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Maternal characteristics and delivery method in patients with preeclampsia in PKU Muhammadiyah Bantul, Yogyakarta

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ABSTRACT

Preeclampsia is the condition of pregnancy that has high mortality of mother and result some complication for the childbirth. The incidence of preeclampsia in the world reaches 10% whereas 3% -5% of them experience complications of eclamptic pregnancy. The objective of this study is to explore maternal characteristics and delivery methods of preeclampsia in order to predict the prognosis of the diseases and direct proper antenatal care. The study was descriptive observational with a cross-sectional design at PKU Muhammadiyah Bantul during 2018-2020. Data were collected from medical records. The variables were compared using the Mann-Whitney, Kruskal Wallis, and crosstabs as appropriate. In this study, we found 77 women with preeclampsia. The age of the majority patients are less than 35 years old. Five patients (6.50%) were mild preeclampsia and 52 patients (67.50%) were severe preeclampsia. Forty-seven (61.04%) patients with preeclampsia were multigravida and 37 patients (48.05%) have normal BMI. Almost all patients without comorbid disease (96.10%) and history of preeclampsia (98.70%). Sixty-eight patients (88.31%) have interpregnancy interval less than 5 years and without complication after delivery. Preeclampsia's patients delivered at term gestational age (67.53%). Most of the preeclampsia patients were delivered their baby with cesarean section method (74.03%; p = 0.01%).

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INTRODUCTION

Preeclampsia is a form of complication of pregnancy with hypertension and is accompanied by organ dysfunction, one of which is the kidneys, resulting in proteinuria. The incidence of preeclampsia in the world reaches 10% and 3% -5% of them experience complications of eclamptic pregnancy^{1,2}. According to the World Health Organization (WHO), In 2017, approximately 295.000 women died due to complications from pregnancy and childbirth³. The International Society for the Study of Hypertension in Pregnancy (ISSHP) defines preeclampsia as the presence of new-onset hypertension and proteinuria or other end-organ damage occurring after 20 weeks of gestation. Classification of preeclampsia are mild preeclampsia and severe preeclampsia. Severe preeclampsia is preeclampsia with any of the following features: blood pressure $\geq 160/110$ mmHg on two separate occasions; platelet count < 1.1 mg/dl ($97.2 \mu\text{mol/l}$); or doubling of the serum creatinine level, pulmonary oedema or newonset cerebral or visual disturbance⁴. Mild preeclampsia is characterized by systolic blood pressure (SBP) ≥ 140 mmHg or diastolic blood pressure (DBP) ≥ 90 mmHg, and proteinuria > 300 mg/24 h⁵. The risk factor of preeclampsia are history of hypertensive disease during a previous pregnancy and underlying maternal diseases including chronic kidney disease, autoimmune diseases, diabetes, or chronic hypertension. Pregnancy has moderate risk if they are nulliparous, ≥ 40 years of age, a body mass index (BMI) ≥ 35 kg/m, a family history of preeclampsia, a multifetal pregnancy, gestational diabetes, or a pregnancy interval of more than 10 years. Condition that increase the possibility of preeclampsia are raised mean arterial blood pressure before 15 weeks' gestation, polycystic ovarian syndrome, sleep disordered breathing, and various infections such as periodontal disease, urinary tract infections, and helicobacter pylori^{1,6,7}. Neonatal morbidity and mortality become an impact of preeclampsia, as it can cause fetal growth restriction with oligohydramnios, nonreassuring fetal status, preterm birth, low birth weight, severe birth asphyxia, stillbirth, and intrapartum death⁸. The primary objective of this study was to explore maternal characteristics and delivery methods of preeclampsia in order to predict the prognosis of the diseases and direct proper antenatal care particularly in Bantul.

METHODS

We conducted a descriptive observational study with a cross-sectional design at one private hospital in Bantul, Yogyakarta, PKU Muhammadiyah Bantul during 2018-2020. Data were collected consecutively from medical records. All women that were diagnosed preeclampsia were included in this study. Patients with incomplete data were excluded from the study.

Statistical Analysis

Descriptive statistics were used to summarize the patient's characteristics, disease subtypes, and clinical characteristics of the patients. The variables was compared using the Mann-Whitney, Kruskal Wallis, and crosstabs as appropriate. All p-values were presented as two-tailed, with values <0.05 being considered as statistically significant.

RESULTS

Table 1. Characteristic of patients

Variable	Mild Preeclampsia n(%)	Severe Preeclampsia n(%)	Total of preeclampsia n (%)	p-value
Age				
>35 years old	3 (3.90%)	17 (22.10%)	20 (25.97%)	0.435
<35 Years old	5 (6.50%)	52 (67.50%)	57 (74.03%)	
Gravida				
Primigravida	2 (2.60%)	28 (36.40%)	30 (38.96%)	0.395
Multigravida	6 (7.80%)	41 (53.20%)	47 (61.04%)	
BMI				
Underweight	0 (0%)	6 (7.80%)	6 (7.79%)	0.253
Normal	6 (7.80%)	31 (40.30%)	37 (48.05%)	
Overweight	2 (2.60%)	32 (41.60%)	34 (44.16%)	
Comorbid disease				
yes	0 (0%)	3 (3.90%)	3 (3.90%)	0.550
No	8 (10.40%)	66 (85.70%)	74 (96.10%)	
History of Preeclampsia				
Yes	0 (0%)	1 (1.30%)	1 (1.30%)	0.733
No	8 (10.40%)	68 (88.30%)	76 (98.70%)	
Interpregnancy interval				
> 5 years	0 (0%)	9 (11.70%)	9 (11.69%)	0.280
<5 years	8 (10.40%)	60 (77.90%)	68 (88.31%)	
Gestational age at delivery				
Preterm	2 (2.60%)	23 (29.90%)	25 (32.47%)	0.636
Aterm	6 (7.80%)	46 (59.70%)	52 (67.53%)	
Delivery method				
Cesarean Section	2 (2.60%)	55 (71.40%)	57 (74.03%)	0.001
Spontaneous Vaginal Delivery	6 (7.80%)	14 (18.20%)	20 (25.97%)	
Complication				
Yes	1 (1.30%)	8 (10.40%)	9 (11.69%)	0.940
No	7 (9.10%)	61 (79.20%)	68 (88.31%)	

3 *Maternal characteristics and delivery method in patients with preeclampsia in PKU Muhammadiyah Bantul, Yogyakarta (Irfan Rahmatullah, Novi Wijayanti Sukirto, Tiara Dinar Ismirahmadani, Rachma Greta Perdana Putri)*

In this study, we found 77 women with complete data whose delivered with preeclampsia during 2018-2020. Eight of them was mild preeclampsia and 69 women was severe preeclampsia. The age of the Majority of patients are less than 35 years old. Five patients (6.50%) were mild preeclampsia and 52 patients (67.50%) were severe preeclampsia. Forty-seven (61.04%) patients with preeclampsia were multigravida, and 37 patients (48.05%) have normal BMI. Mostly patients without comorbid disease (96.10%) and history of preeclampsia (98.70%). Sixty-eight patients (88.31%) have interpregnancy interval less than 5 years and without complication after delivery. Preeclampsia's patients delivered at aterm gestational age (67.53%). Significantly, delivery method of the patients was cesarean section (74.03%; $p = 0.01\%$).

DISCUSSION

Most of preeclampsia patients less than 35 years old, like in Sweden, China, and some region in Indonesia (Palembang and Makassar). They said that maternal age of 35 or older was significantly associated with preeclampsia⁹⁻¹¹. The risk of preeclampsia increase along with maternal age. Older maternal age was significantly associated with the risk of preeclampsia (late onset and early onset of preeclampsia) and cesarean section in preeclampsia^{12,13}.

In this research, Preeclampsia was more prevalent in multigravida than primigravida. It similar to the research in Surabaya, Indonesia and also Sweden^{6,14}. Multigravida are responsible for the progress of preeclampsia but the causes were less well defined¹⁵. Study in Pakistan showed that higher parity increase chance become preeclampsia¹⁶.

In our study, less than a half of severe preeclampsia patients was overweight even though some study stated that obesity related to increasing risk of preeclampsia^{17,18}. Recent issue about obesity, not only maternal obesity, but also paternal obesity increased risk of the disease. Paternal obesity related to preeclampsia caused by induction of epigenetic changes in sperm before conception, alteration of placental function, fetal HLA-G variants that increased immune incompatibility with mother¹⁹. Elevation of pre-pregnancy BMI and gestational weight gain became the risk of preeclampsia by increasing level of oxidative stress, stimulate system inflammatory response, and accelerate damage to vascular endothelial cells²⁰. Placenta also produce Leptin during pregnancy. In preeclamptic placenta, the concentration of leptin become higher. This condition triggered some research using leptin as biomarker for predicting preeclampsia²¹. Contrary, a systematic review study stated that BMI has no correlation with preeclampsia²².

Most of preeclampsia patients in this study were without comorbid disease, history of preeclampsia, and has interpregnancy interval less than 5 years. Majority of preeclampsia cases is

simultaneously with other pathologies in a comorbid manner such as diabetes mellitus and obesity. There are also rare co-occurrences related to preeclampsia that connected to molecular genetic level. Comorbid genes on one hand were contribute directly to preeclampsia, but on the other hand, may triggers the promoting factor of preeclampsia. There are 2 genes dominantly related to preeclampsia. First, ACE (Angiotensin-converting enzyme) as a regulator of blood pressure by influencing vascular tone by activating angiotensin II and inactivating bradykinin. Second, TNF- α (Tumor necrosis factor – alpha) related to insulin resistance²³. Study in India and Canada informed that comorbidities related fetal outcome (NICU admission, neonatal death, intrauterine death, prematurity, and neonatal jaundice) and maternal complication (Postpartum haemorrhage, acute kidney injury, HELLP syndrome, puerperal sepsis)²⁴.

In this study, interval of pregnancy less than 5 years is more common in preeclampsia (mild and severe) and this finding contrary with study in Macedonia and Armenia^{25,26}. They said that pregnancy interval more than 10 years has the risk of preeclampsia about the same as nulliparous women. Another study (a systematic review) informed that comparison between interpregnancy interval less than 2 years with 2-4 years, there is no significant increase in risk. Comparison of intervals 2-4 years and >4 years stated significant small increase. The expected confounding factor of their research was partner changes that induced maternal immune system to react to paternal antigen²⁷. Risk of preeclampsia falls sharply after the first birth, but the risk increases over time. Interpregnancy interval more than 5 years was associated with sevenfold higher odds of preeclampsia development among women without history of preeclampsia²⁵.

The delivery method of severe preeclampsia was majority by cesarean section at aterm gestational week. Patients with severe preeclampsia have eightfold risk to terminate their pregnancy by caesarean section compared to normal pregnancy and sometimes preceded by failed induction. This decision also considering about fetal outcome such as apgar scores, NICU admission, and intrauterine growth restriction. Fetal apgar score of preeclampsia patients who were delivered by emergency caesarean section was higher than patients in normotensive pregnancy. The complication of preeclampsia in our study as mentioned in other study, they are HELLP (Hemolysis, ELevated liver enzymes, and Low Platelet) syndrome, solution placenta, and intrauterine growth restriction (IUGR)²⁸.

CONCLUSION

Maternal characteristics and delivery method in patients with preeclampsia in PKU Muhammadiyah Bantul, Yogyakarta (Irfan Rahmatullah, Novi Wijayanti Sukirto, Tiara Dinar Ismirahmadani, Rachma Greta Perdana Putri)

The increasing of preeclampsia's incidence was in line with increasing of preeclampsia's complication. Characteristics of the patients may vary from one region to another. Some differences were not well defined so the picture of the disease in a region was important to take some action to prevent the increasing of the incidence. Preeclampsia patients in Bantul mostly less than 35 years old, multigravida, and normal BMI. The majority of them was no history of preeclampsia, comorbidity and interval of pregnancy less than 5 years. They delivered their baby at term gestational age with caesarean section as choice of delivery methods. Only a few of them has complication such as HELLP syndrome, solution placenta, and IUGR.

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