Risk Factors of Preeclampsia in RSKDIA Pertiwi Makassar

Andi Zulfaidawaty*, Djuhadiah Saadong, Theresia Limbong, Indriani, Maria Sonda
Midwifery Department, Health Polytechnic of Makassar, Indonesia
*Email : andi_zulfaidawaty@poltekkes-mks.ac.id

ABSTRACT

Health development target in 2025 is increasing community health status with decrease of Maternal Mortality Rate (MMR) indicator from 262 per 100,000 live births in 2005 to 74 per 100,000 live births in 2025. The Increasing of the incidence of deaths due to preeclampsia, the cause is not known with certainty, so there is no agreement on the strategy to prevent preeclampsia. Study aims was to determine the risk factors for preeclampsia in RSKDIA Pertiwi Makassar with age, blood type, and body mass index. Research design used an analytic survey with retrospective case control. Samples was 90 respondent with a ratio 1:2 for the case and control groups, taken by purposive sampling with data completeness criteria. Data analysis using the STATA program, test was carried out with Odds Ratio (OR) with a significant level of <0.05. The results was a relationship between age and preeclampsia, p value = 0.04, age was a risk factor where women aged <20 or >35 years have a 2,667 times risk had preeclampsia. Results of statistical tests did not find a relationship between incidence of preeclampsia with blood type and body mass index, but women with BMI ≥30 had 2.093 times the risk of developing preeclampsia compared to women with BMI <30. In this study, age and BMI are risk factors of preeclampsia, and blood type is a protective factor. Recommended, early detection with a risk factor approach, clients are expected to be more active in seeking information and recognizing risk factors for preeclampsia.
Keywords: *Preeclampsia, ABO blood type, body mass index*

INTRODUCTION

Preeclampsia is one of the leading causes of maternal death in the world. The high maternal mortality rate in this case is mostly due to inadequate management at the basic service level so that patients are referred in an already severe condition, improving the quality of midwifery services at the basic service level is expected to improve the prognosis for mothers and babies

According to WHO predictions, the incidence of preeclampsia cases with complications occurring is seven times higher in developing countries than in developed countries, the prevalence ratio is 14%:1.8% (Osungbade and Ige, 2011). In 2011 the incidence of preeclampsia in Indonesia was 128,273 events, around 5.3% of the entire population of maternity mothers in Indonesia (Noroyono *et al.*, 2016).

The Increasing incidence of death due to preeclampsia until now the cause is not known with certainty, so that there is no agreement in preeclampsia prevention strategies. Therefore, early detection of preeclampsia is very necessary, especially to improve the quality of care in pregnancy. Activities for early detection and handling of pregnant women at risk/midwifery complications need to be further improved both in Maternal and Child Health (KIA) service facilities and in the community.

Data on preeclampsia cases reported at the South Sulawesi Provincial Health Office in 2017 were 1966 cases with 40 deaths (34.78%) of the total 115 deaths in South Sulawesi (Selatan, 2018). The initial survey conducted by the author at the Regional Special Hospital for Mothers and Children (RSKDIA) Pertiwi Makassar, recorded that there were 89 cases of preeclampsia in 2017, which tended to decrease compared to 2016 and 2015 of 146 and 114, respectively case.

Based on the description above, it inspires the author to continue research in the hope of providing additional more accurate information, especially risk factors that are easily identified.

Question of this study are age, blood type, and maternal body mass index a risk factor for the incidence of preeclampsia at RSKDIA Pertiwi Makassar. Objectives of this

study is to determine the risk factors that caused preeclampsia in RSKDIA Pertiwi Makassar.

MATERIAL AND METHOD

Replication of research on risk factors for the incidence of preeclampsia has been widely carried out, both by domestic and foreign researchers. These studies have contributed directly or indirectly to health policy. In this study, researchers limit the variables to be studied, namely the risk factors for the incidence of preeclampsia in terms of age, blood type and maternal body mass index because these variables can be easily identified directly by health workers or individually by the pregnant woman concerned.

Type of research carried out is an analytic survey study with *retrospective case control* approach. This study *retrospective was* conducted by tracing back the risk factors for the incidence of preeclampsia.

This design is used by considering the availability of the sample population at the research site and the dependent variable to be studied is an obstetric complication which in principle is very undesirable to occur. So that by using this design, it is possible to select a case group and a control group involved in the study to see which risk factors play a role.

Case and control groups were selected from the same source population so that both groups had comparable characteristics except for disease status.

The research was conducted in RSKDIA Pertiwi Makassar, consideration of the location easily accessible to transport because it is located in the city center of Makassar administration. RSKDIA is a Type B referral hospital owned by the government of South Sulawesi Province with Main Level Hospital Accreditation status.

Study population was all mothers who gave birth recorded in the medical records at RSKDIA Pertiwi Makassar from January to December 2018.

Ratio of cases to controls is set at 1: 2 so that from the above formula the number of samples needed for the case group is 30 and for the control group is 60 with matching delivery status, it was primipara.

RESULT AND DISCUSSION

The data taken was secondary data contained in the recording of patient medical records and other supporting documents in the form of a MCH book.

The number of deliveries at RSKDIA Pertiwi in 2018 was 3578 with complications of preeclampsia as many as 127 cases so that the number of samples collected until the end of the study was sufficient, 30 people for the case group and 60 people for the control group where the total sample was 90 people.

1. Univariate Analysis Univariate

Analysis in this study is to describe each independent variable presented in the form of a frequency distribution table so that it can be read clearly the distribution of each risk factor for each sample group.

Table 1 Distribution of subjects by age, blood type and BMI at RSKDIA Pertiwi Makassar in 2018

Age (years)	Incidence of Preeclampsia		Non Preeclampsia		Total
	n	%	n	%	
< 20	4	13.33	6	10.00	10

20 – 35	20	66.67	48	80.00	68
> 35	6	20.00	6	10.00	12
Total	30	100.00	60	100.00	90
Blood	n	%	n	%	
Total	30	100.00	60	100.00	90
BMI	n	%		%	
30	11	36.67	13	21.67	24
≤ 30	19	63.33	47	78.33	66
Total	30	100.00	60	100.00	90

Secondary Data, 2018

Table 1 above shows that the largest subjects are in the healthy reproductive age group, which is 66.67% for the case group and 80% for the control group. The 35-year-old group consisted of 6 people, both the control group and the control group, with percentages of 20% and 10%, respectively. For study subjects aged < 20 years, 4 people (13.33) in the case group and 6 people (10%) in the control group. The age grouping in the table above is based on healthy reproductive age, where it is said that the healthy reproductive age is in the age range of 20-35 years, at that time the maturity and reproductive readiness of women have been perfect both physically and psychologically.

The distribution of subjects based on blood type, both case and control group, blood group O is the dominant blood group, 15 people (50%) and 28 people (46.67%), the lowest was

Blood group B as many as 3 people (10%) in the case group and blood type AB as many as 6 people (23.33%) in the control group. Blood type A were 6 people (20%) in the case group and 14 people (23.33%) in the control group. The table above shows the distribution of blood groups in research subjects, where the majority of the blood group in the population is blood type O, although in this study no specific determination was made for blood type.

A	6	20.00	14	23.33	20
B	3	10.00	12	20.00	15
AB	6	20.00	6	10.00	12
O	15	50.00	28	46.67	43

Provides an overview of the subject's body mass index, where body mass index 30 as many as 19 people (63.33%) for the case group and 47 people (78.33%) for the control group , while body mass index > 30 as many as 11 people (36.67%) in the case group and 13 people (21.67%) in the control group.

2. Bivariate Analysis

At this stage, an analysis of the relationship between each independent variable and the dependent variable is carried out.

Table 2 Relationship of age, blood type, and BMI with the incidence of preeclampsia at RSKDIA Pertiwi Makassar in 2018

Age (years)	Occurrence of Preeclampsia		**Total**	**Analysis**
	Preeclampsia	Non Preeclampsia		
High Risk	12	12	24	p=0.040;OR=2,667
Low Risk	18	48	66	95% CI= 0.903 - 7.809
Total	30	60	90	PFE=62.5%; PFP=25%
Blood Type				
High Risk	15	32	47	p=0.765;OR=0.875
Low Risk	15	28	43	95%CI= 0.332 - 2.307
Total	30	60	90	PFE = 12.5%; PFP = 6.7%
BMI				
High Risk	11	13	24	p=0.129;OR=2,093
Low Risk	19	47	66	95%CI = 0.707 - 6.077
Total	30	60	90	PFE = 12.5%; PFP = 6.7%

Secondary Data, 2018

Table 2, it can be seen that there is a significant relationship between age and the incidence of preeclampsia as evidenced by the results of the statistical test p value = 0.04 ; 95% *Confident Interval* (CI). The value of *Odds Ratio* (OR) = 2.667 means that in this study age is a risk factor for the occurrence of preeclampsia, where women aged <20 or >35

years are at risk of 2,667 times experiencing preeclampsia compared to women aged 20-35 years. *The Prevalence Fraction of Exposure* (PFE) states that as many as 62.5% of women aged <20 or >35 years are at risk of developing preeclampsia, and as much as 25% (*Prevalence Fraction of Population*/ PFP) of the total population regardless of age group is at risk of preeclampsia.

Based on the results of statistical tests, table above shows that the incidence of preeclampsia with blood type has no statistically significant relationship as seen from the p value = 0.765 which is greater than the p value = 0.05 with a significance level of 95% (0.332 till 2.307). So it can be interpreted that the alternative hypothesis is rejected and the null hypothesis is accepted. Although not statistically significant, bood type variable in this study can be said to be a protective factor against the incidence of preeclampsia, by looking at the value of OR = 0.875, it means that women with blood type O can avoid the incidence of preeclampsia by 1.14 times compared to women with blood type O (A, B, and AB). However, 12.5% (PFE) of women with blood type non-O are at risk of developing preeclampsia and about 6.7% (PFP) of the entire population is at risk of developing preeclampsia.

The results of the analysis of body mass index risk factors for the incidence of preeclampsia are shown in table 5.6, using thetest the *odds ratio* results OR = 2.093 means that body mass index is a risk factor for preeclampsia. Even though statistically there was no significant relationship between these variables, it was shown by the p value = 0.129 (95% CI = 0.707 till 6.077). The estimated magnitude of women with a body mass index >30 to experience preeclampsia is 12.5% and 6.7% of the total population, respectively.

Preeclampsia is a condition that only occurs during pregnancy and can aggravate pregnancy and childbirth. Complications that occur can lead to eclampsia and can end in death. Preeclampsia is more common in mothers with risk factors for age, parity, mothers with obesity, mothers with multiple pregnancies, mothers with hydatidiform moles, and can also occur in pregnant women with unfavorable lifestyles, such as drinking alcoholic beverages, consuming foods with high levels of high salt and cholesterol, and consume fast food.

Age is the length of time a person lives which is calculated from birth to the time the research is conducted. Age is categorized into 2, unhealthy reproductive age (<20 years and >35 years) and healthy reproductive age (20-35 years).

Causes of maternal death from reproductive factors include maternal age. In the period of healthy reproduction, it is known that the safe age for pregnancy and childbirth is 20-30 years. Maternal mortality in pregnant women and childbirth at the age of under 20 years was 2 to 5 times higher than maternal deaths that occurred at the age of 20 to 29 years. Maternal mortality increases again after the age of 30 to 35 years. Age of 20–30 years is the safest period for pregnancy/delivery, but in developing countries around 10%-20% of babies are born to adolescent mothers who are slightly older than children. Where as from a study it was found that two years after the first menstruation, a woman is still likely to achieve pelvic growth between 2-7% and 1% in height. Age factors affect the occurrence of preeclampsia, the age of adolescent women in their first pregnancy or nulliparas in their teens (young age less than 20 years) are more at risk of suffering from preeclampsia.

In this study, preeclampsia is defined as respondents who were clinically and

diagnostic disease characterized preeclampsia with blood pressure> 140/90 accompanied by proteinuria and edema and who have been diagnosed by a specialist in obstetrics and gynecology.

Age of the mother during pregnancy is one of the factors that determine the level of risk of pregnancy and childbirth. Women aged <20 years and >35 years have a high risk of developing preeclampsia. This is in accordance with research conducted by (Nursal, Tamela and Fitrayeni, 2017) which showed that extreme age is a risk factor for severe preeclampsia (RP= 1,476; CI= 1,094 – 1,922). The same result was also shown by (Primadhani and Supanji Raharja, 2017) which stated that age <20 years had a 1.6 times higher risk of death due to preeclampsia, age >35 years had a 1.2 times risk and for ages 20-35 years had a risk of death due to preeclampsia. is 0.87 times.

Rresults of the statistical analysis of this study showed that there was no significant relationship between blood type and the incidence of preeclampsia, as seen from the results of the analysis *chi square* withvalue *p* = 0.765 which was greater than the *p value* = 0.05 95% significance level (0.332 – 2.307). The value of OR = 0.875 (OR < 1) means that blood type is a protective factor for the incidence of preeclampsia, so it can be said that women with blood type O can avoid the incidence of preeclampsia by 1.14 times compared to women with blood type O (A, B, and AB).). However, 12.5% (PFE) of women with blood type non-O are at risk of developing preeclampsia and about 6.7% (PFP) of the entire population is at risk of developing preeclampsia.

Results of this study are in line with the research which did not find a significant comparison of the distribution of blood grouping on the incidence of preeclampsia (Hentschke *et al.*, 2014). Other studies (Franchini, Mengoli and Lippi, 2016) have not been able to determine how much influence blood type has on the severity of preeclampsia. Previous researchers in the team have done a similar study with the results of non-O blood group are risk factors for preeclampsia are the non- O blood type as the risk of severe preeclampsia compared blood group O, that AB has 7 times the risk of developing severe preeclampsia compared to blood type O (Sonda *et al.*, 2016).

Seeing comparison of some results of research that has been done before that has not been consistent so that the necessary further research in the form of a meta-analysis study of previous studies to describe the strengths and weaknesses of each research result so that a conclusion can be obtained in this regard.

Blood type is a factor that cannot be changed, so that it remains attached to each individual, to avoid the risks that may arise, several preventive measures can be taken, including minimizing situations that can trigger mental stress and close supervision in giving dietary calcium during pregnancy as needed.

One of the factors that is closely related to the occurrence of preeclampsia is obesity. Based on a study conducted on a population of pregnant women in Pittsburgh, it was found that the risk of preeclampsia increased threefold in obese pregnant women. addition, it was also explained that the incidence of preeclampsia at the end of pregnancy was more commonly found in overweight or obese women. One way to identify the presence of overweight or obesity in adults is to use the body mass index

Free radical theory related to body mass index on the incidence of preeclampsia explains that the more weight you gain, the more lipid peroxides increase, while

antioxidants in pregnancy decrease, resulting in the dominance of relatively high levels of lipid peroxides (Tapowolo, Lalandos and Kareri, 2018)

Maternal body mass index is a factor that influences pregnancy. Therefore, it is better to determine the benchmark for the amount of weight gain from before pregnancy until the end of pregnancy. Assessing weight before pregnancy is very important in terms of health for both mother and baby. If pregnant women are overweight before pregnancy, then the recommended increase should be smaller than pregnant women with ideal body weight. Pregnant women who have excessive weight gain will be at risk of pregnancy complications, one of which is preeclampsia. In addition, the accumulation of excessive body fat will make it difficult to lose weight after giving birth. Vice versa, women who were underweight before becoming pregnant, then when they are pregnant they need to gain more weight than mothers with ideal body weight. Reduced nutritional intake will inhibit the growth of the fetus in the womb such as low birth weight and other pregnancy disorders. Weight gain during pregnancy depends on weight before pregnancy. The best thing to do is to prepare for an ideal body weight before getting pregnant, so that the body will store all the nutrients needed by the body during pregnancy, such as carbohydrates, proteins, fats, vitamins, and minerals in balanced amounts. The recommended rate of weight gain is 1 to 2 kg during the first trimester and then 0.4 kg per week for women of normal weight and height (BMI 18.5 – 24.9).

Pregnancy is not the time to go on a diet. For women who are lean and care deeply about their shape (BMI 18.4), weight gain is a major problem. Maternal placentas that are not adequately nourished, often contain fewer cells that are measured smaller and are less able to synthesize nutrients needed by the fetus.

Mother should be briefed on the effects of inadequate nutrition on fetal development. This counseling should include information about the recommended components of weight gain and how much of this gain will be lost during delivery. An explanation of how to lose weight in postpartum, helps relieve anxiety in mothers. Ideally, women who are obese (BMI 30) should undergo a weight loss program prior to conception. However, all women need to gain weight during pregnancy. The increase in weight must be at least equal to the weight of the products of conception (fetus, placenta, amniotic fluid). The quality of this weight gain should be emphasized in nutrient-rich foods and avoiding low-calorie foods.

Based on the results of several studies conducted regarding the relationship between body mass index and the incidence of preeclampsia, (Walsh, 2007), Obesity class II–III was associated with a four-fold increased risk of mild to moderate preeclampsia (adjusted OR 4.0; 95% CI 3.7–4.4) (Sohlberg *et al.*, 2012). Stated that excess body weight in pregnant women is associated with preeclampsia found that each increase in BMI before pregnancy led to an 8% increase in the risk of preeclampsia (Roberts *et al.*, 2011).

Results of research conducted on 30 people in the case group and 60 people in the control group did not find a significant relationship as with several previous studies. Although not statistically significant the value, *p*= 1.29 (95% CI = 0.707 - 6.077), using odds ratio test, results obtained OR = 2.093, meaning that body mass index is a risk factor for the incidence of preeclampsia, obese pregnant women (BMI> 30) 2,093 times risk of experiencing preeclampsia compared to pregnant women with BMI <30. Estimated

magnitude of women with a body mass index >30 to experience preeclampsia is 12.5% and 6.7% of total population, respectively.

Avalue *p*> 0.05 was considered a relationship or association between risk factors and outcomes that were not statistically significant. However, it should be noted that the value *p*- depends on the number of samples.

CONCLUSION

Age is a risk factor for incidence of preeclampsia, with an Odds Ratio (OR) = 2.667 it's mean that women aged <20 or >35 years are at risk of 2.667 times having preeclampsia compared to women aged 20-35 years.

Variable blood type in this study is not a risk factor but a protective factor against the incidence of preeclampsia, based on analysis data we found OR value = 0.875, it means that women with blood type O can avoid the incidence of preeclampsia by 1.14 times compared to women with blood type non O (A, B, and AB).

Body mass index is a risk factor for the incidence of preeclampsia OR=2.093 means that pregnant women with a BMI 30 are at risk of developing preeclampsia 2.093 times.

ACKNOWLEDGEMENT

Author would like to thank the Director of the Earth RSKDIA Makassar, with the whole staff, especially Ms. Maya Muliati for their support during this project.

REFERENCES

Franchini, M., Mengoli, C. and Lippi, G. (2016) 'Relationship between ABO blood group and pregnancy complications: a systematic literature analysis', *Blood Transfusion*, 14(5), p. 441.

Hentschke, M. R. *et al.* (2014) 'Is there any relationship between ABO/Rh blood group and patients with pre-eclampsia?', *Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health*, 4(2), pp. 170–173. doi: https://doi.org/10.1016/j.preghy.2014.03.003.

Kes, P. K. D. (2019) 'Rencana Pembangunan Jangka Panjang Bidang Kesehatan 2005-2025'.

Noroyono, W. *et al.* (2016) 'Pedoman Nasional Pelayanan Kedokteran Diagnosis dan Tatalaksana Pre-Eklampsia'.

Nursal, D. G. A., Tamela, P. and Fitrayeni, F. (2017) 'Faktor Risiko Kejadian Preeklampsia pada Ibu Hamil di Rsup Dr. M. Djamil Padang Tahun 2014', *Jurnal Kesehatan Masyarakat Andalas*, 10(1), pp. 38–44.

Osungbade, K. O. and Ige, O. K. (2011) 'Public health perspectives of preeclampsia in developing countries: implication for health system strengthening', *Journal of pregnancy*, 2011.

Primadhani, S. A. and Supanji Raharja, S. (2017) 'Hubungan Usia Ibu Hamil Risiko Tinggi Dengan Kejadian Preeklampsia Berat (PEB) di RS. Dr. Oen Surakarta Periode 2013-2015'. Universitas Muhammadiyah Surakarta.

Roberts, J. M. *et al.* (2011) 'The Role of Obesity in Preeclampsia', *Pregnancy hypertension*, 1(1), pp. 6–16. doi: 10.1016/j.preghy.2010.10.013.

Selatan, D. K. P. S. (2018) 'Profile Kesehatan Provinsi Sulawesi Selatan', *Journal of Chemical Information and Modeling*, 53(9), pp. 1689–1699.

Sohlberg, S. *et al.* (2012) 'Maternal Body Mass Index, Height, and Risks of Preeclampsia', *American Journal of Hypertension*, 25(1), pp. 120–125. doi:

10.1038/ajh.2011.175.

Sonda, M. *et al.* (2016) 'Relationship between the ABO blood group and hyperemesıs gravidarum, anemia, and preeclampsia', *Medicine Science*, 5(3), pp. 758–760.

Tapowolo, Y. P. B., Lalandos, J. L. and Kareri, D. G. R. (2018) 'Hubungan Jarak Kelahiran Dan Indeks Massa Tubuh Dengan Kejadian Preeklampsia Di Rsud Prof. Dr. Wz Johannes Kupang Tahun 2017', *Cendana Medical Journal (CMJ)*, 6(3), pp. 376–382.

Walsh, S. W. (2007) 'Obesity: a risk factor for preeclampsia', *Trends in Endocrinology & Metabolism*, 18(10), pp. 365–370. doi: https://doi.org/10.1016/j.tem.2007.09.003.