THE RELATIONSHIP OF OBESITY AND HISTORY OF HYPERTENSION ON THE INCIDENT OF PREECLAMPSIA

Sutrisari Sabrina Nainggolan[1], Nur Wahyuni[2]

[1]Nursing Study Programme, Bina Husada College of Health Sciences, Syech Abdul Somad Number 28 Bukit Kecil District Palembang City South Sumatera, email: sutrisarisabrinanainggolan@gmail.com

[2]Nursing Study Programme, Bina Husada College of Health Sciences, Syech Abdul Somad Number 28 Bukit Kecil District Palembang City South Sumatera, email: nurwahyunioye@gmail.com

Abstract

Preeclampsia is an acute complication of pregnancy and can occur during pregnancy, labor, and delivery which can cause morbidity and mortality in both the mother and fetus in the womb. Mothers with obesity and a history of hypertension are at high risk of developing preeclampsia. This study aims to determine the relationship between obesity and a history of hypertension with the incidence of preeclampsia in pregnant women. This research is an analytical survey research with a cross-sectional approach. The research carried out at the Pembina Community Health Center in May 2023. The respondents in this study were 89 pregnant women. The sampling technique uses the accidental sampling method. The analysis used is univariate analysis and bivariate analysis using the Chi-Square test. The research results showed that there was a relationship between obesity and the incidence of preeclampsia in pregnant women ($p = 0.000$) and there was a relationship between a history of hypertension and the incidence of preeclampsia in pregnant women ($p = 0.000$). It hoped that pregnant women will carry out routine pregnancy checks every month to control blood pressure and health workers can provide EIC (Educational Information Communication) to pregnant women so that they can understand quality and safe nutrition to prevent the incidence of obesity in pregnant women which influences the incidence of preeclampsia.

Keywords: preeclampsia, obesity, hypertension, pregnant women

INTRODUCTION

Maternal mortality rate (MMR) is an element in measuring health status and includes quality of life evidence and development index of countries. Until now, the maternal mortality rate is still a concern for solving health problems around the world. One of the causes of high maternal deaths in the world is hypertension in pregnancy (Depkes RI, 2020).

According to data from the Ministry of Health of the Republic of Indonesia (2021), cases of hypertension in pregnancy were the cause of maternal death after bleeding with a total of 1,110 cases, while data from Ministry of Health of the Republic of Indonesia (2022) saw a decrease in cases of hypertension in pregnancy to 1,077 cases. The maternal mortality rate in Indonesia is still far from the Sustainable Development Goals (SDGs) target, which aims to reduce the MMR to 70 per 100,000 live births by 2030.

Preeclampsia is one of the causes of perinatal morbidity and mortality in Indonesia. Preeclampsia is a collection of symptoms experienced by pregnant women at a gestational age

of more than 20 weeks, characterized by increased blood pressure, edema, and proteinuria. Preeclampsia impacts several body systems and can affect 2%-5% of pregnancies. About 76,000 women and 500,000 babies die every year due to preeclampsia. (Poon et al., 2019).

Enlarged blood vessels cause the pregnant woman's blood pressure to become low, making the pregnant woman feel dizzy. On the other hand, narrowing of blood vessels during pregnancy can cause pregnant women to experience narrowing of the blood vessels. Mothers who have cholesterol and gout are susceptible to narrowing of the blood vessels, which results in high maternal blood pressure. Blood flow to the brain becomes less smooth as a result of the narrowing of the blood vessels that occurs in pregnant women with hypertension (Sutanto & Fitriana, 2021).

The cause of preeclampsia is due to the role of prostacyclin and thromboxane. Apart from that, there is also a role for immunological factors due to the activation of the complement system in preeclampsia. Meanwhile, the role of genetic factors is that there is a tendency for the frequency of preeclampsia in children of mothers who suffer from preeclampsia. Then, the role of the renin-angiotensin-aldosterone system (RAA) and other predisposing factors such as *hydatidiform mole*, diabetes mellitus, *multiple pregnancies*, *hydrops details*, obesity, and age over 35 years (Sukarni & Margareth, 2015).

At first, preeclampsia does not show symptoms, so early detection is needed through good antenatal care for pregnant women. During the pregnancy examination, blood pressure was determined where the diastolic pressure was ≥ 90 mmHg, weight gain caused by fluid retention, and was discovered before apparent symptoms of edema appeared, such as swollen eyelids or enlarged hand tissue. In mild preeclampsia, proteinuria is only minimally positive or not (Ratnawati, 2020).

Maternal manifestations of acute preeclampsia include *Hemolysis Elevated Liver Enzymes Low Platelets Count* (HELLP) Syndrome, pulmonary edema, placental abruption, acute renal failure, eclampsia, respiratory distress syndrome, stroke, and perinatal death. Meanwhile, the long-term manifestations are chronic hypertension, diabetes mellitus, chronic renal failure, coronary artery disease, neurological deficits, and death (Manuaba, 2016).

A history of hypertension experienced by the mother before pregnancy and obesity are among the causes of preeclampsia in pregnant women. If a pregnant woman suffers from hypertension, she is likely to experience preeclampsia during pregnancy. This is due to an increase in blood pressure. Meanwhile, obesity causes blood cholesterol to rise, which causes the heart to work (Septiana, 2019).

Pregnant women who have a history of hypertension experience preeclampsia during pregnancy due to hypertension that they have experienced before pregnancy, which has an impact on damage to body organs and compounded by the presence of pregnancy. It makes the body work harder, causing symptoms of edema and proteinuria, thereby causing the risk of preeclampsia (Wulan et al., 2022). Likewise, obesity is also a cause of preeclampsia. It is

caused by excess body weight so that cholesterol in the blood increases. It causes blood pressure to rise and triggers preeclampsia (Silaban & Rahmawati, 2021).

From data on the number of visits by pregnant women at Pembina Community Health Center in 2021, it found that 705 pregnant women visited, while the estimated data for pregnant women with obstetric complications was 141 pregnant women including antepartum hemorrhage, postpartum hemorrhage, anemia, prolonged labor, hyperemesis, preeclampsia, and eclampsia. Meanwhile, in 2022, 169 pregnant women visited will increase by 844 pregnant women with obstetric complications, and 3% (23 people) of them will experience preeclampsia. Furthermore, in April 2023, 162 pregnant women visited the Pembina Community Health Center, and 7% (13 people) experienced preeclampsia. Based on the description above, the author is interested in researching the relationship between obesity and a history of hypertension on the incidence of preeclampsia.

RESEARCH METHODS

The type of research is quantitative with the research method used being an analytical survey using a cross-sectional research design. This research focuses on the relationship between obesity and a previous history of hypertension on the incidence of preeclampsia. This research was implemented in May 2023. The population in this study were all pregnant women who visited Pembina Community Health Center in 2022, totaling 844 pregnant women. This research sample uses a quantitative sample with the accidental sampling method with a total research sample of 89 respondents. Researchers collected data using primary data obtained through direct interviews with respondents using research instruments in the form of questionnaire sheets given to respondents containing questions regarding obesity and previous history of hypertension and observation sheets regarding the incidence of preeclampsia in pregnant women. The analysis used is univariate and bivariate. Univariate analysis to see the distribution and percentage of each variable (obesity, previous history of hypertension, and incidence of preeclampsia). Bivariate analysis to determine the relationship between obesity and a previous history of hypertension on the incidence of preeclampsia using a statistical test, namely the Chi-Square test.

RESEARCH RESULT

The results of research with 89 respondents are presented in the form of univariate and bivariate analysis.

1. **Univariate Analysis**

The results of the univariate analysis show the distribution and percentage of obesity variables, previous history of hypertension, and the incidence of preeclampsia, which can be seen in Table 1 and Table 2 below.

Table 1. Frequency Distribution of Respondents Based on Obesity

Obesity	Amount	%
Not obese	43	48,3
Obesity	46	51,7
Total	89	100.0

Based on Table 1, it found that of the 89 respondents, more than half of the respondents were obese (51.7%).

Table 2. Frequency Distribution of Respondents Based on History of Hypertension

History of Hypertension	Amount	%
Yes	35	39,3
No	54	60,7
Total	89	100.0

Based on Table 2, it found that of the 89 respondents, more than half of the respondents had a history of hypertension (60.7%).

Table 3. Frequency Distribution of Respondents Based on the Incident of Preeclampsia

Incident of Preeclampsia	Amount	%
Yes	17	19,1
No	72	80,9
Total	89	100.0

Based on Table 3, it found that of the 89 respondents, the majority of respondents did not experience preeclampsia (80.9%).

2. **Bivariate Analysis**

This analysis was carried out to see whether there was a relationship between the independent and the dependent variables. In this study, data analysis tests were using the Chi-square statistical test.

Table 4. The Relationship between Obesity and the Incidence of Preeclampsia in Pregnant Women

Obesity	Incidence of Preeclampsia				Amount		p-value	OR
	Yes		No					
	n	%	n	%	n	%		
Not obese	0	0	43	100	43	100		
Obesity	17	37	29	63	46	100	0,000	1.586
Total	17	19,1	72	80,9	89	100		

Table 4, found that of the 46 people (51.7%) respondents who were obese and had preeclampsia, 17 people (19.1%) were more than the 43 people (48.3%) respondents who were not obese and had no preeclampsia. as many as 72 people (80.9%) The results of the chi-square statistical test showed p-value = 0.000, which when compared with the value $\alpha = 0.05$, then p-value ≤ 0.05 and OR 1.586, meaning that obesity has a risk 1,586 times greater risk of developing preeclampsia. It means that there is a relationship between obesity and the incidence of preeclampsia in pregnant women.

Table 5. Relationship Between A History Of Hypertension and the Incidence Of Preeclampsia In Pregnant Women

History Of Hypertension	Incidence Of Preeclampsia				Amount		p-value	OR
	Yes		No					
	n	%	n	%	n	%		
Yes	17	48,6	18	51,4	35	100		
No	0	0,0	54	100	54	100	0,000	0.514
Total	17	19,1	72	80,9	89	100		

Table 5, found that of the 54 people (60.7%) respondents who did not have a history of hypertension and did not experience preeclampsia, 72 people (80.9%), more than the 35 people (39.3%) respondents who had 17 people (19.1%) had a history of hypertension and preeclampsia. The results of the chi-square statistical test showed p-value = 0.000 when compared with the value $\alpha = 0.05$, then p-value ≤ 0.05 and OR 0.514, meaning that a history of pregnancy has a 0.514 times greater chance of developing preeclampsia. It means that there is a relationship between a history of hypertension and the incidence of preeclampsia in pregnant women.

DISCUSSION
1. **The Relationship between Obesity and the Incidence of Preeclampsia in Pregnant Women**

The research results showed that 46 respondents were obese (51.7%), more than 43 respondents who were not obese (48.3%). The results of the chi-square statistical test showed a p-value = 0.000, which compared with the value $\alpha = 0.05$, then the p-value ≤ 0.05 and OR 1,586, meaning that obesity has a 1,586 times greater risk of developing preeclampsia. It means that there is a relationship between obesity and the incidence of preeclampsia in pregnant women.

Several factors cause obesity, including genetic factors, metabolic disorders, and excessive food consumption. If a pregnant woman was previously fat, then the pregnant woman has a large amount of blood, which makes it difficult for the heart's pumping function, as indicated by an increase in blood pressure. If this continues without being treated, it can lead to preeclampsia (Setyawati et al., 2018).

Obese pregnant women can cause blood pressure to increase, causing preeclampsia in pregnant women. It is due to the increasingly difficult function of the heart in pumping blood. Obese pregnant women tend to experience preeclampsia. Working mothers tend to be obese due to less physical activity and increased appetite (Wahyuni et al., 2019).

The same thing was expressed by Dewie et al. (2020) that lifestyle factors such as poor diet and lack of physical activity result in obesity and cardiovascular disease. However, as long as they can maintain adequate diet and physical activity, obesity can be avoided. Physical activity

can reduce the risk of preeclampsia, where mothers who are physically active during early pregnancy experience a 35% reduced risk of preeclampsia compared to inactive women.

Excess weight occurs in pregnant women resulting in high cholesterol in the blood. In addition, it can cause the heart to work harder, resulting in an unstable increase in blood pressure. It is what triggers preeclampsia in pregnant women (Silaban & Rahmawati, 2021).

Obesity is one of the risk factors for preeclampsia, and the risk increases along with increasing BMI (body mass index). Obese pregnant women can experience preeclampsia through hyperleptinemia, metabolic syndrome, inflammatory reactions, and increased oxidative stress by cytokines and direct hemodynamic effects from hyperinsulinemia (increased sympathetic activities, and tubular sodium resorption). It is what causes damage and dysfunction of the endothelium (Yanuaringsih et al., 2022).

Obesity triggers preeclampsia through several mechanisms, including superimposed preeclampsia and triggering other metabolites and macromolecules. The risk of preeclampsia doubles for every 5-7 kg/m2 increase in body weight. An increase in the risk of preeclampsia also occurs with increasing BMI (body mass index). Mothers with a BMI > 35 before pregnancy have a fourfold increased risk of developing preeclampsia compared to mothers with a BMI of 19-27 (Siregar et al., 2022).

Obesity also occurs due to low consumption of antioxidants or high consumption of carbohydrates and fats. Obesity is a nutritional problem caused by excessive consumption of calories, fat, and animal protein, as well as excessive consumption of sugar and salt. It has an impact on the risk of thromboembolism, preeclampsia, eclampsia, and increased rates of labor induction, as well as the fetus experiencing macrosomia, shoulder dystocia, and even stillbirth (Wulandari et al., 2022).

Based on the description above, pregnant women who are obese have a diet that is low in fiber and high in calories and fat. It is what causes pregnant women to suffer from preeclampsia. If this condition is not treated, it can cause serious health problems for pregnant women and even death.

2.   **Relationship Between A History Of Hypertension and the Incidence Of Preeclampsia in Pregnant Women**

The results showed that 54 respondents (60.7%) had no history of hypertension, more than 35 respondents (39.3%). The results of the chi-square statistical test showed a p-value = 0.000, which compared with the value α = 0.05, the p-value ≤ 0.05 and OR 0.514 means that a history of pregnancy has a 0.514 times greater risk of developing preeclampsia. It means that there is a relationship between a history of hypertension and the incidence of preeclampsia in pregnant women.

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The risk factor that most influences the incidence of preeclampsia is a history of hypertension. This is because previously experienced hypertension can cause damage to essential organs in the body. In addition, if pregnancy passes whatever ultimately results in weight gain, it can cause more severe damage (Bekti et al., 2020).

A history of hypertension in a previous pregnancy will cause recurrent hypertension in pregnancy. It is because the mother's history of illness determines the occurrence of complications in subsequent pregnancies (Arnani et al., 2022). Then Harahap & Situmeang (2022) also obtained research results, namely that pregnant women who have a history of hypertension and preeclampsia, if they want to get pregnant at reproductive age (20-35 years), are advised to always regularly check the condition of their pregnancy, so that if complaints are found they can immediately take action.

Pregnant women who have a history of hypertension are more likely to experience preeclampsia compared to pregnant women who do not have a history of hypertension. Hypertension experienced before pregnancy causes disruption or damage to the body's organs, and with pregnancy, the body's work becomes difficult, resulting in even more severe problems with the appearance of symptoms of edema and proteinuria (Purwanti et al., 2021).

Mothers who have a history of hypertension are more likely to experience preeclampsia complications during pregnancy due to abnormal maternal blood flow due to previously experienced hypertension. For mothers who do not suffer from preeclampsia because the mother does not have a history of hypertension the blood flow to the mother is smoother, and there are no blockages so that the mother's health during pregnancy is well maintained (Subani et al., 2020). A different thing was found by Anggraeny (2020) that before pregnancy, mothers already suffered from hypertension, so this situation would make the mother's condition worse during pregnancy. However, the results of the research found that mothers with a history of hypertension before pregnancy were not a risk factor for preeclampsia.

History of hypertension is a mother who has experienced hypertension before pregnancy or before 20 weeks of gestation. Mothers who have a history of hypertension are at greater risk of experiencing preeclampsia, as well as increasing morbidity and mortality rates for pregnant women and fetuses. The blood pressure experienced by pregnant women with preeclampsia is unstable and tends to increase blood pressure further due to vascular resistance which can damage the endothelium (Cunningham, F.Gary, 2014).

Based on the description above, pregnant women who have a history of hypertension before pregnancy have the potential to experience preeclampsia. It is what causes complications for the mother and fetus in the womb. A history of hypertension suffered before pregnancy can result in physiological disorders in the pregnant woman's body. Edema and proteinuria occur if pregnancy causes weight gain. It is what makes the condition of pregnant women experiencing damage to bodily functions that's more serious. Therefore, it is necessary to treat and manage preeclampsia through regular pregnancy consultations. Apart from that, special monitoring is needed from health workers to prevent eclampsia.

CONCLUSIONS AND SUGGESTIONS

Based on the research results, the following conclusions obtained: more than half of the respondents had a history of hypertension (60.7%), more than half of the respondents were obese (51.7%), most of the respondents did not experience preeclampsia (80.9%), there was relationship obesity and the incidence of preeclampsia in pregnant women (*p-value* = 0,000) where obesity has a 1.586 times greater risk of preeclampsia, and there is a relationship between a history of hypertension and the incidence of preeclampsia in pregnant women (*p-value* = 0,000) where a history of pregnancy has a 0.514 times greater risk of preeclampsia. This relationship shows the need to improve more intensive health services for pregnant women who are obese and have a history of hypertension so that they do not experience preeclampsia. Apart from that, pregnant women should maintain their weight and control their blood pressure so that it does not increase normally.

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