

## ORIGINAL ARTICLE

# Determinant of Severe Preeclampsia Among Pregnant Women in Rural Area of Indonesia

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## ABSTRACT

**Introduction:** Preeclampsia is a syndrome characterized by hypertension, proteinuria and edema at the age of 20 weeks of pregnancy. Preeclampsia is a triad of mortality and accounts for the second maternal mortality rate in Indonesia. The study aimed determine the risk factors associated with the incidence of severe preeclampsia in pregnant women at the public health center in 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) were taken by purposive sampling approaches. Data analysis used was univariate, bivariate, and multivariate using multiple logistic regression analysis. **Results:** The incidence of severe 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 risk factor associated with the incidence of severe preeclampsia was ANC examination. Suggestions that can be given are for relevant agencies to conduct counselling about preeclampsia risk factors so that cases of preeclampsia can be prevented early.

**Keywords:** Risk factors, Pregnant woman, Preeclampsia

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## INTRODUCTION

Preeclampsia hypertensive syndromes is the most common problems occur during pregnancy affected maternal and child mortality (1). It is defined as having a BMI of 160/110mmHg or higher, proteinuria 2+, seizures (eclampsia), thrombocytopenia, hemolysis, fetal growth retardation, and oliguria (2). The incidence of preeclampsia is estimated about 3 to 5 percent globally (3). Specifically, In Indonesia, the mortality rate due to preeclampsia was 2.2% and perinatal mortality was 12%. About 54% of pregnant women ( $n=1232$ ) had late-onset preeclampsia ( $> 34$  weeks), and 48% had preeclampsia early-onset (4).

A number of risk factors for pre-eclampsia have been identified in previous systematic reviews, including nulliparity, age, chronic hypertension, and gestational diabetes mellitus (5–7). For women with a high risk of preeclampsia, an accurate risk assessment

requires a list of parameters that are both specific and evidence-based, due to the limitations and complexity of the current criteria. Pregnancy parameters that may be easily acquired at an early prenatal visit should be considered in the development of these indicators. Pregnancy factors that may be easily measured at an early prenatal examination should be taken into consideration in any previous pregnancy as well. There are a number of clinical risk variables that could be used to designate women in their first trimester of pregnancy as “high risk” of pre-eclampsia (5). However, few information about determinant of severe of preeclampsia among pregnant women in rural area. Thus, this study aimed to explore determinant of severe of preeclampsia among pregnant women in rural area of Indonesia.

## MATERIALS AND METHODS

### Study design and sample

A descriptive comparative cross-sectional study was conducted to explore characteristics of pregnant women with severe preeclampsia. Health facility at Ciparay, West Java, an Indonesian rural area, collected data from March to July of this year.

In this study, the participants were pregnant women who were split into two groups, with and without preeclampsia. The inclusion criteria were women age over 18 years old, diagnosed with preeclampsia that confirmed by medical recode. Pregnant women with preeclampsia that reported with complication such as plasenta Praevia, intrauterine growth restriction, and Premature rupture of membranes were excluded from this study.

### Procedure

Ethical permission was obtained prior data collection from the Institutional Review Board of the affiliated university. Google Forms and conventional internet forms were utilized to collect demographic and medical information. Age, education level, and occupation are some of the demographic data collected. Medical history included gravida, parity, gestational age, history of abortion, history of hypertension, antenatal care, and history of hormonal contraception. The doctor has defined and informed the researchers about participants who meet the inclusion criteria. In a quiet environment, we informed potential participants regarding objectives of this study, how data is obtained and their rights are protected, e.g. respect for their autonomy and privacy. When the study's participants understood and agreed to, an informed consent document had to be signed. At the end, every participant was provided a leaflet contained information of preeclampsia prevention.

### Data analysis

Frequency was used to describe the characteristics of participants and major variables in the study. Comparison between group was analyzed using Chi Square and Logistic regression.  $P < 0.05$  was considered significant. In order to evaluate all of the data, SPSS version 22.00 for Windows was used.

### RESULTS

A total of 240 pregnant women joined in this study with response rate was 87.2%. Of 240 respondents, 120 of pregnant women with preeclampsia and 120 without preeclampsia. Tables I summarizes comparison of demographic and clinical information between pregnant women with and without preeclampsia. The majority of women with preeclampsia were aged over 35 years old, multigravida, had history of abortion, gestational age less than 37 weeks, had low education, and unemployed. Compared to women with preeclampsia, women without preeclampsia relative older, visit antenatal care more than four times, and with history of hormonal contraception. Although there were no significant differences, women without preeclampsia had number of children more than four with gestational age more than 37 weeks. Table II shows 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 higher for getting preeclampsia. Maternal age more than 35 years old less likely to have preeclampsia (OR: 0.13, 95% CI: 0.06 – 0.30), and history of hormonal contraception significantly associated with lower risk of preeclampsia (OR: 2.34, 95% 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 studies conducted by (8,9) but different with the results of (10). Research techniques and sample sizes used in this study could account for the difference in findings. Pregnant women between the ages of 20 and 35 are at increased risk of preeclampsia. According to the research, young people are still getting married at a young age.

There was a significant relationship between ANC behavior and the incidence of severe preeclampsia. In line with Fahira's study (2017) which states that pregnancy visit / ANC is a risk factor for the incidence of preeclampsia. In order to ensure the health and well-being of expectant mothers, antenatal care is essential. Pregnancy and childbirth complications and complications can be prevented by having an ANC. An important part of prenatal care is ensuring that the natural process of childbirth is safe for both mother and child. Preeclampsia and eclampsia are complications of ongoing pregnancy, therefore through antenatal care that aims to prevent the development of preeclampsia, or at least can detect early diagnoses so as to reduce the incidence of morbidity (11). ANC examination of the mother during pregnancy is incomplete, so the mother cannot recognize early complications such as preeclampsia that may occur during pregnancy until delivery. It can be seen from the data that 53 mothers (44.2%) there were 21 more women in the case group who were not fully pregnant than there were in the control group. (17.5%). The absence of proteinuria or pitting edema examination in mothers at risk of preeclampsia at the time of ANC examination is another reason for a high correlation between the prevalence of severe preeclampsia and ANC examination.

The use of contraception before pregnancy has a significant effect on the incidence of preeclampsia. There is agreement between the findings of this study and those of (12) states that there is a relationship between contraception and the occurrence of preeclampsia. The use of contraception before pregnancy has a significant effect on the incidence of preeclampsia in these individuals. 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

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

Variables	Total	With Preeclampsia	Without Preeclampsia	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					
Primigravida	52 (21.7)	30 (25)	22 (18.3)	0.673	0.362 – 1.252
Multigravida	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)		
Gestational 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)		
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&lt;0.005

**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

levels in the acceptor's body. However, if used for a long period of time will cause other side effects. Both of these hormones have the ability to facilitate sodium ion retention and water secretion accompanied by an increase in plasma rennin activity and the formation of angiotensin so that it can trigger an increase in blood pressure (12)

Research findings in the field show that gravida is not associated with the incidence of preeclampsia. Preeclampsia in the ICU patients of Dr. Moewardi Surakarta was shown to be unrelated to the presence of gravida variables, with a p-value of 1,492 in the earlier study by (13) on this topic. This is because the proportion of primigravida mothers is less when compared to multigravida, namely primigravida mothers in the case group of 30 people (25%) and multigravida by 90 people (75%). Whereas in the control group primigravida mothers were 22 people (18.3%) and multigravida as many as 98 people (81.7%). This means that the majority of mothers who experience preeclampsia are multigravida mothers may be the cause of insignificant relationship between gravida and the incidence of preeclampsia. HLA-G (human leukocyte antigen G) plays an important role in modulating the mother's immune response during pregnancy, ensuring that the immune response does not deny the mother's existence during normal pregnancies (placenta). In primigravida the possibility of decreased HLA-G expression in the decidua of the placenta, thereby inhibiting the invasion of trophoblasts into the decidua. In these circumstances the proportion of helper cells is low so that NK cells can lyse fetal trophoblasts. This can damage the endothelial cell membrane and increase the risk of pre-eclampsia (14).

Parity was not related to the incidence of preeclampsia. This is because the proportion of mothers with risk parity in the two groups is not much different, namely in the case group of 84 people (70%) and the control group of 93 people (77.5%), which may be the cause of the insignificant relationship between parity and the incidence of preeclampsia. The results of this study are consistent with the results of (15) study stating

that there is no significant relationship between parity factors and the incidence of preeclampsia. The parity factor has an effect on labor because pregnant women have a higher risk of experiencing disorders during their pregnancy, especially in mothers who are having their first pregnancy. Since antibodies against placental antigens build imperfectly in the first pregnancy, this results in an undesirable immunological response. This occurs because of the inhibition of invasion of the mother's spiral arteries by the trophoblast to some extent to interfere with placental function.

In the study, there was no significant correlation between abortion history and the incidence of severe preeclampsia. Preeclampsia is not associated with a mother's history of abortion, according to this study, which supports the findings of other research (8,12). Mothers who experience abortion, the endometrium is considered to have a wound or disability, especially in women with a history of abortion performed curettage. Injuries or disabilities experienced by pregnant women with a history of abortion will result in impaired implantation in subsequent pregnancies and can increase the risk of preeclampsia (16).

## CONCLUSION

Results show that there are a number of potential risk of severe preeclampsia in pregnant women such as maternal age, history of hypertension, ANC behavior and history of hormonal contraception. It is expected that the relevant agencies conduct counseling as a promotive and preventive effort to the risk factors for preeclampsia so as to prevent the emergence of preeclampsia. It is expected that pregnant women carry out routine antenatal care examinations (ANCs) in order to detect early risk factors for preeclampsia. And try to get pregnant at a safe age that is the age of 20-35 years to prevent the risk of the emergence of preeclampsia. For further research, it is expected to conduct further 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.

# Ethical consideration:

Prior to data collection, the Institutional Review Board of the connected university granted ethical clearance 045/ARS/International/LPPM/2019.

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# REFERENCES

1. Vigil-De Gracia P, Ludmir J. The Use Of Magnesium Sulphate For Women With Severe Preeclampsia Or Eclampsia Diagnosed During The Postpartum Period. *J Matern Neonatal Med.* 2014 Nov 6;28:1–12.
2. Muhani N, Masyarakat. Preeklampsia Berat dan Kematian Ibu. *J Kesehat Masy Nas.* 2014;10(27):81.
3. Ramos JGL, Sass N, Costa SHM. Pre-eclampsia. *Rev Bras Ginecol e Obs.* 2017;39(9):496–512.
4. Ilham M, Aldika Akbar M, Bachnas M, Mose J, Dachlan G, Ernawati E, et al. The massive problem of preeclampsia in indonesia: In need of a redesigned national health care system. 2018.
5. Bartsch E, Medcalf K, Park A, Ray J. Clinical risk factors for pre-eclampsia determined in early pregnancy: Systematic review and meta-analysis of large cohort studies. *BMJ.* 2016 Apr 19;353:i1753.
6. Cnossen J, Riet G, Mol BW, Van der Post J, Leeflang M, Meads C, et al. Are Tests for Predicting Preeclampsia Good Enough to Make Screening Viable? A Review of Reviews and Critical Appraisal. *Obstet Anesth Dig.* 2010 Mar 1;30:13–4.
7. Ruano J, Lopez-Miranda J, Fuentes F, Moreno JA, Bellido C, Perez-Martinez P, et al. Phenolic content of virgin olive oil improves ischemic reactive hyperemia in hypercholesterolemic patients. *J Am Coll Cardiol.* 2005;46(10):1864–8.
8. Astrina N, Wahtini S. Analisis Faktor-Faktor yang Berhubungan dengan Kejadian Preeklampsia/ Eklampsia di RSUD Panemahan Senopati Bantul. STIKES' Aisyiyah Yogyakarta; 2015.
9. Fitriyati D, Astuti DA. HUBUNGAN USIA IBU DENGAN KEJADIAN PREEKLAMSI PADA KEHAMILAN DI RS PKU MUHAMMADIYAH BANTUL TAHUN 2017. Universitas' Aisyiyah Yogyakarta; 2017.
10. Sunarto A, others. Hubungan Faktor Risiko Usia Ibu, Gravida, dan Indeks Massa Tubuh dengan Kejadian Preeklampsia di RSUD Tugurejo Semarang. UNIMUS; 2016.
11. Muchtar M, Julia M, Gamayanti IL. Sarapan dan jajan berhubungan dengan kemampuan konsentrasi pada remaja. *J Gizi Klin Indones.* 2011;8(1):28–35.
12. Muzalfah R, Santik YDP, Wahyuningsih AS. Kejadian Preeklampsia pada Ibu Bersalin. *HIGEIA (Journal Public Heal Res Dev.* 2018;2(3):417–28.
13. Setyorini Y, Martono M, Wijayanti I. Faktor--Faktor Yang Mempengaruhi Kejadian PEB Pada Pasien Rawat Inap Diruang ICU. *J KEPERAWATAN Glob.* 2016;1(1).
14. Cunningham FG, Williams JW. Williams obstetrics. Univerza v Ljubljani, Medicinska fakulteta; 2014.
15. Paramitha T, others. Analisis Faktor-Faktor Resiko yang Berhubungan dengan Kejadian Preeklampsia-Eklampsia pada Ibu Bersalin di RSUD Kabupaten Sukoharjo Periode Tahun 2015. *IJMS-Indonesian J Med Sci.* 2017;4(1).
16. Maliana.AS A. Faktor-faktor yang berhubungan dengan kejadian abortus inkomplit di ruang kebidanan rsud mayjend. hm. ryacudu kota bumi. *J Kesehat.* 2016;VII(1):17–25.