

ORIGINAL ARTICLE

Risk Factors of Preeclampsia among Pregnant Women in Rural Area of Indonesia

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ABSTRACT

Introduction: Preeclampsia and other disorders are a leading cause of maternal and infant illness or death. Differences in the time of onset, severity, and organ system involvement suggest there may be different underlying etiologies that ultimately lead to preeclampsia manifested as the triad of maternal hypertension, proteinuria, and edema. Morality due to preeclampsia accounts for the second maternal mortality rate in Indonesia. The purpose of this study was to determine the risk factors associated with the incidence of preeclampsia in pregnant women at the public health centre in the rural area of Indonesia. **Methods:** This was a comparative study using a cross-sectional design. A sample of 120 people for each group (women with and without preeclampsia) was taken by purposive sampling technique. Data analysis used was univariate using the percentage formula, bivariate using chi-square test and multivariate using multiple logistic regression analysis. **Results:** The results showed factors associated with the incidence of preeclampsia were maternal age ($P=0.000$ OR =0.093 95% CI=0.042-0.209), history of hypertension ($P=0.000$ OR=2.188 95% CI = 1.895-2.526), ANC (Antenatal care) examination ($P=0.000$ OR=3.729 95% CI = 2.061-6.747) and history of hormonal contraception ($P=0.000$ OR=2.968 95% CI=1.724-5.110). **Conclusion:** The most dominant risk factor associated with the incidence of severe preeclampsia was Antenatal care examination. This study can help relevant agencies to conduct counseling about preeclampsia risk factors so that the cases of preeclampsia can be prevented early.

Keywords: Pregnant woman, Preeclampsia, Pregnancy-induced hypertension

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INTRODUCTION

Preeclampsia hypertensive syndromes are the most common problems that occur during pregnancy that affect maternal and child mortality(1). The severity of pre-eclampsia is characterized by hypertension at 160/110 mmHg or more, proteinuria of two or more, seizures, visual disturbances, upper abdominal pain, thrombocytopenia, hemolysis, and oliguria. (2). The incidence of preeclampsia is estimated to be around 3 to 5% worldwide(3). In Indonesia, preeclampsia caused the highest mortality rate at 2.2% and perinatal mortality at 12%. About 54% of pregnant women (n=1232) had late-onset preeclampsia. Also, 48% had early-onset of

preeclampsia (4).

Several studies have reported the links between preeclampsia and certain pregnancy risk factors such as null parity, older age, hypertension, and diabetes during pregnancy (5,6,7). Several recognizable risks classify women who are pregnant with pre-eclampsia, either alone or in combination (5). However, risk factors related to severe preeclampsia among pregnant women in rural areas remains less investigated. Due to the limitations and complexity of existing criteria used to define women at high risk of preeclampsia, a specific, concise and evidence-based list of factors is needed to detect women at high risk of preeclampsia. The indicators should consider symptoms in any previous pregnancy and current pregnancy factors to get a more complete picture of pregnancy. Many factors such as previous and current pregnancies should be taken into consideration to ensure the correct prediction of pregnancy (7). Thus,

this study aimed to explore determinants of severe preeclampsia among pregnant women in the rural area of Indonesia.

MATERIALS AND METHODS

Sample

A cross-sectional study with descriptive comparison was conducted to explore characteristics of pregnant women with severe preeclampsia. Data were collected from March to July 2019 at the public health centre in Ciparay, West Java, one of the rural areas of Indonesia. The sample in this study was pregnant women divided into two groups, with and without preeclampsia. The inclusion criteria were women over 18 years of age, diagnosed with preeclampsia which was confirmed by medical records. The exclusion criteria were pregnant women with preeclampsia but with reported complications such as placenta praevia, intrauterine growth restriction, and premature rupture of membranes. The sample size was determined using a power analysis (G-Power software version 3.1), effect size = 0.15, power level=0.80, resulting in a sample size of 116. Due to resource constraints a convenience sampling technique was used to select participants. The data collection technique in this study used secondary data from the respondent’s medical records. Data collected includes age, education level, and occupation. Medical history included gravida, gravida parity, gestational age, history of abortion, history of hypertension, antenatal care, and history of hormonal contraception. Demographic data and medical history were collected through standard online Google Forms. The doctor defined and informed the researchers about participants that met the inclusion criteria. In a quiet environment, potential participants were informed regarding the objectives of this study, process of data acquisition and confidentiality and privacy was maintained. The respondents agreeing to participate signed an informed consent document. At the end, every participant was provided with a leaflet with information on preeclampsia prevention.

Ethical Clearance

The approval and ethical clearance from Bandung Public Health Office on 28 June 2019 (Reference No.B13977/070/VI/2019/SDK).

Statistical analysis

All data were analyzed using a statistical package for the social science (SPSS) version 22.00 for windows. Descriptive statistic was used to describe participant characteristic and major variables using frequency. Comparison between the group was analyzed using Chi-Square and Logistic regression. P<0.05 was considered significant.

RESULTS

A total of 240 pregnant women participated in this study

with a response rate of 87.2%. Among 240 respondents, 120 were pregnant women with preeclampsia and 120 were without preeclampsia. In Table I a comparison of demographic and clinical information was done between pregnant women with and without preeclampsia. The majority of women with preeclampsia was aged over 35 years, multigravida, with a history of abortion, with gestational age less than 37 weeks, low level of education, and was unemployed. Compared to women with preeclampsia, women without preeclampsia are relatively older, visit antenatal care more than four times, and with history of hormonal contraception. Although there were no significant differences, women without preeclampsia had several children (more than four) with a gestational age of more than 37 weeks.

Table I. Comparison of demographic and clinical information between pregnant women with and without preeclampsia (n=240)

Variables	Total	With Pre-eclampsia	Without Pre-eclampsia	OR	95% CI
	n (%)	n (%)	n (%)		
Maternal Age					
< 35 years old	60 (25)	52 (43.3)	8 (6.7)	0.093***	0.042 – 0.209
≥ 35 years old	180 (75)	68 (56.7)	112 (93.3)		
Gravida					
Primi-gravida	52 (21.7)	30 (25)	22 (18.3)	0.673	0.362 – 1.252
Multi-gravida	188 (78.3)	90 (75)	98 (81.7)		
Parity					
≥4	177 (73.8)	84 (70)	93 (77.5)	1.476	0.827 – 2.636
2-3	63 (26.3)	36 (30)	27 (22.5)		
History of Abortion					
Yes	30 (12.5)	18 (15)	12 (10)	0.63	0.289 – 1.372
No	210 (87.5)	102 (85)	108 (90)		
Gestation- al Age					
≥37 weeks	210 (87.5)	103 (85.8)	107 (89.2)	1.358	0.628 – 1.522
<37 weeks	30 (12.5)	17 (14.2)	13 (10.8)		
Education					
Low	155 (64.6)	79 (65.8)	76 (63.3)	2.188	1.892 – 2.526
High	85 (35.4)	41 (34.2)	44 (36.7)		

CONTINUE

Table I. Comparison of demographic and clinical information between pregnant women with and without preeclampsia (n=240) (CONT.)

Variables	Total	With Preeclampsia	Without Preeclampsia	OR	95% CI
	n (%)	n (%)	n (%)		
Working status					
Yes	14 (5.8)	9 (7.5)	5 (4.2)	0.896	0.528 – 1.522
No	226 (94.2)	111 (92.5)	115 (95.8)		
History of hypertension					
Yes	19 (7.9)	19 (15.8)	0 (0)	0.536***	0.174 – 1.650
No	221 (92.1)	101 (84.2)	120 (100)		
Antenatal care					
≥4 times visit	166 (69.2)	67 (55.8)	99 (82.5)	3.729***	2.061 – 6.747
< 4 times visit	74 (30.8)	53 (44.2)	21 (17.5)		
History of Hormonal Contraception					
Yes	148 (61.7)	59 (49.2)	89 (74.2)	2.968***	1.724 – 5.110
No	92 (38.3)	61 (50.8)	31 (25.8)		

Note: ***: $p < 0.005$

Table II shows a multivariate analysis of demographic and clinical information among pregnant women with and without preeclampsia. It was found that pregnant women who did not complete recommended antenatal care were 2.66 (95% CI: 1.38 – 5.12) times more at risk of getting preeclampsia. Preeclampsia was related with maternal age greater than 35 years (OR: 0.13, 95 percent CI: 0.06–0.30), and history of chemical contraception was substantially associated with lower risk of preeclampsia (OR: 2.34, 95 percent CI: 1.28 - 4.28).

DISCUSSION

There is a significant relationship between maternal age and the incidence of severe preeclampsia. The results of this study were consistent with previous

Table II. Multivariate analysis of factors associated with preeclampsia among pregnant women (n=240)

Variable	p-value	OR	CI 95%
Antenatal Care	0.004	2.66	1.38 – 5.12
Maternal Age	0.000	0.13	0.06 – 0.30
History of Hormonal Contraception	0.004	2.34	1.28 - 4.28

studies (8,9,10,11,12). But another study showed different results (13). The difference in the results of this study could be due to differences in the number of samples and research methods conducted. Age at risk of preeclampsia consists of pregnant women less than 20 years and more than 35 years. Healthy reproductive age is 20 - 35 years old, preeclampsia is more often seen among adolescent women or women over 35 years. At <20 years of age, the body of the women is not ready for accepting pregnancy which increases the risk associated with pregnancy in the form of preeclampsia or toxemia gravidarum. At the age of 35 years or older, there will be changes in the tissue and reproductive organs and the birth canal are not flexible at this age. Other diseases that affect the mother's body in this age, is hypertension and preeclampsia(14,15).

There is a significant relationship between antenatal care (ANC) behaviour and the incidence of severe preeclampsia. In line with Fahira's study (2017) which stated that pregnancy visit / ANC is a risk factor for the incidence of preeclampsia (16). Antenatal Care is an important way to monitor and promote the health of pregnant women. ANC is an effective method that helps in the prevention of complications during pregnancy or childbirth. The ANC is important for the mother and for the child to be born to ensure healthy and normal natural process of birth. Preeclampsia and eclampsia are complications of continuing pregnancy, which can be avoided by the prenatal treatment that seeks to avoid or at least identify early signs of development of preeclampsia and thereby can minimize morbidity (17,18). ANC examinations of the mother during pregnancy are often kept incomplete. As a result, the mothers are unable to recognize early complications associated with preeclampsia that may occur during pregnancy until delivery. The data demonstrated that 53 mothers (44.2% of those in the case group, 21% of those in the control group) were more likely to have a complete pregnancy than those who did not have a complete pregnancy (17.5%). Also, for mothers who are at risk of preeclampsia, severe preeclampsia will not be detected on time, if proteinuria or pitting edema is not detected at the time of ANC examination. Thus, mild preeclampsia will develop into severe preeclampsia because it is not detected earlier.

The use of contraception before pregnancy has a

significant effect on the incidence of preeclampsia. The results of this study are in line with other studies (19) that stated that there is a relationship between contraception and the occurrence of preeclampsia. Hormonal contraception in the form of birth control pills mostly contains estrogen and progesterone. The hormones in these contraceptives have been regulated in such a way that they are close to hormone levels in the acceptor's body. However, if used for a long period may cause other side effects. Both of these hormones can facilitate sodium ion retention and water secretion accompanied by an increase in plasma rennin activity and the formation of angiotensin in which can trigger an increase in blood pressure (19).

The results of research in other studies showed that gravida is not associated with the incidence of preeclampsia (20). This study also strengthened this fact that there was no relationship between the incidence of severe preeclampsia with gravida factors in inpatients in ICU Hospital Dr Moewardi Surakarta with a p-value of 1.492. This is because the proportion of pregnant women was less when compared to multigravidas, namely primigravida in the case group of 30 people (25%) and multigravida among 90 people (75%). Whereas mothers in the comparison group were primigravida 22 people (18.3%) and as many as multigravida 98 women (81.7%). This implies that most mothers who experience preeclampsia are multigravida which correlates with a poorer prognosis of preeclampsia.

The incidence of preeclampsia was not linked to parity. The slight disparity in the number of first-time mothers in the case and control groups may be the reason for less difference in the risk of preeclampsia between women with high-risk pregnancies and those with low-risk pregnancies. The results support the findings that have consistently shown that there is no association between parity factors and the incidence of preeclampsia (21). The parity factor affects labour because pregnant women have a higher risk of experiencing disorders during their pregnancy, especially in mothers having their first pregnancy. In the first pregnancy, there are imperfections in antibody formation against the placenta, resulting in an unfavorable immune response. This occurs because of the inhibition of invasion of the mother's spiral arteries by the trophoblast to some extent, which may occlude some of the vessels and therefore decrease the delivery of oxygen and nutrients to the fetus (14).

There is no clear correlation between the history of abortion and pre-eclampsia. The findings of this research are consistent with a previous study that suggests that no substantial association exists between women who have an abortion history and preeclampsia incidence (8,19). A mother who has had an abortion may experience a persistent "wound", especially in women with a history of abortion. Injuries or disabilities experienced by pregnant women with a history of abortion will result in

impaired implantation in subsequent pregnancy and may increase the risk of preeclampsia (22). Pre-eclampsia is a multisystem disorder of human pregnancy with a genetic predisposition. It is seen that it occurs more commonly in first pregnancies that primarily affects maternal renal, cerebral, hepatic and clotting functions while elevating blood pressure (23). But, not all pregnancies with preeclampsia are related with placental under perfusion and intrauterine growth restriction (24).

There is some limitation of this study. First, considering the existence of cross-sectional analysis, it is difficult to discuss the causal effects. Finally, participants were recruited from one public health centre in West Java, Indonesia; therefore, it may not reflect all women conditions in Indonesia which has 34 provinces. It is expected that the relevant agencies conduct counseling as a promotive and preventive effort to the risk factors for preeclampsia to prevent the emergence of preeclampsia. For further research, it is expected to conduct research related to the incidence of pre-eclampsia, especially using other factors that have not been studied such as obesity, twin pregnancy, and history of preeclampsia.

CONCLUSION

The results of this study indicate that the risk factors associated with the incidence of preeclampsia in pregnant women were maternal age, history of hypertension, ANC behavior and history of hormonal contraception. It is recommended that pregnant women must carry out routine antenatal care examinations (ANCs) to detect early signs of risk factors associated with preeclampsia and women safe pregnancy period is the age of 20-35 years which can prevent the risk of the emergence of preeclampsia.

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