

Research

The Relationship of Various Risk Factors with LBW in South Tangerang City General Hospital for the Period March-October 2021

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Abstract

Background Low birth weight (LBW) is a serious child health problem that requires global attention, especially in developing countries or with low economic status. Indonesia itself is in the ninth position of the country with the highest prevalence of LBW in the world. Therefore, it is important to examine various factors that can increase the risk of LBW, and it is hoped that it can prevent the occurrence of LBW, considering the complications that LBW can experience in both the short and long term.

Objectives This study aims to determine the relationship between various risk factors and LBW in South Tangerang City General Hospital for the period March-October 2021.

Methods This study is an analytical observational study using the cross-sectional method. Sources of data were obtained from medical records and books on Maternal and Child Health (KIA) of respondents, with the criteria of respondents being mothers with a history of giving birth to low birth weight (<2500 g), having an active cell phone number and recorded in the NICU registration at South Tangerang City General Hospital, and still having Maternal and Child Health (KIA) book.

Results There was a significant relationship between risk factors for gestational age ($p=0.046$) and frequency of ANC visits ($p=0.035$) with low birth weight, but there was no significant relationship between risk factors for maternal age ($p=0.193$), maternal education ($p=0.087$), maternal occupation ($p = 0.618$), and family income ($p = 0.320$) with low birth weight in South Tangerang City General Hospital for the period March-October 2021.

Conclusion Gestational age and frequency of ANC visits are statistically significant risk factors for LBW incidence in South Tangerang City. Maternal age, maternal education, mother's occupation, and family income are not statistically associated with low birth weight in South Tangerang City General Hospital

Keywords: risk factors, LBW, ANC

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Introduction

One of the very serious health problems that require global attention, especially in developing countries or with low socio-economic conditions, is Low Birth Weight (LBW).¹ WHO defines LBW as babies born weighing less than 2500 grams regardless of gestational age.² The World Health Organization (WHO) reports a global prevalence of LBW of 15.5% annually, and approximately 96.5% of LBW cases occur in developing countries. Meanwhile, Indonesia is included in the top 10 countries with the highest LBW rates, with a prevalence of LBW

of 15.5% annually.³ LBW is an important determinant of child survival because, in the perinatal period, LBW babies are in a critical condition, and about half of all neonatal deaths are directly or indirectly related to LBW,^{4,5} so it can be said that LBW is the main cause of most of the mortality that occurs in neonates.⁶ LBW can also lead to long-term consequences such as growth and development delays compared to babies whose birth weight is not categorized as LBW.⁷ The scope of problems caused by LBW is also getting wider, because of demographic changes and also the increase in life expectancy at birth in developing

countries. Moreover, children born with a history of LBW can cause an increase in the economic burden and burden of disease.⁸ As a result, LBW is considered a universal threat to developing countries which creates barriers to child development.⁹

LBW is a child health problem that can actually be prevented, by identifying various risk factors for the occurrence of LBW.⁴ The various risk factors include maternal factors (age, education level, occupation, economic status, infection, frequency of antenatal visits during pregnancy), fetal factors (prematurity), and environmental factors (residence in the highlands, exposure to cigarette smoke and toxic substances).¹⁰ Based on the importance of these problems, the authors further investigated the relationship of various risk factors including gestational age, frequency of antenatal care (ANC) visits, maternal age, maternal education, maternal occupation, family income with low birth weight at the South Tangerang City General Hospital for the period March-October 2021.

METHODS

This study is an observational analytic study using a cross-sectional method starting in October-December 2021 at the South Tangerang City General Hospital. This research used secondary data obtained from medical records and the Maternal and Child Health (KIA) book of all mothers with a history of giving birth to LBW at the South Tangerang City General Hospital for the period March-October 2021. There are seven variables studied in this study, which are six independent variables including gestational age, frequency of ANC, maternal age, maternal education, maternal occupation, family income, and one dependent variable, which is Low Birth Weight (LBW) babies. Inclusion criteria in this study included respondents and/or the respondent's family who had an active cell phone number and registered in the NICU registration at South Tangerang City General Hospital, respondents, and their babies. respondents who were recorded as still alive at the NICU registration at the South Tangerang City General Hospital still had a Maternal and Child Health (KIA) book and respondents who gave birth to babies with birth weight <2500 grams. Exclusion criteria included respondents whose cell phones

were damaged or whose telephone numbers were no longer active, respondents and/or the respondent's baby who had died, and respondents who had the KIA handbook, but the data on the results of the pregnancy examination were incomplete or unreadable. The number of respondents used a total sampling technique, and there was a total of 31 respondents who met the inclusion and exclusion criteria, where 3 mothers gave birth to twins, so the total number of respondents' babies was 34 respondents. The collected data then were entered and analyzed using SPSS and Microsoft Excel 2016. This study is a bivariate analysis where each of the LBW risk factors (gestational age, ANC frequency, maternal age, maternal education, maternal occupation, and family income) were tested for the normality of distribution with LBW using the Shapiro-Wilk test and then analyzed using one-way ANOVA with post hoc Bonferroni for gestational age, maternal age, maternal education, and maternal occupation, and independent t-test for ANC frequency and family income. This study was approved by South Tangerang City General Hospital Research Ethics Committee and ethical clearance was obtained with the ethical committee research approval letter number 445.1/7702/TU.

RESULTS

In this study, it was found that the frequency distribution of a minimum gestational age of 29 weeks was 1 respondent, and a maximum gestational age of 38 weeks was 4 respondents. The highest frequency of data were mothers with an early gestational age category of 32-<37 weeks as many as 22 respondents with an average gestational age of 33 weeks. A total of 26 respondents (83.9%) gave birth prematurely (<37 weeks). In the distribution of the frequency of ANC visits, the highest frequency of respondents was those who made ANC visits 4 times during pregnancy, with total of 26 respondents (83.9%). While respondents who visited ANC <4 times were 5 respondents (16.1%). In the frequency distribution of maternal age, the youngest respondent is 16 years old, and the oldest respondent is 41 years old, and the highest frequency data in the table is the productive age group (20-35 years), which is 22 respondents (71%), with an average age

respondents 35 years. There are a total of 3 respondents who categorized into the risk age category too young (<20 years) of 9.6% and a total of 6 respondents who categorized age too old (>35 years) which is 19.4%. Regarding the results of the research on maternal education, it was found that most of respondents were at the high school level (45.2%) as many as 14 respondents, followed by primary school (22.5%) as many as 7 respondents, college (19.4%) as many as 6 respondents, and junior high school (12.9%) as many as 4 respondents. As for the distribution of the frequency of work of the respondents, the majority were housewives, namely 24 respondents (77.4%), and 7 respondents (22.6%) had working status including teachers (6.5%), private sector workers (12.9%), and laborer (3.2%). Finally, in this study, the results obtained were 23 respondents (74.2%) whose family income was below the Tangerang and South Tangerang city minimum wages in 2021 and only 8 respondents (25.8%) had family incomes above the minimum wages.

Table 1. Frequency Distribution of Characteristics of Mothers with a History of Giving Birth to LBW in South Tangerang City General Hospital for the Period March-October 2021

Risk Factors	Number (n)	Percentage (%)
Gestational Age		
28-<32 weeks	4	12.9
32-<37 weeks	22	71
37-41 weeks (Aterm)	5	16.1
ANC frequencies		
< 4	26	83.9
≥ 4	5	16.1
Maternal age		
<20 years old	3	9.6
20-35 years old	22	71
>35 years old	6	19.4
Maternal education		
Primary school	7	22.5
Junior high school	4	12.9
High school	14	45.2
College	6	19.4
Maternal occupation		
Housewife	24	77.4
Teacher	2	6.5
Private worker	4	12.9
Labor	1	3.2
Family income		
< Rp. 4.000.000	23	74.2
≥ Rp. 4.000.000	8	25.8

Table 2 shows the distribution of the average LBW according to various risk factors, and it was found that there was a significant relationship between gestational age ($p=0.046$) and ANC frequency ($p=0.035$) with LBW, but not found a significant relationship between maternal age ($p = 0.193$), maternal education ($p = 0.087$), maternal occupation ($p = 0.618$), and family income ($p = 0.320$) with low birth weight in South Tangerang City General Hospital for the period March-October 2021.

Table 2. Average Distribution of LBW by Various Risk Factors at South Tangerang City General Hospital for the Period March-October 2021

Risk Factors	mean (gram)	p-value
Gestational Age		
28-<32 weeks	1681.25	0.046
32-<37 weeks	1782.20	
37-41 weeks (Aterm)	2180.00	
ANC frequencies		
< 4	1522.00	0.035
≥ 4	1881.72	
Maternal age		
<20 years old	1766.67	0.193
20-35 years old	1891.20	
>35 years old	1600.00	
Maternal education		
Primary school	1805.00	0.087
Junior high school	1977.81	
High school	1592.5	
College	1647.14	
Maternal occupation		
Housewife	1866.67	0.618
Teacher	1815.00	
Private sector worker	1620.00	
Labor	1670.00	
Family income		
< Rp. 4.000.000	1789	0.320
≥ Rp. 4.000.000	1925	

DISCUSSION

Relationship of gestational age with LBW

In this study, the relationship between the age of pregnant women and the incidence of LBW was significant, which is $p=0.046$ ($p<0.05$). Until now, the pathophysiology of LBW is still unclear, but prematurity or short gestational age (<37 weeks) is considered a cause of LBW in addition to intrauterine restriction growth (IUGR).⁴ According to

WHO, infant birth weight depends on the level of growth and development during pregnancy and gestational age, so, the more increasing gestational age, the growth and development of the fetus increases, also the length and weight of the baby increase maximally so that the baby is born with a normal weight.¹¹ The results of this study are in accordance with the results of research conducted by Berhane M et al in 2019 where mothers who gave birth before 37 weeks of gestation had nearly 24 times the chance of giving birth to a LBW baby or a baby weighing less than 2500 grams compared to mothers who gave birth at or after 37 weeks of gestation.¹²

Relationship of ANC Frequency with LBW

The results of the T-test obtained a p-value = 0.035, which means that the relationship between the frequency of ANC and LBW is significant ($p < 0.05$). The results of statistical tests also showed that the average weight of LBW from mothers with ANC visits frequency of 4 times was higher, that is 1881.72 grams, compared to mothers whose ANC visits frequency was < 4 times, which was an average of 1522 grams. The results of this study are similar to the results of statistical tests at Dr. RSUP. M. Djamil Padang by Fatimah et al, obtained p value = 0.026, which means that the relationship between ANC frequency and LBW is significant.¹³ The lack of frequency of ANC visits is one of the factors that increases the risk of LBW. This is because ANC visits are an important indicator in increasing awareness and monitoring of maternal nutritional health during pregnancy and the fetus. During ANC, mothers will be given standard antenatal care such as an explanation of signs of complications, blood pressure checks, maternal nutrition, and early detection of complications that affect the weight of the baby to be born, so that pregnant women who do not meet the minimum requirements for ANC visits are at risk of giving birth to low birth weight, due to not the detection of complications, nutrition, maternal and fetal health during pregnancy that disrupt fetal growth and development and result in low birth weight.¹³

Relationship of maternal age with LBW

In this study, the significance value of the relationship between maternal age and LBW was $p = 0.193$, which means that the relationship between maternal age and LBW was not significant ($p > 0.05$). This result may be due to several things, including the small number of research samples and the number of respondents who gave birth to LBW with a risk age of being too young (< 20 years) and at risk of being too old (> 35 years) less than respondents of productive age (20-35 years). In this study, although most of the mothers were in the productive age group (20-35 years), they still gave birth to LBW. This means that reproductive age does not guarantee a healthy or successful pregnancy. There are various other factors that may affect productive age mothers giving birth to LBW. These factors include the level of physical burden due to the mother's work which in this study was not examined by the authors, the lack of frequency of ANC visits, economic problems, and maternal nutritional intake during pregnancy which may not be fulfilled because during pregnancy the mother's knowledge of nutritional needs are still lacking or because the mother is more concerned with her tastes and favorite foods than the food that should be consumed during pregnancy.¹⁴ The results of this study are in accordance with the research of Yana et al, where there is no relationship between maternal age during pregnancy and the incidence of LBW ($p = 0.719$). In this study, it was found that there was no relationship between maternal age and the incidence of LBW, but from the difference in the average weight of LBW based on maternal age, it was seen that the productive mother age group (20-35 years) had the highest average LBW (1891.20 grams) compared to the age group. the mother is too young (1766.67 grams) and the mother's age group is too old (1600 grams). Based on the theory, maternal age affects fertility and is a risk factor for experiencing pregnancy disorders or complications, such as low birth weight. Fertility begins to decline at age 20 and declines rapidly after age 35. Pregnancy at a young age is a risk factor for the occurrence of LBW because the reproductive organs (endometrium) and blood circulation to the cervix have not been completed, thus disrupting the transmission of food from mother to fetus. In addition, mothers who are

pregnant too young are still in the process of growth, so the nutritional intake for the fetus is reduced. As a result, fetal growth is restricted (IUGR) and the baby's birth weight is reduced (LBW). Meanwhile, if the mother becomes pregnant when she is too old (> 35 years), endometrial fertility and ovum quality have decreased, as well as the increased risk of the mother experiencing chronic diseases, such as hypertension or diabetes mellitus, which can cause delays in the transmission of food to the fetus through the placenta, which will increase the risk of having low birth weight,¹⁴ congenital syndromes, and affect the health of mother and child during pregnancy.^{15,16}

Relationship of Maternal Education with LBW

In this study, the significance value of the relationship between the mother's last education and LBW was found to be a significant value of $p=0.087$, which means that the relationship between the mother's last education and LBW was not significant ($p>0.05$). The results of this study are in accordance with the research of Rahim and Muharry, where the maternal education variable is not significantly related to the incidence of LBW ($p = 0.669$).¹⁷ Different result was obtained by research conducted by M. Soewandhie Surabaya, where the p -value (sig) obtained is 0.029, or it can be concluded that statistically there is a significant effect between education status during pregnancy and LBW.¹⁸ In this study, it was found that the relationship between maternal education and LBW was not significant. In fact, mothers who have the last education in elementary and junior high schools have a higher average weight of LBW, which are 1805 grams and 1977.81 grams, respectively, compared to the average weight of LBW mothers with the last education in high school and college, which are each weighing 1592.50 grams and 1647.14 grams.

These results show that high maternal education does not always have a positive effect on maternal behavior during pregnancy, and vice versa, low education does not always negatively affect maternal behavior during pregnancy, considering that LBW is a condition that occurs due to poor behavior and bad lifestyle of the mother during pregnancy.¹⁹ The results of this study were also obtained because nowadays,

although the level of final education is not too high, access to information is very easy with the existence of social media and other internet sites. The majority of mothers in rural areas also already have cellular phones, so it can be easier and faster to get any information, especially regarding pregnancy health. Thus, maternal knowledge can increase by increasing the search for the information needed.¹⁷

Relationship of Maternal Occupation with LBW

In this study, it was found that the relationship between maternal occupation and LBW was not significant ($p>0.05$) or it could be concluded, statistically the relationship between maternal occupation and LBW was not significant. This result is in line with the statistical data of the Maternal and Child Health Profile in 2020, namely the distribution of LBW frequencies is higher for mothers who do not work (11.73%) than mothers who work (10.67%).²⁰ This result may be obtained because most of the research respondents are mothers who do not work or are housewives, which is 77.4% but mothers still give birth to low birth weight. In addition, there are other components in the maternal occupation that the authors did not examine, such as workload, stress level, duration of work, or the duration of the mother's rest during pregnancy, and various other LBW risk factors that play a role in the occurrence of LBW, such as the frequency of ANC, and gestational age. The results of this study are in line with the research conducted by Rahim and Muharry in the Manggari Community Health Center, Kuningan Regency, which showed that the mother's occupation was not significantly related to the incidence of LBW ($p=1,000$). Research conducted by Halu, that a relationship was found between maternal occupation and LBW.²¹ In addition, based on this study, the difference in the average weight of LBW mothers who did not work (housewife) during their pregnancy, in fact, gave birth to a higher weight than working mothers. These results were obtained because unfavorable working conditions such as stress, standing too long, hard and intense physical work, contact with chemicals (a factor of exposure to the work environment), and specifically a long work duration could significantly be risk factors

for LBW. In addition to low birth weight, there are other adverse pregnancy outcomes such as spontaneous abortion, preterm delivery, and neonatal abnormalities.²² These effects can be attributed to physical stress on muscles, particularly those used for work, as well as increased catecholamine release and arteriolar constriction, resulting in a redistribution of blood flow in pregnant women and reduced blood flow to the placenta, as well as hormonal disorders and deficits in food transmission to the fetus which ultimately have a negative impact on fetal growth.²²

Relationship of Family Income with LBW

In this study, the relationship between family income and LBW was not significant ($p=0.320$). These results are similar to the research conducted by Sholiha H and Sumarmi S, where the level of income has no relationship with the incidence of LBW.²³ However, the results of this study are not similar to the results of Surya S study, which found a relationship between family income and the incidence of LBW.²⁴ In this study family income is not related to LBW because the author only examines the respondent's family income every month. While there are various other factors that affect economic status which in this study were not examined by the authors such as the allocation of family income in meeting needs, especially in fulfilling maternal nutrition during pregnancy, the amount of family expenditure each month, and the number of family members living in one house. Although family income is not related to LBW in this study, it could be seen that based on the average weight of LBW, mothers with family incomes above the minimum wage have a higher average LBW weight (1925 grams) than mothers with family incomes below the minimum wages (1789 grams). This happens because a good economic status can guarantee adequate nutrition during pregnancy to get optimal fetal outcomes, and keep pregnant women away, and keep them away from stressful conditions so as to avoid hormonal balance disorders.^{25,26}

CONCLUSION

Based on the results of this study, it can be concluded that there is a significant relationship between gestational age and

the frequency of ANC with LBW in South Tangerang City General Hospital for the period March-October 2021, but there is no significant relationship between maternal age, maternal education, maternal occupation, and family income with low birth weight in South Tangerang City General Hospital for the period March-October 2021.

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