

Relationship Between Severe Preeclampsia, Gestational Hypertension, Impending Eclampsia, Preeclampsia, Superimposed Preeclampsia, and Chronic Hypertension on Fetal Outcomes at Respati Maternal and Child Hospital, Tasikmalaya

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Abstract

Objective: This study aims to explore the impact of preeclampsia on fetal outcomes at birth.

Methods: This research used a total sampling method with a cross-sectional design. The data were from all pregnant patients and newborns delivered at Respati Maternity and Children's Hospital, Tasikmalaya, in 2023. Hypertensive disorders included preeclampsia, severe preeclampsia (SPE), superimposed preeclampsia, gestational hypertension (GHT), impending eclampsia, and chronic hypertension, while fetal outcomes included birth weight and prematurity.

Results: A total of 1,190 subjects were included. There was an association between birth weight and SPE ($p < 0.01$, PR = 7.64), GHT ($p < 0.01$, PR = 13.33), and superimposed preeclampsia ($p < 0.05$, PR = 5.24). A significant association was found between prematurity and SPE ($p < 0.01$, PR = 2.79), impending eclampsia ($p < 0.05$, PR = 3.63), superimposed preeclampsia ($p < 0.01$, PR = 4.47), and chronic hypertension ($p < 0.05$, PR = 3.63). No significant associations were found between other variables and low birth weight or prematurity.

Conclusion: There is an association between SPE and superimposed preeclampsia with low birth weight and prematurity, between GHT and low birth weight, and between impending eclampsia and prematurity.

Keywords: Fetomaternal, Neonatal outcomes, Preeclampsia, Respati maternity and children's hospital.

Hubungan antara Preeklampsia Berat, Hipertensi Gestasional, Impending Eklampsia, Preeklampsia, Superimposed Preeklampsia, dan Hipertensi Kronis terhadap Luanan Janin di RSIA Respati Tasikmalaya

Abstrak

Tujuan: Penelitian ini bertujuan untuk mengeksplorasi lebih dalam mengenai dampak preeklampsia terhadap luaran bayi saat lahir.

Metode: Penelitian ini dilaksanakan dengan metode total sampling, menggunakan desain potong lintang (*cross-sectional*) dengan data pasien ibu hamil dan janin yang dilahirkan di RSIA Respati Tasikmalaya pada tahun 2023. Variabel gangguan hipertensi meliputi preeklampsia, preeklampsia berat (PEB), *superimposed preeklampsia*, hipertensi gestasional (HTG), impending eklampsia, dan hipertensi kronis, sedangkan variabel luaran bayi meliputi berat badan lahir (BBL) dan prematuritas.

Hasil: Sebanyak 1.190 subjek dikumpulkan. Terdapat hubungan yang signifikan antara BBL dengan PEB ($p < 0,01$, PR = 7,64), HTG ($p < 0,01$, PR = 13,33), dan *superimposed preeklampsia* ($p < 0,05$, PR = 5,24). Terdapat hubungan yang signifikan antara prematuritas dengan PEB ($p < 0,01$, PR = 2,79), impending eklampsia ($p < 0,05$, PR = 3,63), *superimposed preeklampsia* ($p < 0,01$, PR = 4,47), dan hipertensi kronis ($p < 0,05$, PR = 3,63). Tidak ditemukan hubungan antara variabel lainnya dan BBL atau prematuritas.

Kesimpulan: Terdapat hubungan antara PEB dan *superimposed preeklampsia* dengan berat badan lahir rendah dan prematuritas, terdapat hubungan antara HTG dan BBL, dan terdapat hubungan antara impending eklampsia dan prematuritas.

Kata kunci: Fetomaternal, Luanan Janin, Preeklampsia, RSIA Respati.

Introduction

Hypertension is the most common medical issue encountered during pregnancy, with a prevalence of 2-3% among pregnant women. Hypertensive disorders in pregnancy are classified into four categories, according to the American College of Obstetricians and Gynecologists (ACOG). They are chronic hypertension, preeclampsia, preeclampsia superimposed on chronic hypertension, and gestational hypertension.¹

Preeclampsia is a multisystem disorder in pregnancy and a leading cause of maternal and fetal morbidity and mortality. Preeclampsia and its complications play a significant role in maternal mortality. The Maternal Mortality Rate (MMR) in Indonesia remains the highest in Southeast Asia. It is far from the global Sustainable Development Goals (SDGs) target to reduce the MMR to 183 per 100,000 live births by 2024. The most common cause of maternal deaths is hypertensive disorders in pregnancy, including preeclampsia (33.1%), followed by other causes such as non-obstetric complications, other obstetric complications, and pregnancy-related infections.²

According to the World Health Organization (WHO), the global prevalence of preeclampsia is estimated at 2-10% of pregnancies.² Hypertensive disorders in pregnancy have distinct diagnostic criteria. Gestational hypertension (GHT) is acute-onset hypertension that develops after 20 weeks of gestation.³ Diagnosis of preeclampsia is established when blood pressure is elevated ($\geq 140/90$ mmHg) after 20 weeks of gestation with proteinuria ≥ 300 mg/24 hours or $\geq +2$ on dipstick.⁴ with or without severe features, is a disorder of pregnancy associated with new-onset hypertension, usually with accompanying proteinuria, which occurs most often after 20 weeks of gestation and frequently near term. This disease represents a spectrum of

hypertensive disease in pregnancy, beginning with gestational hypertension and progressing to develop severe features, ultimately leading to its more severe manifestations, such as eclampsia and HELLP syndrome. This disease encompasses 2% to 8% of pregnancy-related complications, more than 50,000 maternal deaths, and over 500,000 fetal deaths worldwide. Early diagnosis and prompt management are essential to preventing both maternal and neonatal complications through symptomatic management and delivery planning. The parameters for initial identification of hypertension in the context of pregnancy-induced hypertension constituting the "mild range" are specifically defined as a systolic blood pressure (SBP) ≥ 140 mmHg. Severe preeclampsia (SPE) is characterized by blood pressure exceeding 160/110 mmHg, thrombocytopenia ($< 100,000$ cells/ μ L), central nervous system dysfunction, liver dysfunction, kidney impairment, or pulmonary edema.³ Superimposed preeclampsia is diagnosed in cases of preexisting hypertension (< 20 weeks of gestation) with the development of preeclampsia. Impending eclampsia refers to prodromal signs preceding seizures in eclampsia, such as headaches, visual disturbances, or altered consciousness.³

Research indicates that preeclampsia is strongly associated with adverse neonatal outcomes.⁵ Newborns from mothers with preeclampsia often face higher risks for conditions like preterm birth, low birth weight (LBW), and other complications.⁵⁻⁷ Additionally, hypertensive disorders during pregnancy are associated with higher incidences of stillbirth, LBW, preterm labor, and neonatal death.⁸

This study aims to explore the impact of risk factors on fetal outcomes at birth. By better understanding of these relationships, the goal is to develop more effective intervention strategies to improve health outcomes for neonates born to mothers with

preeclampsia.

Methods

The study was conducted at Respati Maternity and Children's Hospital, Tasikmalaya, from January to December 2023, using a total sampling method. A cross-sectional study design was used with secondary data from patient medical records. Data were collected from all pregnant mothers and their newborns at Respati Maternity and Children's Hospital, Tasikmalaya, in 2023. Exclusion criteria included incomplete medical records.

The observed variables included severe preeclampsia (SPE), superimposed preeclampsia, gestational hypertension (GHT), impending eclampsia, and chronic hypertension, while fetal outcomes included birth weight (BW) and prematurity. Univariate data were presented in a table of characteristics. Bivariate analysis used chi-square tests to determine relationships and prevalence ratios (PR) to measure the relationship between risk factors and fetal outcomes. Data were processed using SPSS software with a significance level of $p < 0.05$. This study was approved by the Research

Ethics Committee of Respati Maternity and Children's Hospital, Tasikmalaya (No. 698/SK.KEPK/UNR/XI/2024).

Results

A total of 1,190 medical records of pregnant mothers and neonates were collected. Subjects included those with SPE (78), GHT (23), impending eclampsia (6), preeclampsia (27), superimposed preeclampsia (13), and chronic hypertension (4). There were 120 neonates with birth weights less than 2500 grams and 1,070 with birth weights greater than 2500 grams. There were 23 preterm neonates with a gestational age less than 34 weeks, 171 with a gestational age between 34 and 37 weeks, and 996 with a gestational age of 37 weeks or more. Subject characteristics are presented in Table 1.

The analysis of the relationship between variables and low birth weight (LBW) revealed a significant relationship with SPE ($p < 0.01$, PR = 7.64), GHT ($p < 0.01$, PR = 13.33), and superimposed preeclampsia ($p < 0.05$, PR = 5.24). A significant relationship was found between prematurity and SPE ($p < 0.01$, PR = 2.79), impending eclampsia

Table 1 Subject Characteristics

Diagnosis	Total n = 1190	Percentage
Maternal characteristics		
Severe Preeclampsia (SPE)	78	6,55%
Gestational Hypertension (GHT)	23	1,93%
Impending Eclampsia	6	0,50%
Preeclampsia	27	2,27%
Superimposed Preeclampsia	13	1,09%
Chronic Hypertension	4	0,34%
Fetal outcome characteristics		
Birth weight < 2500 gram	120	10,08%
Birth weight $\geq$ 2500 gram	1070	89,92%
< 34 weeks	23	1,93%
34-37 weeks	171	14,37%
$\geq$ 37 weeks	996	83,70%

Table 2 Relationship between Variables and Birth Weight.

Variable	Group	Birth weight		P value	PR (95%CI)
		< 2500	> 2500		
Severe Preeclampsia (SPE)	SPE	35	43	p < 0,01	7,64 (5,41 - 10,80)
	Non- SPE	61	978		
Gestational Hypertension (GHT)	GHT	18	5	p < 0,01	13,33 (9,63 - 18,45)
	Non- GHT	61	978		
Impending Eclampsia	Impending Eclampsia	1	5	p = 0,264	2,84 (0,467 - 17,27)
	Non- Impending Eclampsia	61	978		
Preeclampsia	Preeclampsia	0	27	p = 0,195	0,30 (0,02 to 4,76)
	Non- Preeclampsia	61	978		
Superimposed Preeclampsia	Superimposed Preeclampsia	4	9	p < 0,05	5,24 (2,24 - 12,27)
	Non- Superimposed Preeclampsia	61	978		
Chronic Hypertension	Chronic Hypertension	1	3	p = 0,106	4,26 (0,767 to 23,65)
	Non-Chronic Hypertension	61	978		

Table 3 Relationship between Variables and Prematurity.

Variable	Group	Prematurity		P value	PR (95%CI)
		< 37 weeks	> 37 weeks		
Severe Preeclampsia (SPE)	SPE	30	48	p < 0,01	2,79 (2,03 - 3,85)
	Non-SPE	143	896		
Gestational Hypertension (GHT)	GHT	6	17	p = 0,0925	1,89 (0,94 to 3,83)
	Non-GHT	143	896		
Impending Eclampsia	Impending Eclampsia	3	3	p < 0,05	3,63 (1,61 - 8,20)
	Non- Impending Eclampsia	143	896		
Preeclampsia	Preeclampsia	2	25	p = 0,3418	0,54 (0,14 to 2,06)
	Non- Preeclampsia	143	896		
Superimposed Preeclampsia	Superimposed Preeclampsia	8	5	p < 0,01	4,47 (2,83 - 7,05)
	Non- Superimposed Preeclampsia	143	896		
Chronic Hypertension	Chronic Hypertension	2	2	p < 0,05	3,63 (1,35 - 9,79)
	Non- Chronic Hypertension	143	896		

($p < 0.05$, $PR = 3.63$), superimposed preeclampsia ($p < 0.01$, $PR = 4.47$), and chronic hypertension ($p < 0.05$, $PR = 3.63$). Other variables did not show any significant relationship with LBW or prematurity. The data for these relationships are presented in Tables 2 and 3.

Discussion

Based on the research findings, the prevalence rates for severe preeclampsia (SPE), gestational hypertension (GHT), impending eclampsia, preeclampsia, superimposed preeclampsia, and chronic hypertension were 6.55%, 1.93%, 0.50%, 2.27%, 1.09%, and 0.34%, respectively. Another similar study reported a prevalence of SPE at 12.39%.⁵ The prevalence of preeclampsia in Indonesia itself is 5.3%, which is relatively lower than the findings of this study.⁹ One possible explanation for the higher prevalence of preeclampsia in this study is that Respati Maternity and Children's Hospital, Tasikmalaya, serves as one of the referral centers for maternal and child cases in Tasikmalaya, thereby receiving severe cases such as SPE from other hospitals. This finding is consistent with another study that found a high prevalence rate of PEB in Tasikmalaya, reaching up to 52.63%.¹⁰

This study explored the relationship between hypertensive disorders in pregnancy and fetal outcomes. There was a significant relationship between SPE and superimposed preeclampsia with low birth weight (LBW) and prematurity. Other studies also found that SPE affects LBW ($p < 0.01$, $OR = 86.8$).¹⁰ Preeclampsia is known to be associated with endothelial dysfunction and vascular constriction.⁴ with or without severe features, is a disorder of pregnancy associated with new-onset hypertension, usually with accompanying proteinuria, which occurs most often after 20 weeks of gestation and frequently near term. This disease represents

a spectrum of hypertensive disease in pregnancy, beginning with gestational hypertension and progressing to develop severe features, ultimately leading to its more severe manifestations, such as eclampsia and HELLP syndrome. This disease encompasses 2% to 8% of pregnancy-related complications, more than 50,000 maternal deaths, and over 500,000 fetal deaths worldwide. Early diagnosis and prompt management are essential to preventing both maternal and neonatal complications through symptomatic management and delivery planning. The parameters for initial identification of hypertension in the context of pregnancy-induced hypertension constituting the "mild range" are specifically defined as a systolic blood pressure (SBP) When the placenta does not receive an adequate blood supply, the fetus is deprived of sufficient oxygen and nutrients, impairing intrauterine growth and resulting in LBW at birth.⁴ with or without severe features, is a disorder of pregnancy associated with new-onset hypertension, usually with accompanying proteinuria, which occurs most often after 20 weeks of gestation and frequently near term. This disease represents a spectrum of hypertensive disease in pregnancy, beginning with gestational hypertension and progressing to develop severe features, ultimately leading to its more severe manifestations, such as eclampsia and HELLP syndrome. This disease encompasses 2% to 8% of pregnancy-related complications, more than 50,000 maternal deaths, and over 500,000 fetal deaths worldwide. Early diagnosis and prompt management are essential to preventing both maternal and neonatal complications through symptomatic management and delivery planning. The parameters for initial identification of hypertension in the context of pregnancy-induced hypertension constituting the "mild range" are specifically defined as a systolic blood pressure (SBP) Another study has similarly indicated an

association between SPE and prematurity ($p < 0.01$, $PR = 3.3$).¹¹ Several complications of SPE include eclampsia, HELLP syndrome, pulmonary edema, myocardial infarction, acute respiratory distress syndrome, stroke, kidney and retinal disorders, as well as fetal complications such as intrauterine growth restriction, placental abruption, or fetal and maternal death.¹ One management approach for SPE is pregnancy termination at 34 weeks of gestation to prevent complications.⁴ with or without severe features, is a disorder of pregnancy associated with new-onset hypertension, usually with accompanying proteinuria, which occurs most often after 20 weeks of gestation and frequently near term. This disease represents a spectrum of hypertensive disease in pregnancy, beginning with gestational hypertension and progressing to develop severe features, ultimately leading to its more severe manifestations, such as eclampsia and HELLP syndrome. This disease encompasses 2% to 8% of pregnancy-related complications, more than 50,000 maternal deaths, and over 500,000 fetal deaths worldwide. Early diagnosis and prompt management are essential to preventing both maternal and neonatal complications through symptomatic management and delivery planning. The parameters for initial identification of hypertension in the context of pregnancy-induced hypertension constituting the "mild range" are specifically defined as a systolic blood pressure (SBP) This approach has led to a higher incidence of prematurity in SPE cases due to induced labor. Our findings align with this, showing a significant association between impending eclampsia and prematurity ($p < 0.05$, $PR = 3.63$).

Other studies have also shown a correlation between GHT and preeclampsia with prematurity.¹² This may be due to inflammation, oxidative stress, and endocrine disorders.^{13–15} In this study, we found a relationship between chronic hypertension and prematurity ($p < 0.05$, $PR = 3.63$).

A potential reason for this could be that uncomplicated preeclampsia cases are not commonly referred to Respati Maternity and Children's Hospital Tasikmalaya from primary healthcare services. This result could also explain why this study's prevalence of SPE was higher than that of preeclampsia.

Risk factors for preeclampsia include nulliparity, age over 40 years, a body mass index (BMI) ≥ 35 kg/m², a family history of preeclampsia, multiple pregnancies, and an interpregnancy interval of more than 10 years.¹⁶ Pregnancy planning is essential to prevent preeclampsia and its complications. One of Indonesia's government programs for addressing preeclampsia is integrated antenatal care with the "10T" program. It includes measuring weight, measuring upper arm circumference (MUAC), measuring blood pressure, measuring uterine fundal height, counting fetal heart rate (FHR), determining fetal presentation, administering tetanus toxoid (TT) immunization, providing iron tablets, conducting laboratory tests (routine and specific), special management and effective counseling and education.¹⁷ With this program, it is expected that the incidence of preeclampsia and maternal and child mortality rates can be reduced.

This research is the first study to explore the impact of hypertensive disorders in pregnancy on fetal outcomes at Respati Maternal and Child Hospital in Tasikmalaya, providing insights that can guide local healthcare practices in Tasikmalaya, West Java. The limitation of this study is that this study did not control for potential confounders that may have interfered with the results. Additionally, the researchers did not find subjects with preeclampsia who delivered LBW infants. It is recommended that further research be conducted on a larger scale to investigate the relationship between hypertensive disorders in pregnancy and fetal outcomes.

Conclusion

The study concludes that there is a significant relationship between SPE and superimposed preeclampsia with LBW and prematurity, a relationship between GHT and LBW, and a relationship between impending eclampsia and prematurity based on research conducted at Respati Maternity and Children's Hospital, Tasikmalaya in 2023.

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