



## Neonatal Outcomes in Preeclampsia and Gestational Hypertension Cases at Tabanan Regional Hospital

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### ABSTRACT

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Pregnancy hypertension is the highest cause of death in Indonesia. Worsening preeclampsia and gestational hypertension have impact on fetus. This study aims to determine outcome of neonates with preeclampsia and gestational hypertension at Tabanan Hospital during August 2022-2024. This research is descriptive with a crosssectional design. This study used total sampling with a sample size of 120 respondents. Secondary data was analyzed univariately, presented in frequency distribution table. Results showed characteristics majority of respondents were low risk age (79.2% preeclampsia, 85.4% gestational hypertension), multipara (68.1% preeclampsia, 70.8% gestational hypertension), pregnancy interval <10 years (50% preeclampsia, gestational hypertension 62.5%), preterm (54.2%) in preeclampsia and normal gestational age (75.0%) in gestational hypertension. Majority of preeclamptic neonates were vigorous babies (76.4%), LBW (55.56%) and normal body length (50%). Outcomes of gestational hypertension neonates were vigorous babies (91.7%), normal weight (79.2%) and normal body length (64.6%). Conclusions is majority were aged 20-35 years, multipara, pregnancy interval <10 years, preterm and normal gestational age (gestational hypertension). Majority of neonate outcomes were vigorous babies, LBW (preeclampsia), normal weight (gestational hypertension) and normal body length. The findings provide a basis for further research on outcomes of neonates from preeclampsia and gestational hypertension mother's.

### INTRODUCTION

Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) are two indicators used to determine the level of health in a country. The SDGs target is to reduce MMR to 70 per 1000 live births and IMR to 12 per 1000 live births by 2030. In 2023, deaths caused by eclampsia were 24 percent and bleeding was 23 percent. Hypertension in pregnancy ranks first as a cause of maternal death in Indonesia<sup>(1)</sup>.

The MMR in Bali in 2023 was 85 per 1000 live births and the IMR was 13.26 per 1000 live births<sup>(2)</sup>. The MMR in Tabanan Regency was 77.28 per 1000 live births and the IMR was 8.89 per 1000



live births<sup>(1)</sup>. Based on the report of Comprehensive Emergency Obstetric Neonatal Services (PONEK) in the Maternity Room of Tabanan Hospital in 2023, there were three cases of maternal death during 2023 caused by bleeding and eclampsia. The number of cases of severe preeclampsia at Tabanan Hospital in 2023 was 24 cases while the number of gestational hypertension was 16 cases. Severe preeclampsia cases are the second most complicated childbirth cases after Locus Minoris Resistance (LMR) cases at Tabanan Hospital in 2023. Based on the Perinatology Room Register at Tabanan Hospital in 2023, the number of LBW babies was 41 cases and the number of asphyxia babies was 39 cases out of 202 babies treated in the Perinatology Room at Tabanan Hospital.

Gestational hypertension is hypertension that appears after 20 weeks of gestation, without any protein in the urine and usually disappears after delivery<sup>(3)</sup>. Preeclampsia is blood pressure of at least 140 mmHg systolic and 90 mmHg diastolic on two examinations 15 minutes apart using the same arm at a gestational age of more than 20 weeks accompanied by at least one or more symptoms of proteinuria, organ failure or utero-placental dysfunction<sup>(4)</sup>. The results of a study in China confirmed that gestational hypertension and preeclampsia can significantly increase the risk of LBW and preterm birth, and this effect is even more pronounced in the group with early symptoms. Preeclampsia has a greater influence than gestational hypertension on the etiology of LBW status and preterm birth<sup>(5)</sup>. Another study in Ghana showed that neonatal outcomes were found to be worse in more than half of pregnancies complicated by severe preeclampsia or eclampsia<sup>(6)</sup>.

There are two main factors that cause the high mortality rate in Indonesia, namely late diagnosis and late referral<sup>(7)</sup>. The Ministry of Health of the Republic of Indonesia has made a number of policies including quality pregnancy checks at least six times, sending ultrasound (USG) to all health centers in Indonesia in stages accompanied by training health center doctors to be able to use USG<sup>(8)</sup>. Pregnant women are advised to detect the possibility of preeclampsia at 11-13 weeks of pregnancy by examining the biomarkers sFlt-1 and PlGF. This examination cannot be used as screening for pregnant women in general due to the high cost and limited facilities for this examination<sup>(9)</sup>. The purpose of this study was to determine the picture of neonatal outcomes in preeclampsia and gestational hypertension in the Maternity Room of Tabanan Hospital for the period August 2022-August 2024.

## METHOD

This study is a descriptive study with a cross-sectional research design. The study was conducted in the delivery room of Tabanan Regional Hospital from August 2022 to August 2024. The population used was all mothers giving birth with a diagnosis of preeclampsia and gestational hypertension. The diagnosis of preeclampsia and gestational hypertension was confirmed by an obstetrician and gynecologist. This study used a total sampling technique with a sample size of 120 respondents. The inclusion criteria for this study were pregnant women who gave birth at Tabanan Regional Hospital with a diagnosis of preeclampsia and gestational hypertension from August 2022 to August 2024 with complete medical records and pregnant women with a diagnosis of chronic hypertension that progressed to preeclampsia based on a doctor's diagnosis. The exclusion criteria were respondents with incomplete medical records and pregnant women with a diagnosis of chronic hypertension. This study has received ethical clearance from the Tabanan Regional Hospital Ethics Committee.

The study used secondary data obtained from the register and patient medical records in the form of maternal age, parity, pregnancy spacing, gestational age, APGAR score, birth weight and birth length. The available data was copied into a form (documentation sheet) that had been prepared by the researcher. Data analysis was carried out univariately to see the variation of each independent and dependent variable, presented in the form of a frequency distribution table. The independent variable is mothers giving birth with preeclampsia and gestational hypertension. The dependent variable is neonatal outcomes.



## RESULT AND DISCUSSION

### The respondent characteristics

The characteristics of respondents in this study include age, parity, pregnancy spacing and gestational age of mothers with preeclampsia and gestational hypertension in the delivery room of Tabanan Regional Hospital for the period August 2022-August 2024.

Table 1.  
Characteristics of Mothers Giving Birth with Preeclampsia and Gestational Hypertension

| Characteristics                     | Preeclampsia |       | Gestational Hypertension |       |
|-------------------------------------|--------------|-------|--------------------------|-------|
|                                     | f            | %     | f                        | %     |
| <b>Age</b>                          |              |       |                          |       |
| Low risk (20-35 years)              | 57           | 79,2  | 41                       | 85,4  |
| High risk (<20 years dan >35 years) | 15           | 20,8  | 7                        | 14,6  |
| Total                               | 72           | 100,0 | 48                       | 100,0 |
| <b>Parity</b>                       |              |       |                          |       |
| Primiparous                         | 23           | 31,9  | 14                       | 29,2  |
| Multiparous                         | 49           | 68,1  | 34                       | 70,8  |
| Total                               | 72           | 100,0 | 48                       | 100,0 |
| <b>Pregnancy interval</b>           |              |       |                          |       |
| ≥10 year                            | 12           | 16,7  | 4                        | 8,3   |
| < 10 year                           | 36           | 50,0  | 30                       | 62,5  |
| First pregnancy                     | 24           | 33,3  | 14                       | 29,2  |
| Total                               | 72           | 100,0 | 48                       | 100,0 |
| <b>Gestational age</b>              |              |       |                          |       |
| Preterm (<37 weeks)                 | 39           | 54,2  | 12                       | 25,0  |
| Normal (37-42 weeks)                | 33           | 45,8  | 36                       | 75,0  |
| Total                               | 72           | 100,0 | 48                       | 100,0 |

### Characteristics of mothers giving birth with preeclampsia

The results of the study showed that the age of the respondents is mostly in the low-risk age group (20-35 years) (79.2%). The high number of preeclampsia in the age range of 20-35 years is because the process of pregnancy and childbirth mostly occurs at a healthy reproductive age. Age alone may not have much effect on the incidence of preeclampsia, but if there are other accompanying risk factors such as comorbidities, nulliparity or twin pregnancy, it will increase the risk of preeclampsia<sup>(10)</sup>. The safe age for pregnancy and childbirth is 20-35 years. The incidence of hypertension increases threefold in women aged >35 years. At the age of <20 years, the size of the uterus has not reached the normal size for pregnancy, so the possibility of disorders in pregnancy such as preeclampsia is greater. At the age of >35 years, a degenerative process occurs which results in structural and functional changes that occur in the peripheral blood vessels that are responsible for changes in blood pressure, making them more susceptible to preeclampsia<sup>(10)</sup>.

In this study, the highest parity of respondents was multipara (68.1%). The incidence of preeclampsia often occurs in primigravida mothers who are exposed to chorionic villi for the first time because the formation of vascular endothelial cells in the placenta is not yet perfect. This is because the immunological mechanism of blocking antibody formation carried out by HLA-G (Human Leucocyte Antigen G) against placental antigens has not been formed perfectly, so that the process of trophoblast implantation into the mother's decidual tissue is disrupted<sup>(11)</sup>. Primigravida mothers are susceptible to



stress in facing childbirth which will stimulate the body to release cortisol. The effect of cortisol is to increase the sympathetic response, so that cardiac output and blood pressure will also increase<sup>(11)</sup>. In this study, the incidence of preeclampsia was often found in multiparous mothers, this could be due to other predisposing factors that were not studied in depth such as socio-economic conditions, malnutrition, obstetric conditions related to the placenta, parity, age, blood vessel disease, kidney disease and a history of other diseases<sup>(12)</sup>.

The results showed that most respondents had a pregnancy interval of <10 years (50%). The relationship between the inter-delivery interval and the risk of preeclampsia is a complex review. According to Cormick et al. (2016), changing partners between pregnancies is believed to confound the relationship between the inter-delivery interval and the risk of preeclampsia, given that changing partners is often associated with longer inter-pregnancy intervals<sup>(13)</sup>. Other studies have shown that the inter-delivery interval affects the incidence of preeclampsia in women without a history of previous preeclampsia, where women with a pregnancy interval of >5 years are seven times more at risk of developing preeclampsia compared to those with a pregnancy interval of <5 years. The ideal pregnancy interval to reduce the risk of recurrent preeclampsia is 2-5 years<sup>(14)</sup>.

A study showed that out of 37 respondents, there were 20 respondents who had ideal birth spacing (two of whom had preeclampsia) and 17 respondents with non-ideal birth spacing (13 of whom had preeclampsia). The results of the bivariate analysis test showed that there was a significant relationship between birth spacing and the incidence of preeclampsia. Mothers who had ideal birth spacing had a lower incidence of preeclampsia than those who did not have preeclampsia. In this study, the incidence of preeclampsia was found in birth spacing of <10 years. This can be caused by various factors, one of which is that the mother has a history of preeclampsia, so that preeclampsia can occur even though the birth spacing is ideal<sup>(15)</sup>.

The results of this study illustrate that mothers giving birth with preeclampsia mostly have a gestational age of <37 weeks (preterm) (54.2%). In cases of preeclampsia, pregnancy termination tends to be carried out to avoid further complications. This results in an increased prevalence of preterm birth. Preeclampsia is one of the causes of preterm labor due to inflammation of the decidua chorioamnion which will stimulate the release of cytokines and prostaglandins that can initiate the labor process<sup>(16)</sup>.

### **Characteristics of mothers giving birth with gestational hypertension**

The results of the study illustrate that most respondents are in the low-risk age group (20-35 years) (85.4%). This can happen because age is not the only risk factor for hypertension in pregnancy, increased blood pressure is also influenced by parity, history of hypertension and Body Mass Index (BMI) which have not been studied in depth<sup>(17)</sup>. Research by Hans and Ariwibowo (2020) showed that most respondents were in the low-risk group (21-34 years) as much as 62.5%, while the risk age <20 years and > 35 years the percentage was lower at 37.5%<sup>(18)</sup>. Mothers with high-risk ages may not experience hypertension in pregnancy due to factors such as the condition of the pregnant mother in good condition, being in a non-risk parity, not experiencing stress and being ready to face pregnancy psychologically, and diligently carrying out ANC examinations during pregnancy which can reduce the risk of dangerous pregnancies at a risky age<sup>(19)</sup>.

This study describes the parity of respondents who are mostly multipara (70.8%). This result is supported by a study where out of 70 pregnant respondents, multipara had a greater chance of experiencing pregnancy hypertension compared to primipara (67.1%). Multipara parity can experience pregnancy hypertension if the pregnancy spacing is too close. Close pregnancy spacing can cause the endometrium of the implantation site to be unprepared to receive the results of conception which can cause various complications in pregnancy<sup>(20)</sup>. Wiknjastro (2017) stated that multipara is at higher risk of experiencing preeclampsia. This is due to changes in the tissue of the uterine organs which have



reduced elasticity including blood vessels, resulting in increased fluid and hypertension accompanied by edema and proteinuria<sup>(21)</sup>.

This study describes that most respondents have a pregnancy interval of <10 years (62.5%). The results of a study stated that there is a significant relationship between hypertension and the incidence of LBW and there is a relationship between pregnancy interval and the incidence of LBW at Wates Regional Hospital<sup>(22)</sup>, while according to Restuti et al. (2020) stated that there is no relationship between pregnancy interval and the incidence of hypertension in pregnancy<sup>(23)</sup>.

This study describes that most respondents have normal gestational age (37-42 weeks) (75%). Hypertension in pregnancy has been proven that the levels of oxidants, especially fat prooxidants, increase, while antioxidants (example vitamin E) decrease, resulting in a relatively high dominance of fat prooxidant oxidant levels. These highly toxic fat prooxidants/free radicals will circulate throughout the body in the bloodstream and will damage the endothelial cell membrane. The majority of women with chronic hypertension experience a decrease in blood pressure towards the end of the first trimester of around 5-10 mmHg similar to the cycle in normal women. Then blood pressure rises again in the third trimester so that it is similar to gestational hypertension<sup>(24)</sup>.

### Neonatal outcomes in mothers giving birth with preeclampsia

Neonatal outcomes in mothers with preeclampsia in the delivery room of Tabanan Regional Hospital for the period August 2022-August 2024 are presented in the table below:

Table 2.  
Frequency Distribution of Neonatal Outcomes in Mothers Giving Birth with Preeclampsia

| Neonatal Outcomes                 | Preeclampsia |       |
|-----------------------------------|--------------|-------|
|                                   | F            | %     |
| APGAR score                       |              |       |
| Vigorous Baby (score 7-10)        | 55           | 76,4  |
| Moderate asphyxia (score 4-6)     | 11           | 15,3  |
| Severe asphyxia (score 1-3)       | 6            | 8,3   |
| Total                             | 72           | 100,0 |
| Birth weight                      |              |       |
| Normal ( $\geq 2500$ -4000 grams) | 32           | 44,44 |
| LBW (<2500 grams)                 | 40           | 55,56 |
| Total                             | 72           | 100,0 |
| Body length at birth              |              |       |
| Normal ( $\geq 48$ -52 cm)        | 36           | 50,0  |
| Short (<48 cm)                    | 36           | 50,0  |
| Total                             | 72           | 100,0 |

This study describes the neonatal outcomes in mothers with preeclampsia, most in the Vigorous baby group (score 7-10) (76.4%). Research by Kamila and Wathaniah (2021) showed that out of 49 pregnant women with preeclampsia, 39 preeclamptic mothers gave birth to babies with neonatal asphyxia. This shows that there is a significant relationship between the incidence of preeclampsia and the incidence of neonatal asphyxia<sup>(25)</sup>. High blood pressure in pregnant women causes reduced blood flow to the placenta, resulting in reduced oxygen supply to the baby. This causes fetal development to be hampered and intrauterine hypoxia occurs. The effect of this hypoxia is neonatal asphyxia. Neonatal asphyxia is the failure of a newborn to breathe spontaneously, causing further disorders, which are



characterized by hypoxemia (decreased PaO<sub>2</sub>), hypercarbia (increased PaCO<sub>2</sub>) and acidosis/decreased pH <7 which affects the entire body's metabolism<sup>(25)</sup>.

This study, most of them had low birth weight (<2500 grams) (55.6%). Cunningham (2016) stated that there is a relationship between preeclampsia and the incidence of LBW. Preeclampsia causes placental insufficiency caused by maladaptation of the spiral artery that provides nutrition to the placenta, so that blood flow to the placenta is reduced so that the nutrients and oxygen that are distributed are also reduced or disrupted. This causes fetal growth disorders or premature labor with low birth weight baby output<sup>(11)</sup>.

The results of this study illustrate that neonatal outcomes in mothers giving birth with preeclampsia show the same number between the normal birth length category (≥48-52 cm) (50%) and short (<48 cm) (50%). Pregnant women with hypertension can cause narrowing of the blood vessels so that fetal food intake is hampered. This will inhibit the development of the fetus and mother. As a result, the mother can give birth to a baby with low birth weight. Babies born with a weight less than normal are certainly followed by a less than normal body length<sup>(26)</sup>.

### Neonatal outcomes in mothers giving birth with gestational hypertension

Neonatal outcomes in mothers with gestational hypertension in the delivery room of Tabanan Regional Hospital for the period August 2022-August 2024 are presented in the table below:

Table 3.  
Frequency Distribution of Neonatal Outcomes in Mothers Giving Birth with Gestational Hypertension

| Neonatal Outcomes             | Gestational Hypertension |       |
|-------------------------------|--------------------------|-------|
|                               | F                        | %     |
| APGAR score                   |                          |       |
| Vigorous Baby (score 7-10)    | 44                       | 91,7  |
| Moderate asphyxia (score 4-6) | 4                        | 8,3   |
| Total                         | 48                       | 100,0 |
| Birth weight                  |                          |       |
| Normal (≥2500-4000 grams)     | 38                       | 79,2  |
| LBW (<2500 grams)             | 10                       | 20,8  |
| Total                         | 48                       | 100,0 |
| Body length at birth          |                          |       |
| Normal (≥48-52 cm)            | 31                       | 64,6  |
| Short (<48 cm)                | 17                       | 35,4  |
| Total                         | 48                       | 100,0 |

The results of the study showed that APGAR in mothers giving birth with gestational hypertension was the most in the Vigorous baby group (score 7-10) (91.7%). This good APGAR score outcome can occur because mothers routinely undergo check-ups during pregnancy so that the mother's hypertension condition can be detected early and the mother receives appropriate treatment according to her pregnancy condition. In addition, mothers giving birth also do not have other comorbidities, so that the babies born have better outcomes. A study of 78 mothers giving birth with hypertension in pregnancy found that 63 babies were born with neonatal asphyxia (80.8%) and 15 babies did not experience neonatal asphyxia (19.2%). Increased blood pressure is caused by increased peripheral blood vessel resistance, this will result in impaired utero-placental circulation. This condition causes more severe disorders of placental insufficiency and affects respiratory disorders<sup>(27)</sup>.



Neonatal outcomes in the form of birth weight in mothers giving birth with gestational hypertension mostly have normal birth weight ( $\geq 2500$ -4000 grams) (79.2%). Wiknjosastro (2016) stated that hypertension in pregnancy is related to the incidence of LBW<sup>(28)</sup>. Pregnant women who experience hypertension in pregnancy are five times more likely to give birth to LBW babies compared to mothers who do not have hypertension. Hypertension or increased blood pressure during pregnancy reflects the failure of the mother's cardiovascular system to adapt to her pregnancy. This condition can reduce uteroplacental blood flow and nutrient supply to the fetus body, resulting in LBW<sup>(28)</sup>.

Neonatal outcomes in the form of birth length in mothers giving birth with gestational hypertension mostly have normal body length ( $\geq 48$ -52 cm) (64.6%). Pregnant women with hypertension can cause narrowing of blood vessels so that fetal food intake is hampered. This will inhibit fetal development. As a result, mothers can give birth to babies with low birth weight. Babies born with low birth weight are certainly followed by low body length<sup>(26)</sup>.

## CONCLUSION

The characteristics of mothers giving birth with preeclampsia in the Tabanan Hospital Delivery Room from August 2022 to August 2024 were mostly at low-risk age, multiparous, pregnancy interval  $<10$  years and preterm gestational age. The characteristics of mothers giving birth with gestational hypertension in the Tabanan Hospital Delivery Room from August 2022 to August 2024 were mostly at low-risk age, multiparous, pregnancy interval  $<10$  years, preterm gestational age in preeclamptic mothers and normal gestational age in gestational hypertension.

Neonatal outcomes in mothers giving birth with preeclampsia, the most babies are in the Vigorous baby group, have low birth weight (LBW) and at birth length have the same percentage between normal and short categories. Neonatal outcomes in mothers giving birth with gestational hypertension, the most babies are in the Vigorous baby group, have normal birth weight and at birth length are normal..

Penelitian ini melihat gambaran luaran neonatus pada ibu bersalin dengan preeklampsia dan hipertensi gestasional tanpa meneliti adanya hubungan karakteristik (umur, paritas, usia kehamilan, dan jarak kehamilan) ibu bersalin dengan preeklampsia dan hipertensi gestasional terhadap luaran neonatus, oleh karena itu hasil penelitian ini diharapkan dapat menjadi data penunjang untuk penelitian selanjutnya.

This study examines neonatal outcomes in mothers giving birth with preeclampsia and gestational hypertension without examining the relationship between the characteristics (age, parity, gestational age, and pregnancy interval) of mothers giving birth with preeclampsia and gestational hypertension towards to neonatal outcomes. Therefore, the findings provided a basis for further research.

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