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PARITY AND BODY MASS INDEX AS FACTORS IN PREECLAMPSIA INCIDENCE

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Abstract

The maternal mortality rate illustrates the number of maternal deaths per 100,000 live births, caused by interference during pregnancy, maternity and childbirth. Factors of preeclampsia are parity and obesity. The purpose of this study to determine the relationship between parity and BMI with the incidence of preeclampsia in QIM Batang Hospital Batang Regency in 2023. The research design used a case control and retrospective approach. Samples in this research was 220 pregnant women, Case Group 110 Respondents and Control Groups 110 Respondents. Data analysis using Chi-Square. The results showed that parity at risk of 55 case groups (50%) and parity at risk of control group 65 (59.1%). IMT is not normal case group 94 (85.5%) and IMT is not normal control group 74 (67.3%). The bivariate analysis shows that there is no relationship between parity and preeclampsia (0.176> 0.05) but there is a significant relationship between the body's mass index and the preeclampsia in the Qim Hospital in Batang Regency (0.002 <0.05). The results of this study can add insight in midwifery care to pregnant women. Pregnant women who have abnormal BMI are advised to maintain diet so that there is no weight gain.

Keywords: *Preeclampsia ; Parity ; Body Mass Index*

1. Introduction

Maternal and child health is the most important measuring tool in determining the level of health of a country. The measuring tool is the maternal mortality rate. The maternal mortality rate describes the number of maternal deaths per 100,000 live births, caused by disturbances during pregnancy (not other factors such as accidents), childbirth and the postpartum period. The causes of maternal mortality are related to the presence of hypertension in pregnancy (including preeclampsia and eclampsia), bleeding (pregnancy, childbirth, postpartum), postpartum infections and unsafe abortions (Dinkes Kota Semarang, 2021).

Preeclampsia is a serious and complex medical problem. The latest criteria do not classify mild preeclampsia because preeclampsia is a dangerous condition and can cause morbidity and mortality for mothers and babies. The latest classification of preeclampsia is preeclampsia without severe symptoms and severe preeclampsia. The magnitude of this problem not only has an impact during pregnancy and childbirth, it can even cause problems during the postpartum period such as the risk of cardiometabolic disease and other diseases such as ischemic heart disease, the risk of hypertension (POGI, 2016). Mothers who experience preeclampsia can have impacts on the baby such as IUGR, IUFD, premature birth (Tapowolo et al., 2018). The cause of preeclampsia is not yet known with certainty. Risk factors for preeclampsia include parity, history of preeclampsia, family history of preeclampsia, multiple pregnancies, age over 40 years and obesity (Mariati et al., 2022).

One of the factors causing preeclampsia is parity and obesity. Parity is the number of babies born either alive or dead. Parity is divided into 3, namely primipara (giving birth once), multipara (giving birth more than once), and grandemulti (giving birth more

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than 5 times). Preeclampsia is prone to occur in primiparas because women who have only given birth once, either alive or dead, tend to feel afraid of going into labor so that the hormone cortisol increases and increases high blood pressure which triggers preeclampsia. Primiparas have the opportunity to inhibit maternal antibodies from entering the baby's immune system through the placenta, thereby triggering high blood pressure during pregnancy and even preeclampsia (Laura et al., 2021).

One of the causes of preeclampsia is obesity. How to determine if a pregnant woman is obese by looking at the body mass index of the pregnant woman. BMI (body mass index) uses the body weight when a pregnant woman first checks for pregnancy, so the BMI category for pregnant women is the same as the BMI for ordinary women. Body mass index can be categorized as underweight less than 18.5 kg/m2, normal if the value is 18.5 kg/m2 up to 22.9 kg/m2, overweight if the value is 23 kg/m2 up to 24.9 kg/m2 and obesity if the value is more than 25kg/m2. Pregnant women who have a BMI > 25 before pregnancy tend to be at risk of blockages in the blood vessels which cause preeclampsia, CS delivery, giving birth prematurely, and large babies (Kemenkes RI, 2022).

Efforts to prevent preeclampsia can be carried out by the government, namely primary prevention and secondary prevention. Primary prevention of preeclampsia can be done by providing access to quality maternal health services. Screening to predict the presence of preeclampsia, so that cases of preeclampsia can be treated early. Preeclampsia screening varies greatly from simple to sophisticated, namely the biomolecular level depending on resource availability. The secondary prevention that can be done is rest, salt restriction, low dose aspirin, and calcium supplementation as an effort to reduce AKI. Programs that have been carried out by the government to reduce MMR include the Reducing Maternal and Infant Mortality Rates (PENAKIB) program. In this program, midwives collect data on pregnant women and assess risk factors for preeclampsia by carrying out anamnesis and physical examination, namely Mean Arterial Pressure (MAP). MAP examination is carried out by calculating the average arterial blood pressure from diastole and systole. Apart from the PENAKIB program, in the 2020 revised edition of the KIA (Maternal and Child Health) Book, preeclampsia screening is added at gestational age < 20 weeks unlike in the previous edition of the MCH book which was only carried out in the 2nd and 3rd trimester. Screening in the 2020 edition of the KIA book revision includes anamnesis of parity, age, history of preeclampsia, autoimmune disease, urine protein examination, BMI calculation and MAP examination which is calculated at each ANC visit (Juwita et al., 2022).

According to the World Health Organization in 2020, the highest maternal mortality rate in the world is in developing countries, namely 94% occurs in lower middle class and low income countries. The highest MMR data in ASEAN in 2020 was occupied by Myanmar at 282.00 per 100,000 live births, and the lowest was in Singapore with no MMR. In general, 80% of MMR in ASEAN is caused by bleeding after giving birth, 25%, hypertension in pregnancy, 12%, obstructed labor, 8%, abortion, 12% and other causes, 7%. MMR in Indonesia from 2018 to 2021 has increased. In 2020, the MMR experienced a drastic increase compared to the MMR in 2021. In 2020, the MMR was recorded at 4,627 cases to 7,389 cases in 2021. Based on the causes of maternal deaths in 2021, most of them were caused by Covid-19, bleeding, hypertension in pregnancy and preeclampsia. or eclampia, abortion or other causes (Kemenkes RI, 2022).

Data from the Central Java Provincial Health Service, the number of MMR in 2021 has increased compared to 2020, namely from 17 cases to 21 cases (95.32 per 100,000 live births). The causes of maternal mortality in Central Java include 76.19% other causes, 14.29% postpartum hemorrhage, 9.52% hypertension in pregnancy, both preeclampsia and eclampsia, 76% of maternal deaths occur during the postpartum period (Dinkes Kota Semarang, 2021).

Data obtained from the Batang Regency Office, MMR from 2020 to 2021 has increased, although not significantly, whereas in 2022 there will still be MMR caused by bleeding, hypertension in pregnancy (preeclampsia and eclampsia), and other reasons. In 2021, MMR due to preeclampsia and eclampsia had cases occurring in the working areas of the Blado Health Center and Batang 4 Health Center. In 2022 there were 3 cases in the Batang 4 Health Center, Pecalungan Health Center and Bawang Community Health Center working areas. AKI data from January to April 2023, AKI at the Batang 4 Community Health Center was 1 case caused by untreated preeclampsia which became eclampsia (Dinkes batang, 2022).

One of the causes of AKI in Batang Regency is untreated preeclampsia which triggers Hellp Syndrome and even eclampsia. The Batang Regency Office has carried out initial treatment measures in the form of integrated ANC for early detection of high-risk pregnant women such as the risk of preeclampsia, with the next action being to make a referral to the hospital to get further treatment from a specialist OBSGIN (obstetrics and gynecology), one of the referral places provided In the working area of

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the Batang Health Service is QIM Batang Hospital. The results of a preliminary study conducted at QIM Batang Hospital using secondary data, namely patient medical records from 2021 to 2022, showed a significant increase in data on pregnant women with preeclampsia. In 2021 there were 81 cases (5.18%) and in 2022 there were 94 cases (8.38%). The efforts made by QIM Hospital in handling preeclampsia cases include handling to prevent worsening conditions such as eclampsia, hellp syndrome or superimpost which can cause mortality and morbidity for both mother and baby. Preeclampsia cases at QIM Batang Hospital are caused by one of the trigger factors including parity, obesity, history of preeclampsia, multiple pregnancies or having given birth to many.

2. Method

This study used an observational analytic design with a case control study model and a retrospective approach. The research population is pregnant women with a gestational age of > 20 weeks as many 1083 pregnant women. Sampling techniques case group uses total sampling techniques, sampling techniques in the control group using simple random sampling. The sample in this study from January to December 2023 as many as 220 pregnant women consisted of 110 cases and 110 respondents.

The data collection instruments using a checklist. Data analysis using the Chi Square test. This study has received a feasibility of research ethics from the Semarang Health Polytechnic number 0125/EA/KEPK/2024, and has received approval from the Health Research Ethics Commission (KEPK) of QIM Hospital with number 01/KEPK/RS.QIM/II/2024

3. Result and Discussion

Parity distribution of pregnant women at QIM Hospital, Batang Regency

Table 1. Parity distribution of pregnant women at QIM Hospital, Batang Regency in 2023 (n=220)

Variabel	Parameter	Case		Control	
		f	%	f	%
Maternal Parity	Risk	55	50	65	59.1
	No Risk	55	50	45	40.9
	Total	110	100	110	100

Based on Table 1, the case group consisted of 55 respondents (50%) who were at-risk parity and 55 respondents who were non-risk parity, namely 55 respondents (50%), while the majority of the parity of pregnant women at QIM Hospital in the control group was at-risk parity, namely 65 respondents (59.1%)

Distribution of body mass index (BMI) among pregnant women at QIM Hospital in 2023

Table 2. Distribution of body mass index (BMI) among pregnant women at QIM Hospital, Batang Regency (n=220)

Variabel	Parameter	Case		Control	
		f	%	f	%
Body Mass Index	Normal	16	14.5	36	32.7
	Abnormal	94	85.5	74	67.3
	Total	110	100	110	100

Based on Table 2, it can be seen that the distribution of samples of most pregnant women at QIM Hospital in the case group was in the abnormal BMI category, namely 94 respondents (85.5%), while the body mass index (BMI) of the majority of pregnant women at QIM Hospital in the control group was in the abnormal BMI category, namely 74 respondents (67.3%).

DOI: 10.31983/jrk.v13i2.11651

The relationship between parity of pregnant women and the incidence of preeclampsia at QIM Batang Hospital in 2023

Table 3. Relationship between parity of pregnant women and the incidence of preeclampsia at QIM Batang Hospital

Parity	Preeclampsia Event				ρ Value
	Preeclampsia		No Preeclampsia		
	n	%	n	%	
Risk	55	45.8	65	54.2	0.176
Not Risk	55	55	45	45	

Based on the analysis using the Chi Square statistical test with the SPSS version 25.0 program, the Asymp-sig value was 0.176> 0.05. This means that Ha is rejected so that it can be concluded that there is no relationship between parity and the incidence of preeclampsia at QIM Hospital, Batang Regency.

The relationship between body mass index (BMI) in pregnant women and the incidence of preeclampsia at QIM Batang Hospital in 2023

Table 4. Relationship between parity of pregnant women and the incidence of preeclampsia at QIM Batang Hospital

Parity	Preeclampsia Event				ρ Value
	Preeclampsia		No Preeclampsia		
	n	%	n	%	
Normal	16	30,8	36	69,2	0,002
Abnormal	94	56	74	44	

Based on the analysis using the Chi Square statistical test with the SPSS version 25.0 program, the Asymp-sig value was 0.002 <0.05. This means that Ha is accepted so that it can be concluded that there is a relationship between body mass index (BMI) and the incidence of preeclampsia at QIM Hospital, Batang Regency.

Based on statistical analysis using the Chi Square test obtained the results of ρ value of 0.176 (> 0.05) thus it can be concluded that there is no relationship between parity and the incidence of preeclampsia in Qim Hospital in Batang Regency. The risk factor for preeclampsia one of which is parity. Parity at risk (primipara and grandemulti) experiences preeclampsia compared to mothers who have parity not at risk (multipara). Grandemulti has an endometrial environment around the implantation place is less than perfect and is not ready to receive the results of conception, so that the provision of nutrition and oxygenation to the results of the conception is less than perfect and results in the growth of conception results will be disrupted so as to increase the risk of preeclampsia. Mothers who have more than 4 parity have experienced a decrease in the function of the reproductive system. Grandemultigravida has decreased the function of the reproductive system, causing preeclampsia, one of the risk factors related to preeclampsia is high parity (more than four), which experiences a decrease Fulfillment of nutrition (Sudarman et al., 2021) (Veftisia & Khayati, 2018).

In the first pregnancy there was the formation of blocking antibodies against perfect antibodies and the formation of human leucocyte antigen protein G (HLA) played an important role in the modulation of immune response, so that mothers reject the results of conception (placenta) or maternal intolerance to the placenta resulting in preeclampsia. Primigravida often experiences stress in the face of labor. Emotional stress that occurs in primigravida causes an increase in the release of corticotropic-releasing hormone (CRH) by the hypothalamus, which then causes an increase in cortisol and causes an increase in cardiac output pressure which triggers increased blood pressure causing preeclampsia (Kurniawati et al., 2020). The incidence of preeclampsia is getting bigger in pregnancy and frequent childbirth (grandemulti). In Grandemulti there is a change in tissue of the devices that are reduced in elasticity including blood vessels, resulting in an increase in fluid and hypertension with edema and proteinuria (Kurniasari & Arifandini, 2019). Preeclampsia does not only occur in pregnant women who first pregnant or have given birth, but also in pregnant women with repeated pregnancies who have the risk of experiencing preeclampsia (Sumarni, 2016).

DOI: 10.31983/jrk.v13i2.11651

This research is not in accordance with the above theory but is in line with research conducted in Etiopia that there is no significant relationship between the mother's parity and the incidence of preeclampsia. This study got the results of 239 pregnant women who experienced preeclampsia, 95 pregnant women (39.75%) were nullipara, 66 pregnant women (27.62%) primipara, and 78 pregnant women (32.64%) multipara . The results of the statistical test obtained the value of P 0.119 which means there is no relationship between parity and the incidence of preeclampsia, so that it shows that preeclampsia not only tends to occur in primipara but can also occur in multipara (Welesemayat et al., 2020).

According to researchers, in Qim Batang Hospital there was no relationship between parity and the incidence of preeclampsia. Parity is not at risk (multigravida) that experiences preeclampsia tends to be still a lot, possibly caused by age, work, unlawful stress levels or history of disease before pregnancy. This is in line with research conducted in China The cause of preeclampsia is an age factor, the results of the statistical test in the study obtained a p-value value of 0,000 which means that pregnancy at the age of 35 years has a high risk of preeclampsia (Nawsherwan et al., 2020). In accordance with the theory that says more and more mothers give birth over the age of 35 will make female reproductive organs weaken and loss of flexibility. Conditions of function and reproductive organs that are not optimal, will cause the function of the endothelium to be disrupted due to blood, oxygen, and nutrients that are flowed to the placenta decreases until it causes the presence of toxic or sensitive substances to influence the endothelium so that it will increase the possibility of complications during the next pregnancy, namely Preeclampsia (Noor et al., 2021).

This study is in line with the results of the analysis conducted by Tigor H. Sitomurang (2016) shows that the value of p value = 0.765 (p> 0.05) is concluded that there is no significant relationship between parity and the incidence of preeclampsia in the Poly of Anutapore Hospital in Palu. This is because most of the pregnant women who come to the Poly of Anutapura Palu General Hospital assume that the number of babies they give birth has nothing to do with the incidence of preeclampsia, as long as they feel able to give birth, are not always anxious (Situmorang et al., 2016). From the results of the study also found that pregnant women with older multiparas are at risk of experiencing severe preeclampsia. Older multipara mothers, the risk of cardiovascular disease increases and there is a decrease in body function which results in the development of preeclampsia faster (Simkin, P., Whalley, J., Kepler, A., Durham, J. & Bolding, 2018).

This research is different from research conducted by Siti Latifah (2023) about parity factors with the incidence of preeclampsia in pregnant women at Pakuhaji Regional Hospital, Tangerang Regency that parity status in the risk category has a chance of 1.8 times having a higher preeclampsia than pregnant women with the Parity Status category other (Latipah et al., 2023). In line with research conducted at Sungai Lilin Regional Hospital stated that the results of statistical tests obtained p value = 0.001 <00.5 then it can be concluded that there is a parity relationship with the incidence of preeclampsia at Sungai Lilin Regional Hospital in 2021 (Sari et al., 2021).

From the results of research, theory and related research, researchers assume that the risk factors for preeclampsia are not only caused by parity. Other causes are age factors, disease history before pregnancy, family health history, obesity, and psychosocial factors such as work, education level and social economy. The results showed that there was a relationship between the Body Mass Index (IMT) and the incidence of preeclampsia in the Qim Hospital in Batang Regency, from the results of the Chi Square test, the p-value value of 0.002 <0.05 could be concluded that there was a relationship between IMT and the incidence of preeclampsia in Qim Hospital Batang Regency.

The results of this study are in accordance with the theory that pregnant women with BMI ≥ 25 (obesity) are at risk of preeclampsia. The body's mass index is one of the factors that causes preeclampsia where the IMT is excessive associated with reduced organ perfusion due to vasospasm and endothelial activation. In pregnant women there is an endothelial dysfunction that is triggered by excessive or obesity, which will cause damage from the endothelium and cause preeclampsia (Fauzia & Pangesti, 2023). Pregnant women with nutritional status based on BMI in the abnormal category are more at risk of experiencing preeclampsia compared to pregnant women with normal BMI. This is because pregnant women with abnormal BMI (obesity) become a trigger factor for degenerative diseases due to increased accumulation of excessive body fat. This fat will produce CRP (Reactive C protein) and excessive inflammatory cytokines (IL 6). CRP is an acute phase reactant formed in adipose tissue and will increase early in pregnancy. Whereas IL 6 (Interleukin 6) is the main stimulator of the acute phase reactants that have an effect on the walls of blood vessels and coagulation systems. The increase in CRP and IL6 also

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contributes more to the oxidative incidence of stress. Oxidative stress along with toxic substances derived from excess fat will stimulate endothelial damage to blood vessels called endothelial dysfunction, where this condition occurs in an imbalance of nutrients that serve as vasodilators with vasoconstrictors (endotheline I, thromboxan, angiotensin II so that there will be broad vasoconstriction and hypertension occurs. The impact of sustainable vasospasm will cause failure in organs such as kidney (proteinuria, kidney failure), liver ischemia and can cause preeclampsia (Kurniasari & Arifandini, 2019).

This study is in line with research (Mrema et al., 2018) which shows that pregnant women with excess weight and obesity have a higher risk of experiencing preeclampsia compared to pregnant women with lower/ less IMT. Based on the results of cross -tabulation in pregnant women with normal body mass index (IMT) the majority did not experience preeclampsia at 69.2% while in pregnant women with an abnormal majority of body mass index (IMT) the majority experience preeclampsia at 56%.

This study was in line with research conducted by Siti Patonah, IMT (Body Mass Index) with the incidence of preeclampsia in pregnant women in the Balen Health Center in Balen District, Bojonegoro Regency in 2020, the majority of obesity respondents experienced severe preeclampsia as many as 36 respondents (100.0%). Obesity in pregnancy has a bad impact on health, especially in pregnant women, which can cause hypertension, hypercholesterol, hyperglycemia known as (3H). Hypertension in pregnancy can trigger preeclampsia. Increasing the IMT of pregnant women, the risk of preeclampsia is also getting bigger. This is because excessive weight gain causes a person to experience various health problems, such as: hypertension where hypertension is a sign of a mother experiencing a preeclampsia (Patonah et al., 2021). Between facts and theories there is a compatibility that IMT obesity is one of the factors that causes preeclampsia. Based on the results of research the majority of obese respondents experience severe preeclampsia. This shows that the greater the weight of pregnant women, the risk of preeclampsia is also greater. This is because excessive weight gain causes a person to experience various health problems, such as: hypertension where hypertension is a sign of a mother experiencing a preeclampsia. Therefore, weight gain and increase in blood pressure in pregnant women must receive special monitoring from health workers (given aspilet) so that eclampsia does not occur (Nawsherwan et al., 2020).

This is also supported by research by Sitomorang et al (2016) states the IMT factor is the second dominant factor that is most related to the incidence of preeclampsia in pregnant women in Pakuhaji Regional Hospital, Tangerang Regency from the three factors studied with the value of OR = 4,052, which means pregnant women Having IMT in the category of obesity is 4 times risk of experiencing a higher or severe preeclampsia than pregnant women with other IMT categories (Situmorang et al., 2016). This is in accordance with the theory that says the increase in BMI causes blood pressure to increase in a person caused by the diameter of the smaller blood vessels so as to make the work of the heart pumping becomes stronger and increases triggering ischemia. Low blood flow perfusion makes the lack of blood flowed into the placenta and hypoxia due to the diameter of blood vessels which become a small risk of metabolic disorders such as heart failure and preeclampsia (Tjipto et al., 2019).

4. Conclusion and Suggestion

There is no relationship between parity and preeclampsia and there is a significant relationship between body mass index and preeclampsia at QIM Hospital, Batang Regency. Pregnant women who are multiparous are expected to postpone pregnancy by following a family planning program to avoid grandemulti (giving birth more than 4 times) which is one of the trigger factors for preeclampsia. Pregnant women who are obese should reduce their sugar consumption and increase their consumption of vegetables to prevent weight gain. Obsessed women who will prepare the pregnancy may reduce their weight so that reach ideal BMI, thorough physically activity.

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