

Medical Records Study: The Relationship between Pregnancy Complications with the Incidence of Low Birth Weight Baby at Ajibarang General Hospital

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Abstract— Low Birth Weight (LBW) is a baby born with a weight of less than 2500 grams. Based on data from the Indonesian Health Profile (2020), LBW is the largest contributor (32%) to the cause of neonatal deaths. BPS Central Java Province data shows that in 2021 there were 22,240 babies born with LBW, while in Banyumas Regency the number of babies born with LBW was 1,629. Many factors are associated with the incidence of LBW, including complications during pregnancy. This medical record research aims to determine the relationship between pregnancy difficulties/complications and the incidence of LBW at Ajibarang General Hospital in 2022. The research design used a case-control study. The research was carried out from July to August 2023, with a sample of 146 newborn babies at Ajibarang General Hospital consisting of a case sample of 73 LBW babies (PO7.1), and a control sample of 73 babies born with normal weight (Z.38.0). The results of the study showed that of the 146 samples of newborns, 31.5% were born to mothers who experienced the pregnancy complication of preeclampsia (O14.9), gemelli (O30.0) 8.9%, premature rupture of membranes/PROM (O42.9) 30.1%, oligohydramnios (O41.0) 25.3%, and anemia (O99.0) 2.1%. The results of statistical tests show that there was a significant relationship between pregnancy complications and the birth of LBW babies, preeclampsia (p-value = 0.002, OR = 3.289), gemelli (p-value = 0.004, OR = 14.164), PROM (p-value = 0.002, OR = 3.407), and oligohydramnios (p-value = 0.008, OR = 0.321). There is no significant relationship between anemia pregnancy complications and the incidence of LBW (p-value = 1.000).

Keywords— Incidence, Low Birth Weight, Pregnancy Complications, Medical Record

I. BACKGROUND

The first month of life is the most vulnerable period for child survival, with 2.4 million newborns dying in 2020. Globally, the number of neonatal deaths declined from 5 million in 1990 to 2.4 million in 2020. However, the decline in neonatal mortality from 1990 to 2020 has been slower than that of post-neonatal under-5 mortality [1].

Preterm birth and low birth weight are the main causes of high infant mortality rates. Preterm birth (i.e. birth before 37 completed weeks of gestation) is the leading cause of neonatal death during the first four weeks of life (days 0-28), and the second leading cause of death in children under 5. In the Asia-Pacific region, India, China, Pakistan, Indonesia, Bangladesh and the Philippines have a particularly large number of preterm births and they accounted for almost half of the preterm births globally [2].

Low birth weight (LBW) is a baby born with a weight of less than 2500 grams. Overall, it is estimated that 15% to 20% of all births worldwide are low birth weight, representing around 20 million births a year [2] [3]. LBW has become one of the most serious challenges in maternal and child health in both developed and developing countries. It is the single most important factor that determines the chances of child survival. The neonatal mortality rate is about 20 times greater for all LBW babies than for other babies [4]. Low birth weight is also a significant determinant of infant and childhood morbidity including neurodevelopment impairment such as mental retardation, cerebral palsy, and learning disability [5].

Based on data from the Indonesian Health Profile (2020), LBW is the largest contributor (32%) to the cause of neonatal deaths [6]. BPS Central Java Province data shows that in 2021 there were 22,240 babies born with LBW, while in Banyumas Regency the number of babies born with LBW was 1,629 babies [7].

Low birth weight is the result of many factors but largely preventable. Mothers' risk factors include poor nutritional status or a low body-mass index (BMI), low socioeconomic status or minority race, being a young mother, smoking or exposure to second hand smoke, excessive alcohol consumption, and history of in-vitro fertilization treatment and low weight births [2].

Many factors are associated with the incidence of LBW, including complications during pregnancy. Based on the results of previous studies, it is known that a history of anemia during pregnancy, hypertension in pregnancy or preeclampsia,

oligohydramnios, and multiple pregnancies (gemelli) are associated with the incidence of LBW. Research conducted by Srimiyati (2021) at Charitas Hospital Palembang obtained data that from January 2015 to December 2017, there were 680 LBW cases from 1,489 births. Based on data from 680 cases of LBW, it is known that 73.80% were born from pregnancies with complications and 36.50% from pregnancies without complications (36.50%). There is a significant relationship between pregnancy complications and LBW, with a p-value = 0.000 and OR = 4.89 (CI = 95%: 3.76 - 6.36), meaning that pregnancies with complications have a 4.89 greater chance of giving birth to a LBW baby compared to pregnancies without complications [8].

The results of the study by Fitri (2020) showed a significant relationship between preeclampsia and LBW with a p-value = 0.000, OR = 23.74. Mothers who experience preeclampsia have a 23.74 times greater risk of giving birth to LBW compared to mothers who do not experience preeclampsia [9]. The results of the research conducted by Reddy, J.M. (2021) found that mothers with a history of anemia and hypertension were significantly associated with the incidence of LBW [10]. The results of study conducted by Moreira (2018) showed that twin/gemelli was significantly associated with the incidence of LBW (p-value < 0.001) [11]. The results of research conducted by Sari (2020) showed that there was a significant relationship between PROM and LBW with a p-value = 0.002 (< 0.05) [12].

Based on the background above, it is necessary to conduct research related to factors related to the incidence of LBW. Therefore, researchers are interested in conducting research on the relationship between the history of pregnancy complications/difficulties with the incidence of LBW.

II. METHOD

This medical record study aims to determine the relationship between pregnancy difficulties/complications and the incidence of LBW at Ajibarang General Hospital in 2022. The research design used case-control study. The research was carried out from July to August 2023. The sample in this study was all babies born with LBW at Ajibarang General Hospital in 2022, totaling 73 babies, as the case group. Then the researcher took an equivalent number of samples, 73 babies born with normal birth weight as the control group. Thus, the total sample taken was 146 LBW medical records. The research instrument used a checklist of LBW incidents and a history of pregnancy/childbirth complications. Univariate analysis was used to describe the frequency distribution and percentage of LBW incidents and also a history of pregnancy complications. Bivariate analysis using the Chi-Square statistical test was used to describe the relationship between pregnancy complications and LBW incidents.

III. RESULTS AND DISCUSSION

Description of Respondents Based on Pregnancy Complications

The results of the study on the frequency distribution and percentage of respondents based on pregnancy complications can be seen in Table 1.

Table 1. The Frequency Distribution and Percentage of LBW based on Pregnancy Complications

Variable	Category	Frequency (f)	Percentage (%)
Preeclampsia	Yes	46	31.5
	No	100	68.5
Gemelli	Yes	13	8.9
	No	133	91.1
PROM	Yes	44	30.1
	No	102	61.9
Oligohydramnios	Yes	37	25.3
	No	109	74.7
Anemia	Yes	3	2.1
	No	143	97.9

Based on table 1, it is known that pregnancy complications with preeclampsia occurred in 46 (31.5%) respondents (31.5%), gemelli occurred in 13 (91.1%) respondents, PROM was found in 44 (30.1%) respondents, and 37 (25.3%) respondents were born to mothers with oligohydramnios, and only 3 (2.1%) respondents were born to mothers with anemia.

The Relationship Between Pregnancy Complications and LBW Incidence

The results of the research on the relationship between pregnancy complications and the incidence of LBW can be seen in table 2.

Table 2. Cross-tabulation of the Relationship between Pregnancy Complications and the Incidence of LBW

Variable	Category	Cases		Control		p-value	OR
		f	%	f	%		
Preeclampsia	Yes	32	69.6	14	30.4	0.002	3.289
	No	41	41	59	59		
Gemelli	Yes	12	92.3	1	7.7	0.004	14.164
	No	61	45.9	72	54.15		
PROM	Yes	31	70.5	13	29.5	0.002	3.407
	No	42	41.2	60	58.8		
Oligohydramnios	Yes	11	29.7	26	70.3	0.008	0.321
	No	62	56.9	47	43.1		
Anemia	Yes	2	66.7	1	33.3	1.000	-
	No	71	49.7	72	50.7		

Based on Table 2, it can be seen that there was a significant relationship ($p\text{-value} < 0.05$) between a history of preeclampsia, gemelli, PROM, oligohydramnios, and the incidence of LBW. At the same time, the pregnancy complication of anemia was found to be unrelated to the incidence of LBW ($p\text{-value} > 0.05$). Based on the Odd Ratio (OR) value, it can be seen that mothers with preeclampsia complications were at risk of giving birth to LBW babies 3.289 times compared to mothers without preeclampsia (CI 95% = 1.563 – 6.920). Twin pregnancies or gemelli were at risk of giving birth to LBW babies 14.164 times compared to pregnancies with a single baby (CI 95% = 1.790 – 112.057). Babies with LBW were 3.407 times more likely to be born to mothers with PROM compared to mothers without PROM (CI 95% = 1.596 – 7.271). Mothers with oligohydramnios complications were at risk of giving birth to LBW babies 0.321 times compared to mothers without oligohydramnios (CI 95% = 0.144 – 0.714). The results of the study showed that there was no significant relationship between a history of anemia during pregnancy and the incidence of LBW, with a $p\text{-value} = 1,000 (> 0.05)$.

The results of the study showed that the pregnancy with preeclampsia was significantly related to the incidence of LBW. Mothers with preeclampsia complications were at risk of giving birth to LBW babies 3.289 times compared to mothers without preeclampsia. Preeclampsia is a condition in mothers with pregnancies > 20 weeks, which is characterized by hypertension, proteinuria and edema. Hypertension in preeclampsia can be said to be the cause of increased systolic pressure (≥ 140 mmHg) and diastolic pressure (≥ 90 mmHg) [13]. The results of a study by Wulandari (2020) found that there were 300 LBW born at Dr. H. Abdul Moeloek Hospital, Bandar Lampung in 2016. Based on the causes of LBW from maternal factors, the highest was in the category of mothers who did not have abnormalities 114 respondents (38.0%), mothers with eclampsia 96 respondents (32%), preeclampsia 53 respondents (17.7%), and severe preeclampsia 37 (12.3%) [14].

The results of this study are in line with several previous studies which also found that there was a significant relationship between a history of preeclampsia and the incidence of LBW. The results of Fitri's study (2020) also found a relationship between preeclampsia and the incidence of LBW with a $p\text{-value} = 0.000$, OR = 23.74 which means that pregnant women with a history of preeclampsia have a 23.74 times greater risk of giving birth to LBW babies compared to pregnant women without preeclampsia [9]. Study conducted by Wahyuni (2023) found a significant relationship between preeclampsia and the incidence of low birth weight (LBW) at AK Gani Hospital, Palembang City in 2023, $p\text{ value} = 0.000$, OR = 4.0 meaning that respondents with preeclampsia have a 4.0 times greater chance of giving birth to a LBW baby compared to respondents without preeclampsia [15].

One of the main symptoms of preeclampsia is 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. A study conducted by Santoso (2023) showed that a history of gestational hypertension was significantly associated with the incidence of LBW, with a p-value = 0.000, and OR = 7.228, which means that pregnant women who experience hypertension are at risk of LBW 7.228 times giving birth to LBW compared to pregnant women who do not have hypertension [16]. Likewise, the results of a study conducted by Reddy (2021) showed that there was a significant relationship between a history of gestational hypertension and LBW [10].

Hypertension in pregnancy results in the absence of trophoblast cell development in the muscle layer of the spiral arteries and the surrounding matrix tissue. The muscle layer of the spiral arteries remains stiff and hard so that the lumen of the spiral arteries does not allow for vasodilation so that blood flow to the uteroplacental decreases and placental hypoxia and ischemia occur. Decreased blood flow to the placenta causes placental disorders, resulting in fetal growth disorders. Fetal growth disorders that can cause LBW [16].

The results of the study showed that the twin pregnancies or gemelli was significantly related to the incidence of LBW. Twin pregnancies or gemelli were at risk of giving birth to LBW babies 14.164 times compared to pregnancies with a single baby. Multiple pregnancy is a factor in the occurrence of LBW because the blood supply for multiple pregnancies is divided into two or more for each fetus so that the nutrient supply is divided.

The results of this study are in line with research conducted by Santoso (2023) which found that there was a significant relationship between gemelli and LBW, with a p-value = 0.000, OR = 11.216 (95% CI: 1.266-99.392). In the third trimester, a larger fetal mass causes accelerated placental maturation and relative placental insufficiency. In dizygotic pregnancies, very striking differences usually occur because the placenta is unbalanced, with one placental site receiving a lot of perfusion from the other placenta. The OR value = 11.216, means that twin babies are at risk of LBW as much as 11.216 times compared to non-twin babies [16].

Several other studies also found that twins were significantly related to LBW, including research by Fitri (2020) with a result of p-value = 0.000, OR = 10.46, research by Moreira with a result of p-value < 0.001, research by Wahyuni (2023), with a result of p-value = 0.006, and research by Permana (2019) with a result of p-value = 0.0001, OR = 14.9 [9] [11] [15] [17].

The results of the study showed that the PROM was significantly related to the incidence of LBW. Mother with PROM were at risk of giving birth to LBW babies 14.164 times compared to mother without PROM. PROM is a direct complication in pregnancy that can disrupt the health of the mother and also the growth of the fetus in the womb, thereby increasing the risk of LBW birth. Delays in handling PROM can cause infection in the mother and fetus.

The results of this study support previous research conducted by Santoso (2023) which found that PROM was significantly related to the incidence of LBW, p-value = 0.009, OR = 1.674, which means that mothers with PROM were 1.674 times more likely to give birth to LBW than mothers without PROM. Mothers with PROM need prompt treatment because it can cause premature labor, and risk of infection, which will ultimately accelerate the increase in morbidity and mortality in newborns [16]. Previous research conducted by Sari (2018) also found that PROM was significantly related to the occurrence of LBW, with a p-value = 0.002 [18].

The results of the study showed that the Oligohydramnios was significantly related to the incidence of LBW. Mothers with oligohydramnios complications were at risk of giving birth to LBW babies 0.321 times compared to mothers without oligohydramnios. Oligohydramnios is often found in mothers who experience PROM. Oligohydramnios will press the umbilical cord so that asphyxia and hypoxia occur in the fetus and reduce nutrition to the fetus, disrupt fetal growth, and ultimately cause LBW [16].

The results of this study support previous research conducted by Wulandari (2020) which found that out of 300 LBW born at Dr. H. Abdul Moeloek Hospital, Bandar Lampung in 2016, 102 respondents (34.0%) experienced oligohydramnios, and 198 respondents (66.0%) did not experience oligohydramnios [14].

The results of the study showed that there was no significant relationship between a history of anemia during pregnancy and the incidence of LBW. The results of this study were not in line with research conducted by Santoso (2023) which found that mothers with anemia were significantly related to the incidence of LBW, with a p-value = 0.015, OR = 4.407, which means that mothers with anemia are at risk of 4.407 to give birth to LBW compared to those who are not LBW. Anemia status is based on hemoglobin levels. Hemoglobin is a coloring agent in red blood cells that transports oxygen and carbon dioxide. If the Hb level in the blood decreases, it means that the blood's ability to bind and carry oxygen will decrease, as will the

nutrients carried by red blood cells. In pregnant women, this condition will cause the fetus to lack nutrients and oxygen so it experiences growth disorders [16]. The results of this study are also not in line with the study conducted by Sari (2018) which found that there was a significant relationship between anemia during pregnancy and the incidence of LBW, with a p-value = 0.002 [18].

On the other hand, the results of this study were in line with the results of research conducted by Permana (2019), which found that there was no significant relationship between pregnancy anemia and LBW, with a p-value = 0.540 [17].

IV. CONCLUSIONS AND SUGGESTIONS

Based on the results of the study, it can be concluded that there are four complications/pregnancy complications related to the incidence of LBW at Ajibarang General Hospital, namely: preeclampsia, gemelli, PROM, and Oligohydramnios, while complications of anemia during pregnancy are not statistically related to the incidence of LBW.

The results of this study can be used as input for health service facilities to continue to monitor the health of mothers and fetuses during pregnancy by conducting routine antenatal care, especially for mothers with high risk that can cause LBW.

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