

## THE CORRELATION BETWEEN RISK FACTORS WITH INCIDENCE OF PREECLAMPSIA

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### ABSTRAK

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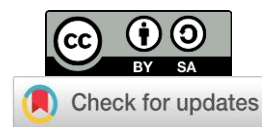
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#### Abstract:

Preeclampsia is a disorder that occurs in the mother and fetus during pregnancy which is one of the problems in pregnancy worldwide, especially in countries with low maternal health levels. Many risk factors contribute to the incidence of preeclampsia, including age, obesity, gravida status or parity, anaemia, history of hypertension, previous history of preeclampsia, and multiple pregnancies. This study aims to determine the association of risk factors with the incidence of preeclampsia at RSUD Dr. H. Chasan Boesoerie Ternate. This is an observational-analytic study with 169 consecutive samples. Using the chi-square test there is a relationship between preeclampsia and age, obesity, and a history of hypertension ( $p < 0.001$ ); anaemia ( $p = 0.039$ ). There is no relationship between preeclampsia and the status of gravida ( $p = 0,514$ ) and multiple pregnancies ( $p = 0.525$ ). It can be concluded that there is an association between preeclampsia and age, obesity, anaemia, and a history of hypertension and no association between preeclampsia and status of gravida and multiple pregnancies.

#### Abstrak:

Preeklamsia merupakan gangguan yang terjadi pada ibu dan janin selama hamil yang menjadi salah satu masalah dalam kehamilan di seluruh dunia khususnya negara-negara dengan tingkat kesehatan maternal yang rendah. Banyak faktor risiko yang turut berpengaruh dalam kejadian preeklamsia yaitu, usia, obesitas, status gravida atau paritas, anaemia, riwayat hipertensi, riwayat preeklamsia sebelumnya, dan kehamilan kembar. Penelitian ini bertujuan untuk mengetahui hubungan faktor risiko dengan kejadian preeklamsia di RSUD Dr. H. Chasan Boesoerie Ternate. Jenis penelitian ini adalah penelitian observasional-analitik dengan teknik consecutive sampling, sebanyak 169 sampel. Hasil uji chi square didapatkan adanya hubungan antara usia, obesitas, dan riwayat hipertensi dengan kejadian preeklamsia ( $p < 0,001$ ), terdapat hubungan antara anaemia dengan kejadian preeklamsia ( $p = 0,039$ ) dan tidak terdapat hubungan antara status gravida dan kehamilan kembar/multiple ( $p = 0,514$  dan  $0,525$ ). Berdasarkan hasil penelitian ini bisa disimpulkan bahwa terdapat hubungan antara usia, obesitas, anaemia, dan riwayat hipertensi dengan kejadian preeklamsia dengan kejadian preeklamsia dan tidak terdapat hubungan antara status gravida dan kehamilan kembar/multiple dengan kejadian preeklamsia.



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## INTRODUCTION

Preeclampsia is a disorder that occurs in the mother and fetus during pregnancy which is one of the problems in pregnancy worldwide, especially in countries with low or moderate maternal health levels with an estimate of at least 16%. Preeclampsia causes multisystem disorders in the mother's body resulting in >500,000 premature births and 60,000 maternal deaths worldwide each year [1].

The prevalence of preeclampsia in Indonesia is one of the health problems that continues to contribute a lot to the Maternal Mortality Rate (MMR). MMR is defined as a measure of the number of maternal deaths during pregnancy, childbirth, and postpartum due to factors related to these processes. In 2021 the number of MMR reached 7,389 deaths in Indonesia. Of this number, hypertension in pregnancy contributed to 1,077 maternal deaths, including preeclampsia [2].

Preeclampsia is also often a problem, especially in North Maluku province. According to the Basic Health Research (RISKESDAS) 2018, Maternal complications due to hypertension in pregnancy in North Maluku was 1.3%. This percentage was calculated for mothers with a recorded age range of 10-54 years, which is quite high for North Maluku [3].

The International Society for the Study of Hypertension in Pregnancy (ISSHP) defines preeclampsia as the presence of systolic blood pressure  $\geq 140$  mmHg with diastolic blood pressure  $\geq 90$  mmHg. This condition can occur after 20 weeks of gestation and can have a serious impact on the health of the mother and fetus. Apart from the increase in blood pressure, some several signs and symptoms can be experienced, namely, proteinuria  $\geq 300$  mg in a 24-hour urine sample or 2 or more urine dipstick results [4]. Although proteinuria is often positive in preeclampsia tests, not all preeclampsia is accompanied by proteinuria. In addition, accompanying signs and symptoms include thrombocytopenia (platelet count  $< 100,000$

cells/mL), impaired liver function characterized by abnormal elevation of liver enzymes (up to twice the upper limit of normal concentration), severe right upper quadrant pain or persistent epigastric pain, renal insufficiency (serum creatinine concentration  $> 1.1$  mg/dL or twice as high as normal), pulmonary edema, and headache [5].

To reduce the incidence of preeclampsia in pregnant women, prevention such as early prediction of preeclampsia and identifying factors including maternal employment, antenatal examination or antenatal care, maternal knowledge of the incidence of preeclampsia, and history of hypertension in the mother, in addition to the influence of age, birth status, nutrition, and previous history of preeclampsia must also be considered [6][7].

Based on the explanation described regarding the many risk factors that affect preeclampsia and no one has conducted researched the relationship of these risk factors in North Maluku, especially at RSUD Dr. H. Chasan Boesoirie Ternate, it is important to conduct this research. RSUD Dr. H Chasan Boesorie Ternate is the only referral hospital in North Maluku. Research on preeclampsia in this hospital is still very minimal, especially regarding what risk factors affect the incidence of preeclampsia in North Maluku. Preliminary data at this hospital obtained in the last 3 years there were more than 50 cases of preeclampsia that occurred This study aims to determine the relationship between risk factors and the incidence of preeclampsia at RSUD Dr. H. Chasan Boesoirie Ternate

## RESEARCH METHOD

This study is a quantitative study with an observational-analytic method with a cross-sectional study conducted during November-December 2023 with medical records taken from January 2022-June 2023. The target population in this study was pregnant women as a whole at Dr. H. Chasan Boesoirie Ternate Hospital. The

affordable population is all pregnant women patients written in medical records at RSUD Dr. H. Chasan Boesoirie Ternate with gestational age  $\geq 20$  weeks in January 2022-June 2023. The inclusion criteria in this study were the medical records of pregnant women patients recorded at RSUD Dr. H. Chasan Boesoirie Ternate, the medical records of pregnant women patients in the period January 2022-June 2023, and the complete medical records of pregnant women patients in accordance by the research variables. Exclusion criteria included incomplete or unclear medical records and medical records of pregnant women with a history of comorbid diseases. The total population of pregnant women obtained was 292 samples. The Slovin formula was used in this study to obtain a minimum sample. The minimum sample size was 169 patients using a consecutive sampling technique

**RESULT AND ANALYSIS**

**Table 1.**

**Patient Characteristics of Pregnant Women**

Variable	N	%
<b>Preeclampsia</b>		
Preeclampsia	50	29,6
Not preeclampsia	119	70,4
<b>Age</b>		
Age at Risk	37	21,9
Age Not at Risk	132	78,1
<b>Obesity</b>		
Obesity	91	53,8
Not Obesity	78	46,2
<b>Gravida Status</b>		
At Risk (Primigravida and Nulliparous)	58	34,3
Not at Risk	111	65,7
<b>Anaemia</b>		
Anaemia	55	32,5
Not Anemic	114	67,5
<b>History of Hypertension</b>		
Yes	12	7,1
No	157	92,9
<b>Multiple Pregnancy</b>		
Yes	2	1,2
No	167	98,8
<b>Total</b>	<b>169</b>	<b>100</b>

Based on this table, the characteristics of pregnant women in the January 2022-June 2023 period in this study are preeclampsia, age, obesity, gravida status, anaemia, history of

hypertension, and twin/multiple pregnancy. The results of this study obtained 169 samples of pregnant women consisting of 50 patients (29.6%) with preeclampsia and 119 patients (70.4%) without preeclampsia. Age frequency distribution obtained 37 patients (21.9%) with age at risk ( $>35$  years and  $<20$  years) and 132 patients (78.1%) with age not at risk (20-35 years). The frequency of obesity in pregnant patients was 91 patients (53.8%) were obese and 78 patients (46.2%) were not obese. The frequency distribution status of gravida was found to be 58 patients (34.3%) with at-risk (primigravida and nullipara) and 111 patients (65.7%) with non-risk status of gravida. Frequency distribution of anaemia, 57 patients (33.7%) were anemic and 112 patients (66.3%) were not anemic. Frequency of hypertension history, 12 patients (7.1%) had hypertension before their pregnancy and 157 patients (92.9%) did not have a history of hypertension. Frequency distribution for multiple pregnancies, as many as 2 patients (1.2%) had multiple pregnancies and 167 patients (98.8%) with single pregnancies.

**Table 2.**

**Correlation between Age, Obesity, Anaemia, and History of Hypertension with Preeclampsia**

Characteristic	Preeclampsia				Total		p-value
	Pre-eclampsia		Not pre-eclampsia		N		
	N	%	N	%			
<b>Usia</b>							
At risk	22	59,5	15	40,5	37	100	<0,001
Nor at risk	28	21,2	104	78,8	132	100	
<b>Obesity</b>							
Yes	39	42,9	52	57,1	91	100	<0,001
No	11	14,1	67	85,9	78	100	
<b>Anaemia</b>							
Yes	22	40,0	33	60,0	55	100	
No	28	24,6	86	75,4	114	100	0,039
<b>Hipertention</b>							
Ya	12	100	0	0	12	100	
Tidak	38	24,2	119	75,8	157	100	<0,001

The results of Table 2 obtained the results of the frequency distribution of age in pregnant women can be seen that the age at risk ( $<20$  years and  $>35$  years) as many

as 37 (21.9%) and not at risk 132 (78.1%). The results of the analytic test with *chi-square* obtained the results of  $p < 0.001$  ( $< 0.05$ ). Most of the pregnant women were found to be obese with a percentage of 91 (53.8%). Based on analytic results obtained  $p = < 0.001$  ( $0.05$ ). Most patients were found without anaemia at 114 (67.5%). Analytical testing obtained  $p$  value = 0.039 ( $< 0.05$ ). The frequency distribution of hypertension history was obtained as many as 157 (92.9%) patients without a history of hypertension with  $p < 0.001$  ( $< 0.05$ ).

**Table 3.**  
**Correlation between Gravida Status dan multiple pregnancy with Preeclampsia**

Characteristic	Preeclampsia				Total		P Value
	Pre-eclampsia		Not pre-eclampsia		N	%	
	N	%	N	%			
<b>Gravida Status</b>							
At risk	19	32,8	39	67,2	58	100	0.514
Nor at risk	31	27,9	80	72,1	111	100	
<b>Multiple Pregnancy</b>							
Yes	1	50,0	1	50,0	2	100	0.525
No	49	29,3	118	70,7	167	100	

The frequency distribution of gravida status was found to be at risk (primigravida and nullipara) as many as 58 (34.3%) and those who were not at risk were 111 (65.7%) with  $p = 0.514$  ( $> 0.05$ ). The frequency distribution of hypertension history obtained in pregnant women with multiple pregnancy as many as 2 (1.2%) and pregnancy with a single fetus 167 (98.8%) with  $p = 0.525$ .

**Correlation between Age and Incidence of Preeclampsia**

Based on the analytic results of age with preeclampsia with the results of  $p < 0.001$  ( $< 0.05$ ) it was concluded that there was a relationship between maternal age and the incidence of preeclampsia at RSUD Dr. H. Chasan Boesoirie Ternate. Research at Dr. M. Djamil Padang Hospital has results that are in line with this study, the results of the research state that there is a correlation between maternal age and the incidence of preeclampsia. Women aged  $< 20$  years and  $> 35$  years are at risk of

preeclampsia more than women aged 20-35 years [8]. Research on the relationship between age and the incidence of preeclampsia has been done before at RSUD Dr. H. Chasan Boesoirie with the result of  $p = 0.025$  ( $< 0.05$ ) so it is supported by this study [9].

Endothelial dysfunction theory is a concept used to explain the increased risk of preeclampsia in women aged  $> 35$  years. Women aged  $> 35$  are associated with degenerative processes that affect the vascular endothelium causing functional decline and structural changes that can result in increased blood pressure and the risk of preeclampsia. Pregnant women aged  $< 20$  years have a high risk of complications in pregnancy due to the lack of uterine maturity or a uterus that is still in growth and has not reached its normal size so complications, such as preeclampsia often occur [10].

**Correlation between Obesity and Incidence of Preeclampsia**

Based on the analytic results of obesity and preeclampsia with the results of  $p < 0.001$  ( $0.05$ ), it was found that there was an association between obesity and the incidence of preeclampsia at RSUD Dr. H. Chasan Boesoirie Ternate. Research conducted at Shanghai First Maternity and Infant Hospital is in line with this study. The results explained that there was a correlation between body mass index or obesity and preeclampsia with  $p = 0.001$  [11]. Research by Stitterich (2021) also supports the results with  $p = 0.001$  ( $< 0.05$ ). The results explain that obesity can increase the risk of preeclampsia up to three times [12].

Women with BMI  $< 25$  kg/m<sup>2</sup> during pregnancy are at lower risk of developing preeclampsia. Obesity creates low-grade endothelial inflammation, endothelial activation, and increased sodium reabsorption. All of these have an effect and play a central role in the occurrence of preeclampsia [13]. Preeclampsia also causes edema in the mother's body

increasing body mass index (BMI). Edema occurs due to excessive fluid increase in the body, decreased plasma colloid oncotic pressure due to proteinuria, use of crystalloids to replace lost blood, and decreased albumin levels [14].

### **Correlation between Anaemia with Incidence of Preeclampsia**

The results of the analytic test of anaemia with preeclampsia obtained  $p=0.039$  ( $<0.05$ ) so that the relationship between anaemia and the incidence of preeclampsia in RSUD Dr. H. Chasan Boesoirie Ternate. Research in India precisely at the Government General Headquarters Hospital has results that are in line with this study regarding the relationship between anaemia and the incidence of preeclampsia, especially pregnancy with hypertension. The  $p$ -value obtained was  $<0.001$  ( $<0.05$ ) [15]. Research conducted in Jember by Gayatri (2022) found results that also support this study with  $p=0.009$  ( $<0.05$ ) which means that anaemia is associated with the incidence of preeclampsia in pregnancy. Research conducted in Jember by Gayatri (2022) found results that also support this study with  $p = 0.009$  ( $<0.05$ ) which means that anaemia is associated with the incidence of preeclampsia in pregnancy [16]. Anaemia has a correlation with several adverse pregnancy outcomes, one of which is preeclampsia. Anaemia that occurs due to hemolysis is one of the causes of HELLP syndrome that occurs in preeclampsia [12]. Anaemia leads to decreased levels of sufficient oxygen in the blood, causing placental hypoxia. Furthermore, placental hypoxia affects trophoblast cell differentiation and remodeling of the spiral artery [17].

### **Correlation between History of Hypertension with Incidence of Preeclampsia**

The analytic results of the history of hypertension and preeclampsia obtained the results of  $p=<0.001$  ( $<0.05$ ) so there is a

relationship between the history of hypertension and the incidence of preeclampsia at RSUD. Dr. H. Chasan Boesoirie Ternate. Research at the Main Referral Maternity Hospital in Freetown is in line with this study because it found a correlation between the two variables with  $p=0.013$  ( $<0.05$ ) [12]. Research conducted at Veer Surendra Sai Institute of Medical Sciences and Research (VIMSAR), Burla, Odisha, on risk factors for preeclampsia also mentions a history of hypertension as one of the influential risk factors because it has a result of  $p=0.002$  ( $<0.05$ ) [18].

This study is supported by the theory that chronic vascular disorders or chronic hypertension in mothers can cause a high risk of preeclampsia. Women with chronic hypertension have increased vascular resistance and possibly reduced intravascular volume expansion. Chronic hypertension also affects PIGF and sFlt-1, all of which can lead to preeclampsia [13].

### **Correlation between Status of Gravida with Incidence of Preeclampsia**

Based on the results of the analytical test of the status of gravida and preeclampsia, it was found that  $p=0.514$  ( $>0.05$ ) so that there was no relationship between the status of gravida and the incidence of preeclampsia at RSUD Dr. H. Chasan Boesoirie Ternate. This study is supported by research at Shanghai First Maternity and Infant Hospital with the results of no relationship between the status of gravida and preeclampsia with  $p=0.710$  ( $>0.05$ ). This means that preeclampsia can occur in any status of gravida [11]. It is also supported by research conducted at the Government General Headquarters Hospital with a cross-sectional method which obtained a  $p$  value= $0.088$  ( $>0.05$ ) [15].

This study is supported by the theory that preeclampsia is a multifactorial disease based on the immunological and physiological conditions of the mother. The risk factors include many risk factors in frequent paternity changes, high BMI, poor



nutrition of the mother, or multigravida with too long a distance between pregnancies/births can also increase the risk of preeclampsia [19].

### Correlation between Multiple Pregnancy with Incidence of Preeclampsia

The test results between multiple pregnancies with preeclampsia obtained  $p=0.525$ . Based on these results, there was no association between multiple pregnancies and the incidence of preeclampsia at RSUD Dr. H. Chasan Boesoirie Ternate. Research at RSUD Prof. Dr. W. Z. Johannes Kupang supported this study, the results did not find a relationship between the two variables with  $p=0.576$  ( $>0,05$ ). The total number of respondents in the study was 90 respondents with a single fetus 4 respondents with multiple pregnancies and 2 of them had preeclampsia so it could not be used in describing the relationship between multiple pregnancies and the incidence of preeclampsia which is also the same as this study [20]. research at Government General Headquarters Hospital, Cuddalore India has different results from this study, regarding twin or multifetal pregnancies which states there is a correlation between twin/multiple pregnancies with the incidence of preeclampsia with  $p=0.00$  ( $<0.05$ ) [15].

This study is not supported by the theory that multiple pregnancy are at greater risk of preeclampsia. Increased fetal number and antiangiogenic factor levels play a role in the pathogenesis of preeclampsia in multiple pregnancy. Women without a history of hypertension with multiple pregnancy have high levels of antiangiogenic factors soluble Fms-like tyrosine kinase 1 (sFlt-1) and soluble endoglin and lower levels of proangiogenic placental growth factor (PlGF), which will cause an increase in blood pressure and result in preeclampsia [13].

### CONCLUSION

This study concluded that there was an association between the risk factors of

age, obesity, anaemia, and history of hypertension with the incidence of preeclampsia and there was no association between the risk factors of status of gravida and multiple pregnancy with the incidence of preeclampsia.

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