



The Relationship between Low Birth Weight (BBLR) Babies and Gestational Age at Bunda Gorontalo Hospital

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Abstract. Low birth weight (BBLR) is a condition characterized by a birth weight of less than 2,500 grams and until now has been the main contributor to the number of neonatal morbidity and mortality in various regions, including Indonesia. Gestational age is believed to be one of the most dominant biological determinants that directly affects the baby's birth weight, considering that the maturity of the fetal organs is highly dependent on the length of gestation. This study aims to determine the relationship between gestational age and the incidence of BBLR at Bunda Gorontalo Hospital. The method used is a quantitative approach with a cross-sectional design on 30 maternal respondents, selected through a total sampling technique. Data collection was carried out through retrospective medical record analysis, then analyzed using the chi-square test and Spearman's rho correlation with a significance level of 0.05. The results showed that 40.0% of respondents experienced preterm delivery, 43.3% of term, and 16.7% of postmen, while 50.0% of infants experienced BBLR. Babies born prematurely showed the highest proportion of BBLR at 91.7%. The chi-square test yielded a value of $p = 0.000$, while the Spearman's rho correlation coefficient of 0.710 showed a strong and statistically meaningful relationship strength. It was concluded that there was a significant relationship between gestational age and the incidence of BBLR, so the optimization of antenatal care services is highly recommended as an effort to prevent premature birth and reduce the incidence of BBLR.

Keywords: Antenatal Care; Cross-Sectional; Gestational Age; Low Birth Weight; Premature.

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1. Background

Low birth weight is still one of the serious public health problems in various parts of the world, including Indonesia. This condition refers to babies born with a body weight of less than 2,500 grams regardless of the length of their pregnancy, and until now remains the main contributor to the number of pain and death in the neonatal period because of the higher risk compared to babies with normal birth weight (Tahir 2025). Globally, this issue is closely related to birth Preterm or prematurity which is one of the main causes. The latest estimates jointly published by the World Health Organization and the World Children's Institute show that low birth weight is related to the risk of death in the neonatal period, as well as long-term impacts in the form of growth stunts, neurodevelopmental disorders, and an increased risk of non-communicable diseases such as type two diabetes, hypertension, and cardiovascular disease later in life (Pramardika 2022). This fact confirms that the problem does not stop at the birth period alone, but has long-term consequences that affect the quality of the next generation.

A number of previous studies have traced various factors suspected to be related to the incident. Research in Bandar Lampung, for example, found a meaningful relationship between maternal age, parity status, and maternal employment with the incidence of low birth weight through the test chi square. Similar findings were also obtained from a study in Batam, which reported the relationship between maternal age, parity, and pregnancy distance with the event, with a significance value below 0.05 in all three variables (Loebis, Ramadanti, and Purnamasari 2024). Meanwhile, a comprehensive literature review of risk factors and the impact of this condition confirms that Prematurity or short gestational age is one of the main causes most

often found in various studies in Indonesia (Okwaraji et al. 2024). Not only in the early stages of life, but the impact can also extend to the next period of child growth, as shown by recent research in the Gorontalo region that links the history of this condition to the incidence stunting in toddlers (Maria 2023).

However, there is still variation in results between regions regarding the consistency of the relationship between gestational age and this event, as can be seen from the latest study in Manado which did not find a meaningful relationship between the mother's age and the event, but rather parity that seemed more dominant (Mardhiyani and Ernawati 2024). This kind of variation suggests that the pattern of the relationship between gestational age and low birth weight still needs to be reviewed in different population and regional contexts, given the demographic characteristics and health services of pregnant women that are not uniform in each region. Research on the relationship between gestational age and this condition in the Gorontalo region, especially in maternal and child health care institutions such as Bunda Gorontalo Hospital, is still very limited, so representative empirical data for the local context need to be completed (Vinther 2023).

Based on these gaps, this study is important to be carried out to provide an overview of local data that can complement existing scientific evidence and be a basis for consideration in prevention efforts at the local health service level. This study aims to determine the relationship between gestational age and the incidence of low birth weight babies at Bunda Gorontalo Hospital.

2. Theoretical Studies

Low birth weight (BBLR) is still a serious public health problem in various parts of the world, including Indonesia. This condition refers to babies born with a body weight of less than 2,500 grams regardless of the length of their pregnancy, and until now remains the main contributor to the number of illnesses and deaths during the period neonatal (Thapa et al. 2022). Globally, this condition is closely related to birth Preterm or prematur as one of the main causes. Recent estimates show that BBLR is not only related to the risk of death neonatal, but also has long-term impacts in the form of growth stunts, neurodevelopmental disorders, and increased risk of non-communicable diseases such as diabetes melitus type two, hypertension, and cardiovascular disease later in life.

A number of previous studies have identified various factors related to the incidence of BBLR. Research in Bandar Lampung found a meaningful relationship between maternal age and status Parity, and maternal work with the incidence of BBLR. Similar findings were reported from Batam, where the mother's age, Parity, and pregnancy distance was shown to be significantly related to the event (Budiarti 2022). A comprehensive literature review on BBLR risk factors also confirms that Prematurity is the most consistent cause found in various studies in Indonesia. Furthermore, the history of BBLR is also associated with the incidence of stunting in toddlers in the Gorontalo area (Haryanti and Ningsih 2024).

However, there is variation in results between regions regarding the consistency of the relationship between gestational age and BBLR. Research in Manado did not find a meaningful relationship between maternal age and BBLR, but rather Parity who appear to be more dominant (Dwihestie and Sulistyoningtyas 2022). This variation shows that the pattern of the relationship between gestational age and BBLR needs to be reviewed in different population and regional contexts. Similar research in the Gorontalo region, especially at Bunda Gorontalo Hospital, is still very limited, so representative local empirical data need to be completed. Based on these gaps, this study aims to determine the relationship between gestational age and the incidence of low birth weight babies at Bunda Gorontalo Hospital.

3. Research Methods

This study uses a quantitative approach with a design cross-sectional, where the measurement of independent and dependent variables was carried out simultaneously without intervention. The population in this study was all mothers who gave birth at Bunda Gorontalo Hospital, with a sample of 30 respondents selected using the total sampling. The independent variable studied was gestational age, categorized into prematur (<37 weeks), Term (37–42 weeks), and postterm (>42 weeks), while the dependent variable is the incidence low birth weight (BBLR), categorized into "yes" and "no" based on birth weight below 2,500 grams (Martinus 2023). Data collection was carried out through a retrospective review of patients' medical records. Data analysis was carried out in stages, including univariate analysis to describe the frequency distribution of each variable, as well as bivariate analysis using tests chi-square to determine the relationship between gestational age and the incidence of BBLR.

Given that the data scale is ordinal, the strength of the relationship between variables is then measured using correlation coefficients Spearman's rho. All statistical analysis was carried out with SPSS software version 26.0, with the limit of statistical significance set at the value of the $p < 0.05$ (Physicist, 2020).

4. Results And Discussion

Respondent Characteristics

This study involved 30 mothers who gave birth at Bunda Gorontalo Hospital. The characteristics of the respondents studied included education level and parity, as presented in the following table.

Table 1. Frequency Distribution of Respondent Characteristics.

Variabel	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Age	22	1	3,3	3,3	3,3
	23	1	3,3	3,3	6,7
	24	1	3,3	3,3	10,0
	25	3	10,0	10,0	20,0
	26	1	3,3	3,3	23,3
	27	5	16,7	16,7	40,0
	28	4	13,3	13,3	53,3
	29	1	3,3	3,3	56,7
	30	1	3,3	3,3	60,0
	31	3	10,0	10,0	70,0
	33	1	3,3	3,3	73,3
	34	2	6,7	6,7	80,0
	35	2	6,7	6,7	86,7
	38	1	3,3	3,3	90,0
	39	1	3,3	3,3	93,3
	42	1	3,3	3,3	96,7
	43	1	3,3	3,3	100,0
Total		30	100,0	100,0	
Education	SD	1	3,3	3,3	3,3
	SMP	3	10,0	10,0	13,3
	SMA	8	26,7	26,7	40,0
	PT	18	60,0	60,0	100,0
Total		30	100,0	100,0	
Paritas	1	11	36,7	36,7	36,7
	2–3	15	50,0	50,0	86,7
	>3	4	13,3	13,3	100,0
	Total	30	100,0	100,0	

The majority of respondents had a college education as many as 18 people (60.0%), followed by high school as many as 8 people (26.7%), junior high school as many as 3 people (10.0%), and elementary school as many as 1 person (3.3%). In terms of paritas, most respondents have paritas 2–3 as many as 15 people (50.0%), paritas 1 as many as 11 people (36.7%), and paritas more than 3 to 4 people (13.3%). The relatively high level of education in the majority of respondents is a positive capital in the receipt of health information, including an understanding of risk factors that can affect pregnancy conditions. Mothers with higher education backgrounds tend to be more compliant with examinations antenatal and easier access information about pregnancy risks (Maratussaada and Wahyuhidaya 2024).

Distribution of Gestational Age and Incidence of BBLR

Before analyzing the relationship between variables, the distribution of each main variable needs to be known first through univariate analysis. The following is presented the distribution of the frequency of gestational age and the incidence of BBLR in respondents.

Table 2. Distribution of Pregnancy Age Frequency and BBLR Incidence.

Variabel	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Gestational Age	<i>Prematur</i>	12	40,0	40,0	40,0
	<i>Aterm</i>	13	43,3	43,3	83,3
	<i>Posterm</i>	5	16,7	16,7	100,0
	Total	30	100,0	100,0	
BBLR	Ya	15	50,0	50,0	50,0
	No	15	50,0	50,0	100,0
	Total	30	100,0	100,0	

The gestational age distribution shows that the End was the most with 13 people (43.3%), followed by the group prematur 12 people (40.0%), and posterm as many as 5 people (16.7%). The incidence of BBLR was recorded in 15 babies (50.0%) out of a total of 30 respondents. High proportion of births prematur In line with scientific evidence that the immaturity of fetal organs at less than 37 weeks gestational age directly contributes to low body mass at birth, while putting the baby at risk of complications neonatal larger (Purwandari and Mulyono 2022; Rosuliana 2022).

The Relationship of Gestational Age with BBLR Incidence

To see the pattern of cross-distribution between gestational age and the incidence of BBLR, a crosstabulation analysis was performed. The results of cross-tabulation are presented in the following table.

Table 3. *Crosstabulation of Gestational Age with BBLR Incidence.*

		BBLR		Total
		Ya	No	
Gestational Age	<i>Prematur</i>			
	Count	11	1	12
	% within Gestational Age	91,7%	8,3%	100,0%
	<i>Aterm</i>			
	Count	4	9	13
	% within Gestational Age	30,8%	69,2%	100,0%
	<i>Posterm</i>			
	Count	0	5	5
	% within Gestational Age	0,0%	100,0%	100,0%
Total	Count	15	15	30
	% within Gestational Age	50,0%	50,0%	100,0%

The table above shows a very clear pattern that babies born in prematur has the highest proportion of BBLR of 91.7%, while in the End only 30.8%, and not a single baby with birth posterm experience BBLR. This pattern confirms that the shorter the gestational age, the more likely it is that the baby will be born weighing less than 2,500 grams. Similar findings were reported in a study that confirmed that each increase in weeks of gestational age is positively correlated with an increase in fetal body mass, so that gestational maturity is one of the main determinants of the baby's birth weight (Köber 2024; Ranjbar et al. 2023).

Chi-Square Test Results

In order to prove the statistical significance of the relationship between gestational age and the incidence of BBLR, a chi-square test was performed. The test results are presented in the following table.

Table 4. *Chi-Square Test Results.*

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
<i>Pearson Chi-Square</i>	15,256	2	0,000
<i>Likelihood Ratio</i>	18,656	2	0,000
<i>Linear-by-Linear Association</i>	14,154	1	0,000
N of Valid Cases	30		

a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 2,50.

Test results chi-square Generate value Pearson Chi-Square of 15,256 with a score of $p = 0.000$, which is well below the limit of statistical significance of 0.05. This statistically proves that there is a significant relationship between gestational age and the incidence of BBLR at Bunda Gorontalo Hospital. These findings are in line with research that reports that gestational age is the main determinant of infant birth weight, where delivery at immature gestational age significantly increases the probability of babies being born with low birth weight (Gemilastari et al. 2021; Yang Shaohua 2022).

Spearman's Rho Correlation Test Results

To measure the strength and direction of the relationship between gestational age and BBLR incidence, a nonparametric Spearman's rho correlation test was performed considering that the data scale is ordinal. The test results are presented in the following table.

Table 5. *Spearman's Rho Correlation Test Results*

		Correlations	
		Gestational Age	BBLR
<i>Spearman's rho</i>	Gestational Age		
	<i>Correlation Coefficient</i>	1,000	0,710**
	<i>Sig. (2-tailed)</i>	.	0,000
	N	30	30
		BBLR	

Correlation Coefficient	0,710**	1,000
Sig. (2-tailed)	0,000	.
N	30	30

***. Correlation is significant at the 0.01 level (2-tailed).*

Correlation coefficient Spearman's rho of 0.710 indicates the strength of a relatively strong relationship with a positive direction between gestational age and the incidence of BBLR. A significance value of 0.000 confirms that the relationship is statistically meaningful at a 99% confidence level. This means that the lower the gestational age during delivery, the greater the risk of the baby being born weighing less than 2,500 grams. These findings are reinforced by a predictive model-based study that places gestational age as the most dominant predictor of BBLR incidence, surpassing other risk factors such as maternal age and nutritional status (Sulastri and Harahap 2023).

5. Conclusions And Suggestions

This study proves that there is a meaningful relationship between gestational age and the incidence of low birth weight (BBLR) at Bunda Gorontalo Hospital, with a value of $p = 0.000$ and a Spearman's rho correlation coefficient of 0.710 which is relatively strong. Babies born prematurely showed the highest proportion of BBLR at 91.7%, while none of the postterm babies experienced a similar condition. Health workers are recommended to intensify early pregnancy monitoring through quality antenatal care services to reduce the risk of premature birth and the incidence of BBLR in the local area.

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