RESEARCH

Relationship between Gravida Status, Age, BMI (Body Mass Index) and Preeclampsia

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Abstract

Background: Preeclampsia is one of the complications in pregnancy that can cause serious illness, long-term disability, and death in the mother, fetus and neonate. There are many risk factors that influence the occurrence of preeclampsia, such as primigravida, hyperplasentation, extreme maternal age (less than 20 years and more than 35 years), family history of preeclampsia / eclampsia, kidney disease, diabetes mellitus, chronic hypertension that has happened before pregnancy (less than 20 years and more than 35 years), family history of preeclampsia / eclampsia, kidney disease, diabetes mellitus, chronic hypertension that has been suffered before pregnancy (less than 20 years and more than 35 years). superimposed preeclampsia) and obesity.

Objective: To determine the relationship between gravida status, age, and BMI status with the incidence of preeclampsia.

Methods: The descriptive analytic study was using a cross sectional study design by looking at the medical records of subjects according to the time and place of research. The study population was all medical records of pregnant women with preeclampsia and those without preeclampsia in the Department of Obstetrics and Gynecology Dr. M. Djamil Padang period 1 January 2017 - 31 December 2017. Samples were taken from populations that met the inclusion criteria and did not have exclusion criteria. Sampling using consecutive sampling techniques was taken from the Medical Record Section of RSUP Dr. M. Djamil Padang. Univariate analysis was used to assess gravida status, maternal age, and BMI. Bivariate analysis was performed using the chi square test with a significance level of $p < 0.05$.

Results: A total of 63.7% of patients with severe preeclampsia were primigravida ($p < 0.05$), 52.5% were high risk groups with age <20 years and> 35 years ($p < 0.05$), and 55% of patients with overweight and obese group ($p < 0.05$). Primigravida has a tendency to suffer from preeclampsia compared to multigravida. Patients who have a tendency for preeclampsia are patients with overweight and obese BMI status with a high risk age range.

Conclusion: There is a significant relationship between gravida status, age, and BMI to the incidence of preeclampsia.

Keywords: gravida, age, BMI, preeclampsia
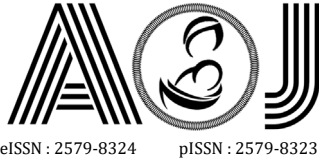
INTRODUCTION

Preeclampsia is a disease with clinical symptoms of hypertension and proteinuria in pregnancies over 20 weeks due to vasospasm and endothelial activation1. Preeclampsia occurs in 3.9% of all pregnancies worldwide.[1] 3% - 8% of pregnant women in western countries experience preeclampsia.[2] At Dr. M. Djamil Padang found 2.38% of cases of preeclampsia in 2003, 3.69% in 2004, 3.43% in 2005.[3] From the medical record data it is known that in 2012 there were 193 cases of preeclampsia and 228 cases in 2013.

Preeclampsia is a complication in pregnancy that causes severe illness, long-term disability, and death in mother, fetus and neonate.[4] Pregnancy accompanied by preeclampsia is classified as a high-risk pregnancy because preeclampsia is the cause of 30% - 40% of maternal deaths and 30% - 50% of neonatal deaths.[5] Of all maternal deaths that occur in Latin America, 0.25% are due to preeclampsia. Whereas in developing countries, 15% - 20% of maternal deaths are caused by preeclampsia.[6]

Detection of preeclampsia must be done as early as possible through antenatal care pregnancy examinations to prevent maternal and neonatal morbidity and mortality.1 There are many risk factors that affect preeclampsia, such as primigravida, hyperplacement, extreme maternal age (less than 20 years and more than 35 years), family history of preeclampsia / eclampsia, kidney disease, diabetes mellitus, chronic hypertension that was suffered before pregnancy (superimposed preeclampsia) and obesity.[1]

In physiological states nerve signals are delivered through an action potential, which is a rapid change in membrane potential. To deliver nerve signals, the action potential moves along nerve fibers until they reach the ends of the fibers. The main culprit that causes nerve membrane depolarization and repolarization events during action potentials is the gate voltage for the sodium channel. The gate voltage for the potassium channel also plays an important role in increasing the speed of membrane repolarization. These two voltage gate lines will support the Na pump+- K+ and the leakage channel Na+-K+.

The action potential will travel along the muscle fiber membrane in the same way as the action potential goes along the nerve membrane. The action potential will cause depolarization of the muscle fiber membrane, and also travel deeply within the muscle fiber, at the place where the action potential causes the sarcoplasmic reticulum to release large amounts of calcium ions, which have been stored in the reticulum, into myofibrils. Calcium ions give rise to attractive forces between actin filaments and myosin, which cause them to move together, and produce a contraction process. After less than one second, calcium ions are pumped back into the sarcoplasmic reticulum, where these ions are stored until the new muscle action potential comes again; removal of calcium ions from myofibrils will cause muscle contractions to stop.

Clinical manifestations of eclampsia result from irritability of the central nervous

system. During seizures an increase in the frequency of contractions, where the contraction force will reach its maximum point. When the frequencies reach a critical point, the next contractions occur so fast that they are really united together, and the contractions as a whole appear to be smooth and continuous. This happens because there is enough calcium ions which are then maintained in the muscle sarcoplasms even between the action potentials, resulting in a state of full contraction that continues without allowing relaxation between the action potentials (Guyton 1997).
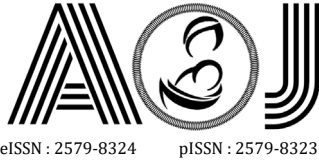
Preeclampsia is more common in primigravida than multigravida. Of all primigravidas, 7.6% were diagnosed with preeclampsia1. The risk of preeclampsia in primigravida increases due to immunologic mechanisms of the formation of blocking antibodies against placental antigens by HLA-G (human leukocyte antigen G) which is incomplete compared to multigravida.[1,4]

Pregnant women aged <20 years and> 35 years tend to experience severe preeclampsia compared with those aged 20 to 35 years. Pregnant women aged <20 years have a risk of preeclampsia 3.58 times greater than pregnant women aged 20-35 years. 7 Women age> 35 years have a risk of suffering from chronic hypertension which will continue to become superimposed preeclampsia when pregnant.

Maternal and fetal morbidity and mortality rates due to preeclampsia are still high, where gravida status, age, and BMI are some risk factors that influence the onset of preeclampsia. Therefore, researchers are interested in examining the relationship between gravida status, age, and maternal BMI with the incidence of preeclampsia in RSUP Dr. M. Djamil Padang period 1 January - 31 December 2017. Preeclampsia is a disease with clinical symptoms of hypertension and proteinuria in pregnancies over 20 weeks due to vasospasm and endothelial activation1. Preeclampsia occurs in 3.9% of all pregnancies worldwide.[1] 3% - 8% of pregnant women in western countries experience preeclampsia.[2] At Dr. M. Djamil Padang found 2.38% of cases of preeclampsia in 2003, 3.69% in 2004, 3.43% in 2005.

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Detection of preeclampsia must be done as early as possible through antenatal care pregnancy examinations to prevent maternal and neonatal morbidity and mortality.[1] There are many risk factors that affect preeclampsia, such as primigravida, hyperplacentation, extreme maternal age (less than 20 years and more than 35 years), family history of preeclampsia / eclampsia, kidney disease, diabetes mellitus, chronic hypertension that was

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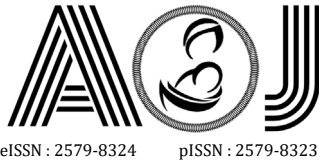suffered before pregnancy (superimposed preeclampsia) and obesity.[1]

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Pregnant women aged <20 years and> 35 years tend to experience severe preeclampsia compared with those aged 20 to 35 years. Pregnant women aged <20 years have a risk of preeclampsia 3.58 times greater than pregnant women aged 20-35 years. 7 Women age> 35 years have a risk of suffering from chronic hypertension which will continue to become superimposed preeclampsia when pregnant.

Maternal and fetal morbidity and mortality rates due to preeclampsia are still high, where gravida status, age, and BMI are some risk factors that influence the onset of preeclampsia. Therefore, researchers are interested in examining the relationship between gravida status, age, and maternal BMI with the incidence of preeclampsia in RSUP Dr. M. Djamil Padang for the period of 1 January - 31 December 2017.

METHOD

This type of research is a descriptive analytic study with a cross sectional study design. This research was conducted by looking at the subject's medical records prospectively on January 1, 2017 - December 31, 2017. The study population was all medical records of pregnant women with preeclampsia and those without preeclampsia in the Obstetrics and Gynecology section of Dr. RSUP Dr. M. Djamil Padang period 1 January 2017 - 31 December 2017. Samples were taken from the portion of the population that met the inclusion criteria and did not have exclusion criteria.

The inclusion criteria in this study were patients with preeclampsia and not preeclampsia with a single pregnancy who gave birth at RSUP Dr. M. Djamil Padang and recorded in the medical records section period January 1, 2017 - December 31, 2017. Exclusion criteria in this study were preeclampsia patients with a history of chronic hypertension, kidney disease. and diabetes mellitus, patients who do not have preeclampsia but have other pregnancy complications in the form of placenta previa, placental abruption and multiple pregnancies, and data to be examined on incomplete medical records.

The sample in this study were all populations that met the inclusion criteria and there were no exclusion criteria taken with consecutive sampling techniques. Secondary data were collected from medical records in the Medical Records Section of the General Hospital. Dr. M. Djamil Padang with independent variables gravida status, age, and BMI, as well as dependent variables on the incidence of preeclampsia.

Data processing in this study uses the SPSS (Statistical Package of Social Science) version 16.0 program. Bivariate analysis using a chi-square test with a significance level of 0.05.

RESULTS AND DISCUSSION

The study was conducted on patients with preeclampsia and not preeclampsia who gave birth at RSUP Dr. M. Djamil Padang period 1 January 2017 - 31 December 2017. The number of patients with preeclampsia who are treated and recorded in the medical records of Dr. RSUP M. Djamil Padang in that period was 90 people from 1,682 deliveries. After selecting research subjects based on predetermined criteria, 80 patient data were obtained that met the criteria to be sampled in this study. The results of the study the relationship of gravida status, maternal age, and BMI to the incidence of preeclampsia in RSUP Dr. M. Djamil.
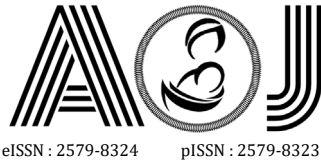
Table 1 Sample Characteristics

| Characteristics	Group	
	Severe preeclampsia Median (Min-Max)	Normal pregnancy Median (Min-Max)
Age (years)	34.5 (17-43)	28 (19-43)
Parity (times)	3 (1-6)	2 (1-8)
Pregnancy age (weeks)	32 (28-38)	37 (30-41)
Weight (kg)	60 (50-69)	58 (49-67)
Height (cm)	155 (143-165)	154 (145-160)
BMI (kg / m^2)	25.2 (21-31)	24.4 (20.9-28.4)

From table 1 above it was found that the median age in the Severe preeclampsia group was 34 years and in the normal pregnancy group it was 28 years. The median parity of the Severe preeclampsia and Normal pregnancy groups is not much different, namely 3 times and 2 times respectively. The median gestational age in the Severe preeclampsia group was 32 weeks and in the normal pregnancy group was 37 weeks. Median body weight in the Severe preeclampsia group was 60 kg while in the normal pregnancy group 58 kg. Median height for the sample in the Severe preeclampsia and normal pregnancy groups was 155 cm and 154 cm, respectively. The median BMI for the Severe preeclampsia group was 25.2 kg / m2 and the normal pregnancy group was 24.4 kg / m2.

Table 2 The relationship between maternal age and the incidence of preeclampsia

Gravida's Status Mother	Category				p*
	Severe preeclampsia		Normal Pregnancy		
	n	%	n	%	
Primigravida	51	63,7	22	27,5	0,001
Multigravida	29	36,3	58	72,5	

* Chi square

In table 2 it can be seen that of the 80 patients with preeclampsia, 51 people (63.7%) were primigravidas. The proportion of primigravidas who suffer from preeclampsia is 2 times more than that of primigravidas who do not suffer from preeclampsia. Chi square test results obtained a significant relationship between maternal gravida status with the incidence of preeclampsia. This shows that primigravida has a tendency to develop preeclampsia compared to multigravida.
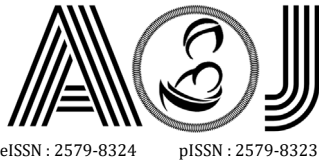
Table 3 The relationship between maternal age and the incidence of preeclampsia

Mother's Age	Category				p*
	Severe preeclampsia		Normal Pregnancy		
	n	%	n	%	
High Risk (<20 and > 35 years)	42	52,5	10	12,5	0,001
Low Risk (20-35 years)	38	47,5	70	87,5	

* Chi square

In table 3 it can be seen that from 52.5% of patients with preeclampsia are women with a high risk age category (<20 years and> 35 years) The proportion of mothers in the high risk age category and suffering from preeclampsia is 4.2 times more than those without preeclampsia . Statistical test results showed a significant relationship between maternal age and the incidence of preeclampsia in Dr. M. Djamil Padang. This shows that women aged <20 years and > 35 years have a higher tendency to experience preeclampsia compared to mothers aged 20 - 35 years.

Table 4 Relationship between BMI and Preeclampsia

| Mother's BMI	Category				p*
	Severe preeclampsia		Normal Pregnancy		
	n	%	n	%	
Normal	36	45	56	70	0,001
Overweight and obesity	44	55	24	30	

* Chi square

In table 4 above it can be seen that 55% of patients with preeclampsia are overweight and obese patients. The results of the analysis test have a significant relationship between BMI and the incidence of preeclampsia. In this study patients with overweight and obese BMI had a tendency to suffer from higher Severe preeclampsia.

DISCUSSION

Preeclampsia is a disease with clinical symptoms in the form of hypertension and proteinuria arising from pregnancy due to vasospasm and endothelial activation when the gestational age is over 20 weeks.[1] Preeclampsia is one of the complications in pregnancy that causes severe illness, long-term disability, and death in the mother, fetus, fetus and neonates.[4]

In this study it was found that the proportion of primigravidas suffering from preeclampsia was 2 times more than those without preeclampsia. Primigravida has a tendency to experience preeclampsia higher than multigravida. This result is in accordance with Rozikhan's research, it was found that there was a significant relationship between gravida status and preeclampsia. In the case control study it was concluded that primigravida has a risk factor for preeclampsia 2.1 times greater than multigravida.[7] In theory, primigravida
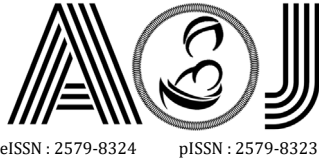
is more at risk of developing preeclampsia than multigravida because preeclampsia usually occurs in women who are first exposed to chorion.

The proportion of mothers who were in the high risk age category (<20 years and> 35 years) and had preeclampsia in this study were 4 times more than those without preeclampsia. Based on the chi square test, found a significant relationship between maternal age and the incidence of preeclampsia. Mothers aged <20 years and> 35 years have a tendency to experience preeclampsia more than those aged 20 - 35 years. Langelo found that there was a relationship (p = 0.001) between mothers of high risk category and the incidence of preeclampsia with an OR of 3.73.[9]

Age under 20 years and above 35 years is also called the age of high risk for pregnancy complications. At the age of <20 years, the uterus has not reached the normal size for pregnancy, so the possibility of disruption in pregnancy is greater. At the age of> 35 years degenerative processes occur that result in structural and functional changes in peripheral blood vessels, making it more prone to occur preeclampsia.[4]

This study shows that there is a relationship between BMI and the incidence of preeclampsia. Patients with overweight and obese BMI are more prone to suffer from preeclampsia compared to normal BMI patients. Overweight pregnant women are twice as likely to develop preeclampsia than pregnant women who have normal weight. In overweight pregnant women preeclampsia can occur through the mechanism of hyperleptinemia, metabolic syndrome, inflammatory reactions and increased oxidative stress which leads to damage and dysfunction of endothelial.[4]

CONCLUSION

After conducting research on the relationship of gravida status and maternal age to the incidence of preeclampsia at RSUP Dr. M. Djamil Padang in the period 1 January 2017 - 31 December 2017 the following conclusions can be drawn:

1. There is a significant relationship between gravida status and the incidence of preeclampsia, where primigravidas have a tendency to suffer from preeclampsia rather than multigravida.
2. There is a significant relationship between maternal age and the incidence of preeclampsia, where pregnant women who are in the high risk age category have a tendency to suffer from preeclampsia than mothers who are in the low risk age category.
3. There is a significant relationship between BMI status and the incidence of preeclampsia, where overweight and obesity have a tendency to suffer from preeclampsia than normal BMI

ACKNOWLEDGMENT

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