

Predisposing Factors to Risk of Low Birth Weight in Premature Baby in Bengkulu Indonesia

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Abstract

Introduction: Birth weight is the most important factor which determines the survival of newborns. Low birth weight (LBW) is one of the challenges in maternal and child health and most are caused by preterm labor. Exposure to prenatal or postnatal cigarette smoke has a detrimental effect on fetal and infant health including premature birth. This study was conducted in Bengkulu Province which aims to determine the magnitude of maternal predisposing factors influence on the LBW in preterm birth.

Method: This was research with a cross-sectional design which used a questionnaire on 95 premature babies born in January to October 2018 in the Bengkulu Province, Indonesia. Predisposing factors studied including smokers in family members, mother's age, mother's education level, mother's occupation, gestational age and gender of the baby. Data were analyzed using multivariate logistic regression.

Result: On average, premature babies were born at 32.9 weeks of gestation, 81.1% of babies born with LBW, most of the samples have family member who smokes (85.3%), most mothers participated aged 26-35 years (46.3%), most mother's education level was moderate (45.3%), and most mother's occupation was house wived (70.5%). In the multivariate variable analysis, the predisposing risk of experiencing very low birth weight (VLBW) including smoker in a family member (OR=8.79, 95% CI 1.54-50.35), gestational age (OR=0.63, 95% CI 0.49-0.82), and mother's age of 26-35 years (OR=1.47, 95% CI 1.59-134.73).

Conclusion: Smoker in a family member, Mother's age, gestation age, and Mother's private employee has a significant risk of LBW in premature babies in Bengkulu Province.

Keywords: *Predisposing factors, Low birth weight, Premature baby.*

Introduction

Quality health care before, between and during pregnancy will ensure all women have a positive pregnancy experience. Preventing death and complications from preterm birth begins with a healthy pregnancy. The study conducted by Sheeba et al., (2019)

showed that preterm labor and low birth weight (LBW) had an impact on increasing stress on the mother¹. According to Aryastami et al., (2017) LBW is a stunting-related factor among children aged 12-23 months in Indonesia².

Premature birth is the birth of a baby which occurs before 37 weeks of pregnancy. Premature births can be categorized into four subgroups, namely late preterm (34-36 weeks of pregnancy), moderate preterm (32-34 weeks of pregnancy), very preterm (<32 weeks of pregnancy), and extremely preterm (<28 weeks of pregnancy). Premature birth can also be defined as the low birth weight (less than 2500 grams), very low birth weight (less than 1500 grams), and extremely low birth weight (less than 1000 grams)³.

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An estimated 15 million babies born prematurely every year. Around 1 million children die every year due to complications of premature birth⁴. In low-income countries, an average of 12% of babies was born too early compared to developed countries (9%). Indonesia is among the ten countries with the highest number of preterm births and is also one of 10 countries with the highest preterm birth rate per 100 live births⁵.

Many factors contribute to LBW and preterm birth. Endalamaw et al., (2018) in a systematic study review and meta-analysis showed that mothers aged <20 years and mothers who did not have formal education were significant factors of experiencing LBW. Female infants were not associated with LBW and gestational age of fewer than 37 weeks was positively associated with LBW⁶. Khurana et al., (2017) study used a cross-sectional method in tertiary care hospitals in Gurugram and found that maternal education, maternal occupation, socioeconomic status, and family type were found to be significantly associated with LBW in multivariate analysis⁷.

Mothers involved with the use of nicotine and tobacco burning during pregnancy have a higher risk of experiencing small-for-gestational-age (SGA) births, and products containing nicotine should be avoided during pregnancy⁸. Babies born to fathers who smoke and both parents who smoke >20 cigarettes/day significantly increase the risk of LBW and preterm birth. Fathers who smoke >20 cigarettes/day have a higher risk of having LBW babies than non-smokers⁹. Mothers who smoke have a higher incidence of LBW, SGA, and premature babies, especially when the mothers smoke >20 cigarettes/day. There is a significant relationship between fathers smoking with LBW, SGA, and premature babies born¹⁰.

Prenatal or postnatal cigarette exposure has a detrimental effect on fetal and infant health, including preterm birth and this is very important because it

can cause infant death. This study aimed to determine the predisposing factors which influence the LBW in preterm birth.

Method

This study was a cross-sectional study design. Data was collected using a questionnaire filled in by the mother of the preterm baby. The population of this study was preterm babies born less than 37 weeks gestational age and birth weight less than 2500 grams in the Bengkulu Province, Indonesia. The study sample of 95 infants born from January to October 2018 was taken incidentally after discharge from the Regional General Hospital and independent practice midwives. Independent variables in this study were predisposing factors which included smoker family members, mother’s age, mother’s education level, mother’s occupation, gestational age and gender of the baby.

The collected data were analyzed using the chi-square test on gender variables, exposure to cigarette smoke, mother’s education level, mother’s occupation, and mother’s age while gestational age was analyzed using the Mann-Whitney test. All variables found significant (p<0.25) were analyzed further with multivariate analysis using logistic regression to estimate odds ratios (OR) and 95% confidence intervals (CI).

Result

Frequency distribution of baby’s gender, exposure to cigarette smoke, mother’s education level, mother’s occupation, mother’s age and LBW in the Bengkulu Province can be seen in table 1. On average, preterm baby in this study was born at 32.9 weeks of gestational age, and most of them (81.1%) are LBW babies. Most respondents (85.3%) were exposed to cigarette smoke. Nearly half (46.3%) of the mothers aged 26-35 years, almost half (45.3%) of the mother’s education level was moderate, and most (70.5%) of the mother’s occupation was a full-time mother.

Table 1. Relationship of predisposing factors (smoker in a family member, mother’s age, mother’s education level, gestational age, mother’s occupation, the gender of the babies with LBW).

Variable	Low Birth Weight		Total n (%)	p-value
	LBW n (%)	VLBW n (%)		
Smoker in a family member				
No	8(57.1)	6(42.9)	14(100)	0.023*
Yes	69(85.2)	12(14.8)	81(100)	

Variable	Low Birth Weight		Total n (%)	p-value
	LBW n (%)	VLBW n (%)		
Mother's age				
≥36 years	8(57.1)	6(42.9)	14(100)	0.045*
26-35 years	37(84.1)	7(15.9)	44(100)	
≤25 years	32(86.5)	5(13.5)	37(100)	
Mother's education level				
High (bachelor)	15(75)	5(25)	20(100)	0.701
Moderate (high school)	35(81.4)	8(18.6)	43(100)	
Low (elementary school, junior high school)	27(84.4)	5(15.6)	32(100)	
Gestational age				
Mean ± SD	33.5±2.43	30.2±3.39		0.000*
Mother's occupation				
Civil government employee	3(42.9)	4(57.1)	7(100)	0.019*
Private employee	19(90.5)	2(9.5)	21(100)	
Fulltime mother	55(82.1)	12(17.9)	67(100)	
Baby's gender				
Female	35(77.8)	10(22.2)	45(100)	0.440
Male	42(84)	8(16)	50(100)	

*multivariate candidate variables

Table 2. Logistic regression multivariate analysis

Predisposing factors	OR	95% CI	p-value
Smoker in a family member	8.79	1.54-50.35	0.015
Mother's age of 26-35 year	1.466	1.59-134.73	0.018
Gestational age	0.63	0.49-0.82	0.000
Mother's private employee	1.168	1.27-107.89	0.030
Housewife	0.316	0.04-2.47	0.272

The results of the analysis showed that mothers with a smoker in family members had a higher risk of LBW compared to mothers whose family members were not smokers (OR 8.79, 95% CI 1.54-50.35). Gestational age had a risk of giving birth to LBW babies (OR 0.63, CI 95% 0.49-0.82), and mother's age of 26-35 years tends to increase the risk of experiencing VLBW compared to the mother's age of ≤25 years (OR 1.47 and 0.27). These data can be seen in table 2.

Discussion

This study has a significant relationship between smoking families with LBW in preterm infants. Mothers who were exposed to cigarette smoke by their families who smoke are protective factors against the VLBW of babies. Previous research according to Mumbare et al., (2011) found that exposure to cigarette smoke poses a risk of LBW (OR=4.10, 95% CI 1.85-9.06)¹¹. Ashford

et al., (2011) stated that prenatal exposure to passive smoking puts women at higher risk for premature birth (OR=2.3)¹².

Furthermore, according to Qiu et al., exposure to passive smoking during pregnancy was associated with an increased risk of <32 weeks of very preterm birth (OR=1.98, 95% CI 1.41-2.76)¹³. It is also in line with Nieuwenhuijsen et al., (2013) study which found that there was a statistically significant relationship between environmental exposure such as tobacco smoke, air pollution and chemicals, and pregnancy outcomes, including LBW (OR=1.32) and SGA (OR=1.21)¹⁴. Cui et al., (2016) found that the significantly increased risk of preterm birth was associated with exposure to passive smoking at home (OR=1.16, 95% CI 1.04-1.30)¹⁵. Fathers who smoke >20 cigarettes/day have a much higher risk of having LBW babies than non-smokers (OR=2.09, 95% CI 1.38-3.17)⁵.

Pregnant women exposed to environmental smoke cigarettes during pregnancy experienced an adverse effect on the mother and fetus such as impaired fetal growth, LBW, preterm labor, and increased fetal and infant mortality, indicating that the number of pregnant women exposed to environmental cigarette smoke is still high due to the high number of families who smoke. However, this finding is different from the study by

Elkin et al., (2018). The study assessed the relationship between exposure to Environmental Tobacco Smoke (ETS) and preterm birth and showed inconclusive results¹⁶.

Gestational age has a significant relationship to the weight of the baby born. The results of another study conducted by Anitha et al., (2009) found that gestational age is one of the risk factors which can affect infant birth weight ($R^2=141.98$, 95% CI 123.74-160.22)¹⁷. Xia et al., (2016) found that LBW cases were significantly associated with gestational age (OR=1.81, 95% CI 0.90-3.67)¹⁸.

The results of this study are in line with the research of Akanksha et al., (2017) which found that the relationship between maternal age and LBW of the newborns was statistically significant (OR=0.022)⁷. Foto et al., (2016) found that mothers' age of 20-34 years significantly decreased the risk of giving birth to an LBW baby (OR=0.681)¹⁹. The findings of Cui et al., (2016) showed that mother's age was significantly associated with preterm birth (OR=1.27, 95% CI 1.09-1.47)¹⁵. This finding is different from the result of Bhaskar et al., (2015) study which found that mother's age has no significant relationship with LBW²⁰.

In this study, mother's education level showed no significant relationship to the LBW babies because other factors were more influential on the occurrence of LBW such as gestational age, a smoker in family members, and mother's age. This study found that most mothers with moderate education level (45.3%) gave birth to babies with LBW (81.4%) and VLBW (18.6%). This research is in line with Mumbare et al., (2011) study which stated that mother's education level was not significantly related to the birth of LBW babies⁷. This finding is in contrast to the opinion of Akanksha et al., (2017) which stated that there was a statistically significant relationship between maternal education and LBW (OR=0.192). The study also said that educated women should have a better awareness of available health services and information¹⁹.

Mother's occupation showed no significant relationship with LBW, this is consistent with the study conducted by Demelash et al., (2015) which found that the mother's occupation was not a risk factor of LBW²¹, but different from the study conducted by Akanksha et al., (2017) which found that unskilled occupation was a risk factor for LBW (OR=0.184)⁷.

In this study, the mother's occupation was mostly categorized as other (70.5%), which in this case was housewives. As a housewife, they were not required to do heavy work, and house chores can be done according to the mother's physical abilities; also the mother can rest any time she was exhausted. Mother's occupation does not affect the occurrence of LBW, more likely due to other factors including gestational age.

Pregnant women should always maintain the health of themselves and their fetuses. The LBW is not only caused by diseases during pregnancy such as preeclampsia, anemia, and others but also can be caused by predisposing factors. A pregnant woman should avoid exposure to cigarette smoke and women preferably pregnant in productive age. Besides, mothers and families should avoid the occurrence of pregnancy in those who are too young or too old and alert for the possibility of preterm labor.

Conclusion

The results of this study indicate the predisposing factors which influence LBW, including smokers in family members, mother's age, gestational age and mother's occupation while the variables at risk for VLBW are smokers in family members (OR=8.79, 95% CI 1.54-50.35), gestational age (OR=0.63, 95% CI 0.49-0.82), and mother's age of 26-35 years (OR=1.47, 95% CI 1.59-134.73).

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