Office, 2014). Based on a preliminary survey at Tidore City Regional Hospital, data on the incidence of preeclampsia in 2022-2025 reached 196 patients. The general objective of this study was to determine factors associated with the incidence of preeclampsia. Researchers are interested in conducting a study on factors related to the incidence of preeclampsia at Tidore City Regional Hospital.

2. RESEARCH METHOD

This research method is a descriptive analytical study using a case-control approach. A case-control study is a comparative study conducted between two categories: cases and controls (Notoatmodjo, 2014). The authors examined factors correlated with the incidence of preeclampsia by comparing the medical records of preeclamptic and non-preeclamptic patients. The population of this study was all 196 inpatients with preeclampsia at Tidore City Regional Hospital who underwent examinations between January and December 2022-2025. Accidental sampling was used, with a total sample size of 132 respondents. This study was conducted at Tidore Regional General Hospital from October 24 to 31, 2025. The inclusion criteria were all medical records of preeclampsia patients from 2022-2025 with complete data, while the

exclusion criteria were incomplete medical records. The data source was obtained from the Tidore City Regional Hospital Medical Records, then the data was processed and presented in the form of Univariate and Bivariate Statistical Tests using X2 Chi Square, where if the p score ≤ α (0.05) then it is said that there is a correlation.

3. RESULTS AND DISCUSSION

Table 1. Relationship between parity and the incidence of preeclampsia (n=132).

Paritas	Preeclampsia Incident				Total	P	OR
	No		Yes				
	f	%	f	%			
(≤3)	64	48.5	51	38.6	115	0.001	9.412
(>3)	2	1.5	15	11.4	17		

Table 1 shows the distribution of respondents according to parity, several low parities (≤3) namely 115

Table 2. Relationship between age and the incidence of preeclampsia (n=132).

Age	Preeclampsia Incident				Total	P	OR
	No		Yes				
	f	%	f	%			
Not risk (20-35 years)	51	38.6	47	35.6	98	0.426	9.412
Risk (>3)	15	11.4	19	14.4	34		

Table 2 shows the distribution of respondents according to age, some of the non-risk ages (20-35 years) are 98 respondents.

Table 3. Relationship between education and the incidence of preeclampsia (n=132).

education	Preeclampsia Incident				Jumlah	p	OR
	No		Yes				
	f	%	f	%			
Base (SD-SMP)	54	40.9	51	38.6	105		
Middle (SMA)	11	8.3	12	9.1	23	0.569	-
High (Akademi/PT)	1	0.8	3	2.3	4		

Table 3 shows the distribution of respondents according to education, some of whom had basic education (elementary-junior high school), namely 105 respondents.

Table 4. Relationship between occupation and the incidence of preeclampsia (n=132).

Work	Preeclampsia Incident				Total	P	OR
	No		Yes				
	f	%	f	%			
Work	18	13.6	4	3.0	22	0.001	5.813
Doesn't work	48	36.4	62	47.0	110		

Table 4 shows the distribution of respondents according to their occupation, some of whom are unemployed, namely 110 respondents.

Table 5. Relationship between history of hypertension and the incidence of preeclampsia.

History of Hypertension	Preeclampsia Incident		Total	P	OR
	No	Yes			

	f	%	f	%			
Once	2	1.5	24	18.2	26	0.000	0.055
Never	64	48.5	42	31.8	106		

Table 5 shows the distribution based on the history of high blood pressure, some of whom did not have a history of hypertension, namely 106 respondents.

Table 6. Relationship between multiple pregnancies and the incidence of preeclampsia.

Gemelli	Preeclampsia Incident No		Yes		Jumlah	P	OR
	f	%	f	%			
Gemelli	1	0.8	2	1.5	3	0.559	0.492
No	65	49.2	64	48.5	129		

Table 6 shows respondents according to multiple pregnancies, some did not experience multiple pregnancies, namely 129 respondents.

Table 7. Relationship between history of diabetes mellitus and kidney disease with the incidence of preeclampsia (n=132).

DM and kidney disease history	Preeclampsia Incident No		Yes		Jumlah	P	OR
	f	%	f	%			
Yes	0	0.0	4	3.0	4	0.042	2.065
No	66	50.0	62	47.0	128		

Table 7 shows the distribution of respondents based on their history of DM and kidney disease. The majority of respondents did not have a history of DM and kidney disease, namely 128 respondents.

The Relationship between Parity and Preeclampsia

Based on the research results, the Chi-Square statistical test yielded a p-value of 0.001 (Sig. < 0.05). Ho was rejected, indicating a significant correlation between parity and the incidence of preeclampsia at Tidore City Regional Hospital. Based on the researcher's assumption, parity is associated with preeclampsia because delivering more than three pregnancies carries a high risk for pregnant women. This condition can cause reproductive organs, especially the uterine muscles, to weaken, which can complicate labor and increase the risk of preeclampsia.

Parity is the number of live births a woman has had. Parity is divided into three categories: primiparous, multiparous, and grandemultiparous. Parity is one of the most common causes of preeclampsia in pregnant women. The earlier a woman's pregnancy or the more births she has had, the greater the risk of developing preeclampsia. This is because women who are pregnant early and even at a young age are more susceptible to preeclampsia due to the reproductive system not being ready for pregnancy. Women who have given birth repeatedly are more likely to develop preeclampsia due to their physical condition and

declining health, which then increases the risk of developing preeclampsia (Rohmah, 2019). This research aligns with Laila's (2019) study of 45 respondents. The study found a relationship between parity and the incidence of preeclampsia in the Whale Ward of Pelabuhan Ratu Regional Hospital, Sukabumi Regency. The study found that preeclampsia was more common in pregnant women with low parity (low parity) than in pregnant women with high parity (high parity). Consistent with this study, the majority of preeclampsia cases were found in respondents with low parity (≤3). Parity is a significant predisposing factor for preeclampsia. Based on the theory that parity is a predisposing factor for preeclampsia (Laura et al., 2021),

Relationship between Age and Preeclampsia Incidence

Based on the research results, the Chi-Square statistical test yielded a p-value of 0.426 (Sig. <0.05), indicating that Ho is accepted, indicating no significant relationship between age and preeclampsia incidence at Tidore City Regional Hospital. Based on the researcher's assumptions, this result is likely due to the fact that the study showed that several respondents were aged 20-35, which aligns with this research. Therefore, it can be assumed that mothers aged 20-35 are the lowest contributors to maternal and infant mortality, while very young and elderly mothers are at greater risk.

This finding is possible because the majority of mothers in this study were of mature age (20-35). According to the WHO (2023), teenage pregnancy carries a higher risk of complications than pregnancy ages 20-35. Mothers aged 20-29 are at a lower risk for maternal and infant mortality, while both young and older mothers are at higher risk. Pregnant women aged 16 years and over are at increased risk of preeclampsia, those aged 35 and over are at higher risk, and those aged 40 years and over are at increased risk. If the mother is older than 35, it can lead to problems, especially hypertension, which can later lead to preeclampsia. In the 20s, uterine size often develops below the standard for pregnancy. This can lead to a higher risk of preeclampsia. Furthermore, at this age, mothers are generally less mentally and physically capable (Andriani et al., 2022).

This research is supported by Rukiah et al. (2021) who studied 130 pregnant women. The analysis found no correlation between age and the incidence of preeclampsia at RSU A Purwakarta in 2020. The study found that maternal deaths due to excessive bleeding occurred in mothers aged 20–35, which is considered the optimal age for childbirth. This is because the age group of 20–25 is the age group for managing pregnancy and is considered mature for pregnancy and childbirth, while mothers are often less active and less familiar with their pregnancies. This coincides with a study by Palupi & Indawati (2014) of 373 respondents. This study found that several respondents were aged 20–35, which aligns with this study. Therefore,

it can be assumed that mothers aged 20–35 have the lowest rates of maternal and infant mortality, while very young and even elderly mothers have higher risks.

The Relationship between Education and Preeclampsia

Based on the research findings, the Chi-Square statistical test yielded a p-value of 0.569 (Sig. <0.05), indicating that Ho is accepted, indicating no significant correlation between education and preeclampsia incidence at Tidore City Regional Hospital. Based on the researcher's assumption, respondents experiencing preeclampsia with minimal education do not necessarily have limited knowledge.

This is due to the knowledge they gained through training provided by health workers, which is routinely conducted every few months. This understanding of health practices, such as undergoing comprehensive antenatal checkups, is also evident. There is no correlation between education level and preeclampsia.

Education is an activity and effort that enhances characteristics, leading to transformational actions that lead to maturity and even individual perfection. This study concluded that mothers with higher education and those without education have a similar risk of developing preeclampsia. This study essentially influences decision-making and choices. Women with higher levels of education have the skills to obtain, organize, and learn information related to healthy lifestyles. They can discuss and ask health workers and even make informed choices. However, an individual's education cannot determine whether or not they suffer from a specific disorder (Hutabarat et al., 2016). This is in line with research by Nursal et al., (2020) conducted on pregnant women with 34 case samples and 34 control samples. The study showed no significant correlation between education level and the occurrence of preeclampsia. This finding was obtained if mothers with higher education and mothers with less certainly have a similar chance of contracting preeclampsia. This is also in line with a study by Saraswati & Mardiana (2016), which conducted on 145 respondents in each case and control category. The study found no correlation between education level and the occurrence of preeclampsia in pregnant women.

The Relationship between Occupation and Preeclampsia

Based on research findings, the Chi-Square statistical test yielded a p-value of 0.001 (Sig. < 0.05), meaning Ho is rejected, indicating a significant correlation between occupation and preeclampsia at Tidore City Regional Hospital. Based on the researcher's assumptions, occupation is also related to physical activity. For housewives, some physical activities such as cleaning the home, helping children with school, preparing meals, and other monotonous daily activities can increase stress. This stress can stimulate endothelial damage to blood

vessels and blood vessels, which can lead to vasoconstriction, which increases blood pressure and can lead to preeclampsia. An individual's work activities can affect muscle performance and blood flow. In pregnant women, blood flow can undergo changes as the pregnancy progresses due to the pressure exerted by the enlarging uterus. Increasing gestational age increases the risk of heart failure, which increases the need for adequate support during pregnancy. Pregnant women who work are more susceptible to preeclampsia because they experience higher levels of stress than unemployed women. According to Karrar & Hong (2023), the heavy workload experienced by mothers is a real explanation for the stress experienced by mothers during pregnancy. While heavy work is not performed outside the home to earn a living, working at home as a housewife is a recognized significant task. Therefore, the work performed by pregnant women can complicate the development of preeclampsia.

This study is supported by Agustina et al., (2022), which conducted a study on 93 pregnant women. The study found a correlation between work and preeclampsia. The study showed that employed respondents had a 3.615 times higher risk of preeclampsia than unemployed respondents. The study found that mothers with large jobs did not experience preeclampsia disorders, as did those without jobs. However, the rate of preeclampsia disorders tended to be higher in working mothers. This is because working mothers experience greater stress than unemployed mothers, which then affects muscle performance and blood flow, which can lead to increased blood pressure, which later leads to preeclampsia. This study aligns with the research of Yani et al., (2023), which was conducted on 60 pregnant respondents. The study showed a correlation between the mother's occupation and preeclampsia in pregnant women in the Banda Raya Community Health Center Work Area, Banda Aceh City in 2021. This study is in line with the assumption of this study that work has an influence on an individual's body activity, which causes preeclampsia. The impact on mental health will then flow the kidneys and adrenal glands to produce the hormone adrenaline. Adrenaline hormone then works and increases the heart rate, which affects increased blood pressure, thus risking preeclampsia.

The Relationship between a History of Hypertension and the Incidence of Preeclampsia

Based on the research results, the Chi-Square statistical test yielded a p-value of 0.000 (Sig. < 0.05), meaning Ho is rejected, indicating a significant correlation between a history of hypertension and the incidence of preeclampsia at Tidore City Regional Hospital. Based on the researchers' assumptions, high blood pressure experienced before pregnancy causes problems and damage to organs. Pregnancy causes weight gain, which can then lead to serious problems, manifested as edema and even proteinuria. Proteinuria can be caused by leaky kidneys due to

the excretion of too much protein in the urine. This can disrupt pregnancy, as preeclampsia is prone to organ system dysfunction.

A history of hypertension is a significant risk factor for the development of preeclampsia, as preexisting high blood pressure can cause organ problems. Furthermore, pregnancy leads to weight gain, which then causes significant problems and damage. The incidence of preeclampsia increases in women with chronic high blood pressure, as placental blood flow is compromised. One predisposing factor for severe preeclampsia is high blood pressure, preexisting vascular hypertensive disorders, and even essential hypertension. This finding is consistent with a study by Andriani et al. (2022) conducted on 34 pregnant women. The study found a relationship between a history of hypertension and the development of preeclampsia and pregnancy outcomes at Sekayu Regional Hospital, Musi Banyuasin Regency. The study concluded that mothers with a history of high blood pressure in a previous pregnancy are more likely to develop hypertension in subsequent pregnancies. This finding is consistent with the study, which found that 26 respondents in both the problem and control categories had a history of hypertension. This could be due to the mother's medical history being a predictor of complications in subsequent pregnancies.

The Relationship between Multiple Pregnancy and Preeclampsia

Based on the study's findings, the Chi-Square statistical test yielded a p-value of 0.559 (Sig. < 0.05), indicating that Ho is accepted, indicating no significant correlation between multiple pregnancy and preeclampsia at Tidore City Regional Hospital. This assumption is based on the researcher's assumption that the majority of respondents in this study had no history of multiple pregnancies. Multiple pregnancies, which involve two or more fetuses, can pose significant risks to both the fetus and the mother. Twin fetuses are more likely to develop preeclampsia due to the increased blood flow to the fetus. This study, conducted by Sutrimah et al. (2015), found no significant correlation between multiple pregnancies and the risk of preeclampsia. This finding is explained by the significantly higher proportion of respondents who had singletons compared to mothers who had multiples, suggesting that twin pregnancies were not associated with preeclampsia. Preeclampsia in twin pregnancies can be caused by excessive uterine stretching, which reduces blood flow to the uterus, which can then lead to preeclampsia in pregnant women with twins. However, this study did not identify a risk factor for preeclampsia in twin pregnancies, as it is often associated with decreased fetal weight in the mother.

This study is supported by Tonasih & Kumalasary (2020) which was conducted on 1271 respondents of mothers treated in the Maternity Room of Gunung Jati Regional Hospital,

Cirebon City in 2018. The study showed that multiple pregnancies had no correlation with the occurrence of preeclampsia. In the study, it was assumed that there was no correlation between twin pregnancies and preeclampsia because the majority of respondents in the case category did not have a history of multiple pregnancies. In line with this study, it was found that most respondents in the case category did not have multiple pregnancies. In line with the study of ZA et al., (2016) which was conducted on 20 respondents in the control category and 20 respondents in the case group. The study can be concluded that there is no correlation between risk factors for multiple pregnancies and the occurrence of preeclampsia in mothers giving birth at Meuraxa Regional Hospital, Banda Aceh in 2014-2015. Mothers carrying twins have a very low chance of developing preeclampsia six times lower than mothers who do not have twin pregnancies. The study concluded that risk factors for preeclampsia include a history of chronic hypertension before pregnancy, a previous history of preeclampsia, a history of preeclampsia in the mother or female relatives, obesity, and even multiple pregnancies. This research also found a correlation between a history of hypertension and preeclampsia. This is in line with Sarli's (2016) study, which included 13 respondents. The study showed no correlation between diabetes mellitus and preeclampsia. In this study, preeclampsia often occurs in pregnancies that experience endocrine and carbohydrate metabolism transformations that lead to gestational diabetes. Other causes include bacteria, genetics, and even viruses.

The Relationship between a History of Diabetes Mellitus and Kidney Disease with Preeclampsia

According to the study findings, the Chi-Square statistical test yielded a p-value of 0.042 (Sig. <0.05), meaning Ho is rejected, indicating a significant correlation between a history of diabetes mellitus and kidney disease with preeclampsia at Tidore City Regional Hospital. Based on the researchers' assumptions, this occurs because a history of chronic disorders causes problems with the placental blood vessels before pregnancy. This increases the incidence of preeclampsia in pregnant women with chronic disorders such as diabetes and kidney disease. A study by Nurhasanah (2020) found that pregnant women with a history of chronic disorders such as diabetes and kidney disease have a twofold higher risk of developing preeclampsia than those without such disorders, due to preexisting problems with placental blood flow. Women with chronic disorders have a higher risk of developing preeclampsia. Preexisting kidney problems increase the risk of adverse pregnancy outcomes, particularly preeclampsia.

Concurrently, a study by Tangren et al. (2018) found a correlation between a history of kidney disease and the incidence of preeclampsia. According to this study, pregnant women

with a history of kidney problems had a 2.9 times higher risk of developing preeclampsia than those without them. Preexisting kidney problems are detrimental, particularly increasing the risk of preeclampsia. Pregnancy is associated with high transformations in renal plasma flow, resulting in a 50% increase in the glomerular filtration rate (GFR) during midgestation. Low pregnancy hyperfiltration has been shown to reduce the risk of preeclampsia, prematurity, and even birth burden.

4. CONCLUSION

There is a correlation between parity, occupation, history of hypertension, history of diabetes mellitus and kidney disease with the occurrence of preeclampsia, there is no correlation between age, education, multiple pregnancy with the occurrence of preeclampsia.

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