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Research Article

The Association of Gestational Hypertension With the Incidence of Low Birth Weight at Harapan Bunda Hospital, Batam City

Nadya Amelia [1]*, Catur Yulinawati [2], Inke Asmika [3]

[1,2,3] Institut Kesehatan Mitra Bunda, e-mail : Bby.yaa20@gmail.com

* Corresponding Author : Nadya Amelia

Abstract: Low birth weight babies (LBW) are babies who weigh <2500 grams regardless of gestational age or gestation period. Gestational hypertension can continue into labor which will cause fetal growth disorders that will affect the baby's birth weight so that mothers who have high blood pressure have a higher risk of giving birth to low birth weight babies. This study was conducted to determine the relationship between gestational hypertension and the incidence of low birth weight at Harapan Bunda Hospital, Batam City. Methods: This study is a quantitative study with an observational analytic approach using a Case Control design with a retrospective approach. The population in this study were all babies born at Harapan Bunda Hospital Batam. The number of samples taken was 30 babies and used purposive sampling technique using a Checklist sheet. Data analysis using chi-square test. From the statistical results using the Chi Square statistical test with a meaning value of a=0.05, the p value = 0.027 means that there is a relationship between gestational hypertension and the incidence of low birth weight and the magnitude of the Odds Ratio (OR) value is 2.333, meaning that mothers who have a history of gestational hypertension or who experience hypertension during pregnancy have a 2.333 times greater chance of giving birth to babies with low birth weight.

Keywords: Case Control; Chi-Square; Gestational Hypertension; Low Birth Weight (LBW); Odds Ratio

1. Introduction

Newborns (BBL) or also known as neonates are babies aged 0-28 days. Normal newborns are babies born from 37 weeks of gestation to 42 weeks of gestation with a weight. Birth weight 2500 grams to 4000 grams, and spontaneous crying less than 30 seconds after birth with an APGAR score between 7-10 [1]. According to the United Nations Children's Fund (UNICEF), by 2023 the infant mortality rate (IMR) will be around 4.9 million babies, with 2.3 million deaths in the neonatal period (i.e. 0-27 days old) and 2.6 million deaths in children aged 1-59 months. IMR is used as an indicator to determine the degree of health, this is contained in the Sustainable Develpoment Goals (SDGs).

In Indonesia, the trend of Infant Mortality Rate (IMR) in Indonesia has shown a decline, but it still requires accelerated efforts and measures to maintain the momentum, so that the IMR target of 16/1000 live births can be achieved by the end of 2024. The majority of deaths occurred in the neonatal period (0-28 days) with a total of 27,530 deaths (80.4% of deaths occurred in infants. With a significant number of deaths during the neonatal period, Respiratory and Cardiovascular (1%), Low Birth Weight Condition (LBW) (0.7%), congenital abnormalities (0.3%) [2]. According to Batam City Health Office, IMR in 2023 is 3.66% (131 cases). The causes of death in infants are low birth weight at 31.42% (307 cases), asphyxia at 16.48% (161 cases), and congenital abnormalities at 0.82% (8 cases).

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A low birth weight baby (LBW) is a baby weighing <2500 grams regardless of gestational age or gestation period. Since 1961, WHO has replaced the term preterm infant with low birth weight (LBW). This is due to the fact that not all babies born weighing less than 2500 grams are considered to be born under gestation. The intended birth weight of the baby is measured one hour after birth [3]

Based on data obtained from the Batam City Health Office in 2023, Low Birth Weight (LBW) was the first complication in infants with 307 cases (30.7%). There is an increase in the incidence of LBW, namely 4.7% (46 cases) in the Batu Aji Health Center working area, 4.3% (42 cases) in the Baloi Permai Health Center working area, and 4.0% (39 cases) in the Tiban Baru Health Center working area. Based on the survey results of low birth weight infant cases in several hospitals in Batam City in 2023, 2.24% (37 cases) were found, 1.71% (9 cases) of LBW in 2024 were recorded at Graha Hermine Hospital. In 2023, 6.98% (56 cases), 5.61% (32 cases) of LBW in 2024 were recorded at Mutiara Aini Hospital and in 2023 there were 8.70% (164 cases) and in 2024 there were 7.83% (92 cases) of LBW at Harapan Bunda Hospital.

Factors that can cause LBW can be from maternal factors, such as lack of nutrition during pregnancy, age less than 20 years or above 35 years, pregnancy distance and socioeconomic status. Pregnancy factors can also cause LBW, such as hypertension, namely gestational hypertension, premature rupture of membranes, anemia, gemelli (multiple pregnancies), and anterpartum bleeding. Fetal factors can include intrauterine growth restriction (IUGR), infection, and congenital abnormalities [4].

Hypertension is one of the non-communicable diseases that is still a major problem in the world of health globally. Pregnancy hypertension is hypertension found in pregnant women with blood pressure higher than normal, reaching ≥140/90 mmHg or an increase in systolic 30 mmHg and diastolic 15 mmHg. Complications that are harmful to pregnant women, including pre-eclampsia and eclampsia, can arise as a result of pregnancy hypertension [5].

One of the hypertension in pregnancy is gestational hypertension, hypertension that occurs after ≥ 20 weeks of pregnancy and there is no proteinuria. Gestational hypertension can continue into labor, causing impaired intrauterine fetal growth that will impact birth weight. This results from decreased uteroplacental perfusion, vascular endothelial damage, and vasospasm. In mothers with normal blood pressure, this does not occur, so the perfusion of nutrients and oxygen for fetal growth will be adequate. As a result, mothers with high blood pressure have a higher risk of giving birth to low birth weight babies while the impact that can occur on the mother if hypertension continues will cause Pre-ecampsia and maternal death [6].

The impact of LBW in the short term is the occurrence of hypothermia, hypoglycemia, impaired immunity and respiratory disorders. While the impact of LBW in the

long term can be impaired growth development, speech and communication disorders, neurological and cognitive disorders, learning disorders and attentional and hyperactivity disorders [7].

The government has made efforts to reduce LBW cases found in articles 10 and 11 of the Indonesian Minister of Health Regulation No. 1464 / MENKES / PER / X / 2010 concerning the rules for the implementation of midwife practice in maternal and child health services. Midwives' efforts in preventing and controlling LBW with several efforts, namely providing adequate health education about newborns, especially the condition of babies with LBW to pregnant women. As for other efforts such as, measuring the nutritional status of pregnant women, calculating and preparing steps in health (Antenatal Care), and conducting complementary therapies such as Kangaroo Mother Care (KMC) or Kangaroo Mother Care (PMK) to help maintain the baby's body temperature to remain stable by skin to skin (touching the baby's skin directly with the mother's skin).

This study was designed to answer the question of whether there is an association between gestational hypertension and the incidence of low birth weight at Harapan Bunda Hospital Batam City. The main objective is to determine the relationship, with specific objectives including analysis of the frequency of gestational hypertension, the frequency of low birth weight, and the relationship between the two in the hospital. Theoretically, this study is useful as reading and reference material for lecturers and students, especially in the Mitra Bunda Health Institute Batam. While practically, the results of the study are expected to add insight in the field of midwifery regarding gestational hypertension and its impact on birth weight, and contribute to the development of midwifery science.

2. Literature Review

2.1 Definition of Low Birth Weight (LBW)

Babies weighing below 2500 grams at birth regardless of gestational age or gestation period are called low birth weight babies (LBW). Since 1961, WHO has replaced the term premature infant with low birth weight (LBW). This is due to the fact that not all babies born weighing less than 2,500 grams are considered to be born at less than gestational age. The intended birth weight of the baby is measured one hour after birth [3]

Maternal socio-demographic characteristics include low socio-economic status, age less than 20 years and more than 34 years, and low education level. These are risk factors that influence the incidence of LBW. Maternal medical risks before pregnancy also influence the incidence of LBW, such as parity, weight, birth history, and birth spacing. Maternal reproductive health status also affects the incidence of LBW, such as maternal nutrition, infections and diseases during pregnancy, pregnancy history, and pregnancy complications. Maternal antenatal care status, such as the frequency and quality of antenatal care, and the

health worker who examined the mother during her first antenatal check-up, also influence the incidence of LBW [9].

2.2 Definition of Pregnancy

Pregnancy is the period starting from conception until the birth of the fetus. The duration of pregnancy is 280 days (40 weeks or 9 months and 7 days). Pregnancy begins with ovum and sperm cells meeting in the uterus, precisely in the fallopian tubes. After conception and nidation, implantation occurs in the uterine wall on the sixth and seventh days after conception [10]. Fetal development or the growth of fetal organ structures from none to none and in accordance with the stages of fetal age is called fetal growth. The fetus develops in the womb for nine months, or 38-40 weeks [10].

2.3 Definition of Hypertension in Pregnancy

One of the causes of pregnancy complications that can cause maternal death is pregnancy hypertension, a non-communicable disease. Hypertension in pregnancy is characterized by an increase in blood after 20 weeks of pregnancy ≥140 mmHg for systolic and ≥90 mmHg for diastolic without urine protein and laboratory evaluation results during pregnancy and returning to normal before 12 weeks post-partum. Besides bleeding and infection, the most common complications of pregnancy are hypertension [11]

According to (Sarwono, 2016 in [12], The cause of hypertension in pregnancy is not clearly known, but from various existing theories there is still no explanation of the various symptoms that can be caused. Therefore, it is called the "disease of theory". For all pregnant women, blood pressure measurements should be taken in the sitting position as the supine position can lead to lower blood pressure than that measured in the sitting position. Blood pressure should be measured twice for at least six hours to determine hypertension during pregnancy. Due to the increase in stroke volume, cardiac output increases by 40% during pregnancy. In the third trimester, the heart rate increases tenfold per minute. However, in the second trimester, systemic vascular resistance decreases, which is associated with a decrease in pressure [13].

2.4 Definition of Gestational Hypertension

Gestational hypertension is hypertension that occurs ≥ 20 weeks of pregnancy with no proteinuria. The incidence rate is 6%. Some women >25% progress to pre-eclampsia diagnosis of gestational hypertension is usually known after delivery [13]. An increase in blood pressure of more than 160/110 mmHg is known as severe gestational hypertension. Blood pressure usually returns to normal 10 days after delivery. Patients may experience headaches, blurred vision, and abdominal pain. They may also experience abnormal laboratory tests, such as low platelet count and liver function tests[13]. Gestational hypertension occurs after 20 weeks of pregnancy in the absence of proteinuria. Although the cause is not yet known, it is an indication that one should be monitored and treated to prevent chronic hypertension in the future[13].

2.5 Relationship of Hypertension in Pregnancy with LBW Incidence

Pregnant women with hypertension will experience vasoconstriction of blood vessels, which can lead to decreased transportation of oxygen and nutrients to the fetus. Impaired retroplacenter circulation, where arterioles spasm towards important organs in the body, reducing blood flow to the retroplacenta, which impairs fetal growth [14]. Thus there can be impaired fetal growth and development.

Hypertension causes vasoconstriction within the uterus, which reduces uterine blood flow. Vascular lesions at the base of the placenta lead to placental abruptio, which causes fetal growth retraction. In addition, decreased placental function disrupts the release of hormones, which can cause serious problems for the life of the fetus. The combination often leads to premature birth and increases the baby's weight at birth[14]. With decreased blood flow to the placenta, the placenta has difficulty delivering maternal oxygen and nutrients to the fetus. If the fetus' intake of oxygen and nutrients is disrupted, fetal growth may be impaired, which means the fetus will have a lower weight at birth[15].

In the occurrence of hypertension in pregnancy, the spiral artery narrows and there is a failure of "spiral artery remodeling". As a result, blood flow to the placenta decreases, leading to placental ischemia and fetal hypoxia. Abnormalities in uteroplacental circulation lead to abnormal excretion of oxygen, nutrients and metabolic products. Lack of oxygen and nutrients in the late fetal trimester can inhibit fetal growth, leading to low birth weight babies [12].

3. Proposed Method

This study is a quantitative study with an observational analytic approach using a retrospective case control design, in which measurements are made first on the dependent variable (effect) and then traced retrospectively to determine the effect of the independent variable (risk factor).[16] The purpose of this study was to determine the association between gestational hypertension and the incidence of low birth weight (LBW) at Harapan Bunda Hospital, Batam City.

The target population in this study was all live newborns in Batam City in 2024, totaling 12,326 babies, while the target population was babies born at Harapan Bunda Hospital Batam City in January-August 2024, totaling 1,175 babies. The sample was selected using non-probability sampling technique with purposive sampling method, which is selection based on certain criteria set by the researcher [16], [17]. The research was conducted on November 9-14, 2024.

Data were collected in the form of secondary data from medical records and recorded using a checklist sheet containing six variables, namely respondent code, maternal age, parity, hypertension, gestational age, and birth weight. Because the data were sourced from medical records, the instrument did not go through validity and reliability tests. Data were analyzed

through editing, coding, entry, cleaning, and tabulating to ensure accuracy before further analysis.

4. Results and Discussion

Based on the results of the analysis of the relationship between gestational hypertension and the incidence of low birth weight at Harapan Bunda Hospital, Batam City, a univariate analysis of the characteristics of the respondents was obtained as follows:

Table 1. Frequency distribution based on case group age of respondents at Harapan Bunda Hospital Batam

Usia (tahun)	Frekuensi (n)	Persentase (%)
<20 Tahun	0	0,0
20 - 35 Tahun	12	75
>35 tahun	4	25
Total	16	100

Sumber: Rekam Medik RS Harapan Bunda, 2024

Based on table 1. obtained data aged <20 years amounted to 0 respondents (0.0%), aged 20-35 years amounted to 12 respondents (75%). And >35 years old amounted to 4 respondents (25%).

Table 2. Frequency distribution based on age control group of respondents at Harapan Bunda Hospital Batam

Usia (tahun)	Frekuensi (n)	Persentase (%)
<20 Tahun	2	14,3
20 - 35 Tahun	11	78,6
>35 tahun	1	7,1
Total	14	100

Sumber: Rekam Medik RS Harapan Bunda, 2024

Based on table 2. obtained data aged <20 years amounted to 2 respondents (23.3%), aged 20-35 years amounted to 9 respondents (76.7%). And >35 years old amounted to 3 respondents

Table 3. Frequency distribution by case group of respondents' gestational age at Harapan Bunda Hospital Batam

Usia Kehamilan	Frekuensi (n)	Presentase (%)
<37 Minggu	9	50
37 – 42 Minggu	9	50
>42 Minggu	0	0
Total	18	100

Sumber: Rekam Medik RS Harapan Bunda, 2024

Based on table 3. obtained data on respondents whose gestational age <37 weeks amounted to 9 respondents (50%), gestational age 37-42 weeks amounted to 9 respondents (50%) and gestational age >42 weeks amounted to 0 respondents (0%).

Tabel 4. Frequency distribution based on gestational age control group of respondents at Harapan Bunda Hospital Batam

Usia Kehamilan	Frekuensi (n)	Presentase (%)
<37 Minggu	4	33,3
37 – 42 Minggu	8	66,7
>42 Minggu	0	0,0
Total	12	100

Sumber: Rekam Medik RS Harapan Bunda, 2024

Based on table 4. obtained data on respondents whose gestational age <37 weeks amounted to 4 (33.3%), gestational age 37-42 weeks amounted to 8 (66.7%) and gestational age >42 weeks amounted to 0 (0%).

Tabel 5. Frequency distribution based on hypertension of laboring mothers at Harapan Bunda Hospital Batam

Riwayat Hipertensi	Frekuensi (n)	Presentase (%)
Hipertensi	15	50
Tidak hipertensi	15	50
Total	30	100

Sumber: Rekam Medik RS Harapan Bunda, 2024

Based on table 5. above, it can be seen that the number of respondents who had hypertension or who experienced hypertension during pregnancy were 15 respondents (50%) and those who did not have a history of hypertension were 15 respondents (50%).

Tabel 6. Frequency distribution based on the incidence of low birth weight at Harapan Bunda Hospital Batam

Berat Badan Bayi	Frekuensi (n)	Presentase (%)
BBLR	15	50
Berat Badan Normal	15	50
Total	30	100

Sumber: Rekam Medik RS Harapan Bunda, 2024

Based on table 6. above, it can be seen that the number of babies born with low birth weight (LBW) was 15 babies (50%) and babies born with normal weight were 15 babies (50%).

Tabel 7. The association of gestational hypertension with the incidence of low birth weight at Harapan Bunda Hospital Batam City

Riwayat Hipertensi	Berat badan lahir				Total		P	OR
	BBLR		BBLN					
	F	%	F	%	N	%		
Hipertensi	15	50%	15	50%	30	100%	0,027	2,333
Tidak Hipertensi	15	50%	15	50%	30	100%		

Based on table 7, it can be seen that the results of research conducted at Harapan Bunda Hospital Batam City, obtained data on mothers who had a history of hypertension who gave birth to babies with low birth weight were 15 (50%) and babies with normal birth weight were 15 (50%). While mothers who did not have a history of hypertension who gave birth to low birth weight babies were 15 (50%) and babies with normal birth weight were 15 (50%). From the statistical results using the Chi Square statistical test with a significance value of $\alpha = 0.05$, the p value = 0.027 means that there is a relationship between gestational hypertension and the incidence of low birth weight and the magnitude of the Odds Ratio (OR) value is 2.333, meaning that mothers who have a history of gestational hypertension or who experience hypertension during pregnancy have a 2.333 times greater chance of giving birth to babies with low birth weight.

This study used a case control design with a retrospective approach. The sampling technique used was purposive sampling of 30 babies born with 15 LBW groups and 15 LBW groups at Harapan Bunda Hospital Batam City. Univariate analysis was performed to identify the age group of mothers with gestational hypertension at Harapan Bunda Hospital Batam City using the frequency distribution formula and obtained data on mothers with gestational hypertension in the case group aged <20 tahun berjumlah 0 responden (0%), berusia 20-35 tahun berjumlah 12 responden (75%) dan berusia >35 years totaling 4 respondents (25%). In the control group of mothers with gestational hypertension aged <20 tahun berjumlah 2

responden (14,3%), berusia 20-35 tahun berjumlah 11 responden (78,6%) dan berusia >35 years amounted to 1 respondent (7.1%). Maternal age at risk <20 years and >35 years is one of the obstetric complications that causes the optimization of the mother and fetus to be disrupted. Whereas at the age of the mother who is more than 35 years old, although mentally and socio-economically more mature, but the physical and reproductive organs have regressed.

According to the researcher's assumption, mothers who become pregnant at the age of <20 years the state of the reproductive organs is not ready to accept pregnancy, while in mothers who become pregnant at the age of 35 years or more there are changes in the tissues and organs of the womb and the birth canal is no longer flexible. Therefore, education about pregnancy planning needs to be given to mothers, so that pregnancy occurs at a productive age for reproduction, namely 20-35 years. Because the age that is too young or too old indicates the risk not only to the fetus but also to the mother.

Bivariate analysis was conducted to determine the association of gestational hypertension with the incidence of low birth weight at Harapan Bunda Hospital Batam City. The bivariate analysis used in this study was a statistical test, namely the Chi-Square test. The Chi-Square test was performed using a 2x2 table with a confidence level of 95% and the correlation value (α=0.05) obtained from the Chi-Square test results and the meaning limit = 0.05 obtained p-value = 0.027 <0.05. This shows that there is a significant relationship between gestational hypertension and the incidence of low birth weight. Thus Ha is accepted and H0 is rejected, meaning that there is a relationship between gestational hypertension and the incidence of low birth weight at Harapan Bunda Hospital Batam City statistically proven and this data is proven hypothetically. Hypertension is a complication that often occurs in pregnant women. In pregnant women with hypertension, blood vessels are narrowed, as well as blood vessels in the placenta, causing the supply of oxygen and nutrients.

For underweight fetuses. If this is allowed to continue, it can cause the birth of low birth weight babies (LBW), premature birth, and fetal death. LBW has a higher risk of death compared to babies born with normal weight because LBW are very vulnerable to exposure to disease, asphyxia, hypothermia and infection (Sigmawati, 2020).

These results can be explained because when pregnant women experience hypertension, the food intake to the fetus becomes obstructed due to the narrowing of blood vessels. The obstructed food intake causes the development of the fetus in the womb to be inhibited. In the end, the baby is born with low birth weight [7]. The results of this study are in accordance with research from Fitriyah et al. (2021), the results of the contingency coefficient test obtained a significance value of 0.000 and an OR value of 12.4 with a 95% confidence interval of 0.198-0.524. The results obtained indicate that there is a significant relationship between gestational hypertension and the incidence of LBW, as well as sufficient correlation strength and positive correlation direction.

The results of this study are also supported by the results of Syafira's research (2021), it was found that the p value was 0.050 (≤ 0.05), meaning that there was a relationship between hypertension in pregnancy and the incidence of LBW The OR result is 5.550 which shows that pregnant women with hypertension have a 5 times greater risk of giving birth to LBW babies compared to pregnant women who are not hypertensive.

6. Conclusions

Based on the results of the study entitled "The Relationship between Gestational Hypertension and the Incidence of Low Birth Weight at Harapan Bunda Hospital Batam City," it can be concluded that the frequency distribution of mothers who experienced gestational hypertension and those who did not experience gestational hypertension at Harapan Bunda Hospital Batam City each amounted to 15 respondents or 50%. Similarly, with the frequency distribution of babies, 15 babies or 50% were born with low birth weight, and 15 other babies were born with normal birth weight. From the results of statistical analysis using the Chi-square test, there was a significant association between gestational hypertension and the incidence of low birth weight, with a P value of 0.027 which is smaller than 0.05. In addition, the Odds Ratio (OR) value of 2.333 indicates that mothers who have a history of gestational hypertension have a 2.333 times greater chance of giving birth to a baby with low birth weight compared to mothers who do not experience gestational hypertension.

Based on the research results and conclusions that have been described, the researcher provides several suggestions that are expected to be considered in the future. This research is expected to be able to contribute as scientific reference material for health agencies, especially in the development of learning related to newborns at the Mitra Bunda Health Institute. In addition, the results of this study can also be utilized as a library reference to broaden students' horizons and increase knowledge, as well as being the basis for applying science in the real world. For the author himself, this research has provided additional valuable insight and experience regarding the relationship between gestational hypertension and the incidence of low birth weight, so that it can be a provision in self-development and in dealing with health problems in the field.

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