

Risk Factors of Maternal Age, Gestational Age, and Parity for the Incidence of Low Birth Weight in Mothers with Preeclampsia at Drs. H. Amri Tambunan Hospital

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Abstract: Preeclampsia is a complication of pregnancy with various risk factors that also affect perinatal outcomes, especially the incidence of low birth weight (LBW). This study aims to analyse the relationship between risk factors for maternal age, gestational age, and parity on the incidence of LBW in mothers with preeclampsia. Observational analytical research with a case-control design was carried out at Drs. H. Amri Tambunan Hospital for the period August–October 2024. A sample of 176 people (88 preeclampsia, 88 non-preeclampsia) was taken using a consecutive sampling technique. Data analysis using Chi-Square test with SPSS. There was a significant relationship between maternal age ($p=0.000$), gestational age ($p=0.000$), and parity ($p=0.001$) with preeclampsia. The age group >35 years (40.9%), preterm pregnancy (39.8%), and primigravida (35.2%) dominated the preeclampsia cases. The risk factors of maternal age, gestational age, and parity were significantly related to the incidence of LBW in preeclamptic mothers at Drs. H. Amri Tambunan Hospital.

Keywords: Low birth weight; risk factors; parity; preeclampsia; gestational age

INTRODUCTION

Preeclampsia is one of the most serious pregnancy complications and contributes greatly to maternal and perinatal morbidity and mortality worldwide. This condition is characterised by hypertension that appears after 20 weeks of gestation, accompanied by proteinuria and/or other signs of organ dysfunction. In Indonesia, preeclampsia is still one of the top three causes of maternal death, along with bleeding and infection.¹⁻³ The high incidence

of preeclampsia reflects the challenges of early detection, monitoring, and optimal management during pregnancy.

The impact of preeclampsia is not only limited to the health of the mother, but also has serious consequences for the fetus. One of the most common complications is the birth of a baby with low birth weight (LBW). This condition is closely related to uteroplacental perfusion disorders due to endothelial dysfunction and spiral artery remodelling failure, which causes the supply

of oxygen and nutrients to the fetus to be inadequate. As a result, fetal growth is stunted and leads to intrauterine growth restriction (IUGR), which is clinically manifested as LBW.⁴⁻⁵

Babies with LBW are defined as babies born weighing less than 2,500 grams regardless of gestational age. LBW is a global health concern because it is associated with an increased risk of neonatal death, growth and developmental disorders, and increased susceptibility to non-communicable diseases in adulthood, such as diabetes mellitus and cardiovascular disease. In Indonesia, LBW is the leading cause of neonatal deaths, with a proportion of 35.2% in 2020.^{2,6} This data shows that LBW is still a priority problem that requires serious attention in efforts to improve the quality of maternal and child health.

Various maternal factors are known to play a role in increasing the risk of LBW in mothers with preeclampsia. These factors include the mother's age, gestational age, and parity. Mothers who are too young (<20 years) and old (>35 years) are associated with an increased risk of pregnancy complications due to biological unpreparedness and decreased physiological reproductive function. In addition, preterm pregnancies are directly related to low birth weight, while extreme parity such as primigravida and grandemultigravida are also reported to have a higher risk of pregnancy disorders, including preeclampsia and LBW.^{3,7,8} The interaction of these various factors suggests that the occurrence of LBW in preeclampsia is multifactorial and complex.

Although the relationship between preeclampsia and LBW has been extensively researched, studies that specifically analyse the role of maternal factors such as age, gestational age, and parity in local

populations are limited. Therefore, this study is important to provide a more comprehensive picture of the risk factors that contribute to the incidence of LBW in mothers with preeclampsia. This study aims to analyse the relationship between maternal age, gestational age, and parity and the incidence of LBW in mothers with preeclampsia at Drs. H. Amri Tambunan Hospital.

METHODS

This study is an observational analytical research with a case-control design which was carried out in August–October 2024 at Drs. H. Amri Tambunan Hospital, Lubuk Pakam, Deli Serdang Regency, North Sumatra. The population is all postpartum patients for the period of July 2021–August 2024. Samples were taken using *consecutive sampling* of 176 people, consisting of 88 cases of preeclampsia and 88 non-preeclampsia controls. The data used are secondary data from the patients' medical records.

Independent variables were risk factors that included maternal age (categories: <20 years, 20–35 years, >35 years), gestational age (preterm <37 weeks, term 37–40 weeks, postterm >42 weeks), and parity (primigravida, multigravida, grandemultigravida). The outcome variable was the incidence of LBW (<2,500 grams). Bivariate analysis used the Chi-Square test on SPSS with a value of $p < 0.05$ as the mean boundary.

RESULTS

Based on data analysis on 176 research subjects, the characteristics of the distribution of risk factors were obtained as presented in Table 1 below.

Table 1. Frequency Distribution Based on Risk Factor Characteristics in Mothers with Preeclampsia and Non-Preeclampsia

Features	Preeclampsia N (%)	Non- Preeclampsia N (%)	Value p
Mother's Age			
<20 years old	1 (1.1)	0 (0)	0.000
20-35 years old	51 (58)	77 (87.5)	
>35 years old	36 (40.9)	11 (12.5)	
Total	88 (100)	88 (100)	
Age of Pregnancy			
Preterm (<37 weeks)	35 (39.8)	12 (13.6)	0.000
Aterm (37-40 weeks)	21 (23.9)	49 (55.7)	
Postterm (>42 weeks)	32 (36.4)	27 (30.7)	
Total	88 (100)	88 (100)	
Paritas			
Primigravida (mothers who have given birth 1 time, both live and dead babies)	31 (35.2)	12 (13.6)	0.001
Multigravida (mothers who have given birth ≥2-4 times, both babies born alive or dead)	30 (34.1)	53 (60.2)	
Grandgravida (Mothers who have given birth ≥5 times, both babies born alive or dead)	27 (30.7)	23 (26.1)	
Total	88 (100)	88 (100)	

Based on Table 1, the characteristics of the mother's age in the preeclampsia group were most in the 20–35 years category, as many as 51 people (58.0%) and >35 years old as many as 36 people (40.9%). Based on gestational age, the preeclampsia group was the most in the preterm category, as many as 35 people (39.8%). Based on parity, the preeclampsia group was the most

in the primigravida category, as many as 31 people (35.2%). The three risk factors showed a $p < 0.05$ value, which means statistically significant.

DISCUSSION

The results of this study showed that there was a significant relationship between maternal age and the incidence of preeclampsia ($p = 0.000$). The age group of >35 years dominated the cases of preeclampsia (40.9%), which indicates that advanced maternal age is an important risk factor in the occurrence of hypertension disorders in pregnancy. These findings are in line with previous research that stated that preeclampsia is more common at extreme ages, both <20 years and >35 years, which is associated with increased susceptibility to vascular disorders.^{4,9,10} At the age of >35 years, there are physiological changes in the form of decreased elasticity of blood vessels, increased peripheral vascular resistance, and a tendency to comorbidities such as chronic hypertension and metabolic disorders.^{5,11} This condition worsens cardiovascular adaptation during pregnancy and contributes to the occurrence of endothelial dysfunction, which is the main mechanism in the pathogenesis of preeclampsia.

In addition to the mother's age, gestational age also showed a significant association with the incidence of preeclampsia ($p = 0.000$), where the preterm pregnancy group dominated the cases (39.8%). This is consistent with various studies that state that preeclampsia is one of the main causes of premature delivery, both due to spontaneous conditions and medical indications to save the mother and fetus.^{6,12,13} Pathophysiologically, early-onset preeclampsia is generally associated with trophoblast invasion disorders and heavier spiral artery remodelling failure, resulting in

significant placental insufficiency. This condition not only triggers early termination of pregnancy, but also has an impact on the growth of the fetus that is not optimal. The lower the gestational age at delivery, the higher the risk of low birth weight (LBW), organ immaturity, and neonatal complications such as respiratory distress syndrome and infection.^{14,15}

Parity was also shown to have a significant relationship with the incidence of preeclampsia ($p=0.001$), with primigravida being the most dominant group (35.2%). These findings support the immunological theory that in the first pregnancy, the mother's immune system does not have adequate tolerance to the paternal antigens found in the placenta. As a result, an imbalanced immune response can trigger inflammatory processes and endothelial dysfunction that lead to preeclampsia.^{7,16-18} On the other hand, the grandemultigravida group also showed an increased risk, albeit through different mechanisms. Repeated pregnancies can cause structural and functional changes in the uterus and blood vessels, affecting uteroplacental perfusion. In addition, factors of reproductive fatigue and the possibility of comorbidities in mothers with high parity also contribute to an increased risk of pregnancy complications, including preeclampsia and LBW.^{19,20}

Overall, the results of this study confirm that maternal age, gestational age, and parity are factors that interact with each other in influencing the incidence of preeclampsia and its impact on pregnancy outcomes. These three factors do not stand alone, but rather contribute to a complex mechanism involving vascular, immunological, and placental aspects. Therefore, early identification of these risk

factors is becoming very important in clinical practice.

The implication of these findings is the need to strengthen prevention and early detection efforts through comprehensive and quality antenatal care (ANC) services. Regular blood pressure monitoring, screening for risk factors from the first trimester, and education to pregnant women about pregnancy hazards must be an integral part of health services. In addition, a risk-based approach in pregnant women with extreme age, preterm pregnancy, and high parity needs to be optimised to reduce the incidence of preeclampsia and its subsequent complications, including LBW.

CONCLUSION

There was a significant relationship between risk factors for maternal age ($p=0.000$), gestational age ($p=0.000$), and parity ($p=0.001$) with the incidence of low birth weight (LBW) in mothers with preeclampsia at Drs. H. Amri Tambunan Hospital. Early screening of these risk factors needs to be done as part of comprehensive antenatal services.

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