

Risk factors for low birth weight infants in East Nusa Tenggara

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Abstract

Background and purpose: Low birth weight (LBW) is a major cause of neonatal and infant mortality. The Indonesian Demographic and Health Survey indicated that neonatal mortality rate in East Nusa Tenggara was 26 per 1000 live births, 15% of which were caused by low birth weight. This study aims to understand the relationship between age of mother, birth spacing, chronic energy deficiency, presence of concomitant diseases, employment status, anemia, quality of antenatal care and traditional dietary restrictions on the incidence of LBW in Ende District, East Nusa Tenggara.

Methods: A case control study was conducted at Ende District in 2015, with a total of 156 respondents. Cases were mothers giving birth to LBW infant (<2500 gram) and controls were mothers giving birth to normal weight infant (≥2500 gram). Case and control ratio was 1:1. Data were obtained from antenatal care records and interviews. Data were analysed using bivariate analysis and multivariate with logistic regression.

Results: This study found that risk factors of LBW include age of mother <20 or ≥35 years (AOR=6.8; 95%CI: 1.87-25.0), traditional dietary restrictions (AOR=6.7; 95%CI: 1.71-26.8), birth spacing <2 years (AOR=6.5; 95%CI: 1.78-24.2), chronic energy deficiency (AOR=5.3; 95%CI: 1.38-21.0), being employed (AOR=4.6; 95%CI: 1.44-14.9), anemia (AOR=4.2; 95%CI: 1.37-13.1), malaria infection (AOR=3.9; 95%CI: 1.21-12.7) and low quality of antenatal care (AOR=3.5; 95%CI: 1.11-11.3).

Conclusions: Age of mother <20 or ≥35 years, traditional dietary restrictions, birth spacing <2 years, chronic energy deficiency, maternal occupation, anemia, malaria infection and low quality of antenatal care are risk factors for LBW in the District of Ende.

Keywords: LBW, risk factors, case control, East Nusa Tenggara

Introduction

Low birth weight (LBW) is a national public health problem.¹ United Nations International Children's Emergency Fund (UNICEF) and World Health Organization (WHO) reported that the incidence of LBW is increasing every year in both developed and developing countries.¹ The Indonesian Demographic and Health Survey (2012) showed that the infant mortality rate in Indonesia was 34 per 1000 live births, whereas in East Nusa Tenggara was 45 per 1000 live births and neonatal mortality rate was 26 per 1000 live births.² LBW is the main

cause for neonatal mortality with contribution of 10 per 1000 live births.²

Even though the national prevalence of LBW is decreasing, the LBW prevalence in East Nusa Tenggara remains high. As many as 15% of live births in East Nusa Tenggara were LBW.³ A total of 267 LBW cases were reported in Ende District in 2013 or 5.97% from 4472 live births. This number increased to 729 cases in 2014 or 15% from 4862 live births. From January to June 2015, 160 cases were reported or 23.7% from 673 live births.⁴ Furthermore, fifteen cases of neonatal mortality were reported with seven cases were caused by LBW (46.6%).⁴

While several studies exploring risk factors of LBW have been undertaken, these studies are still inconsistent in their findings regarding risk of parity, education level, employment status and family incomes to LBW. This study aims to explore risk factors of LBW in Ende District, East Nusa Tenggara.

Methods

A case control study was conducted at Ende District from February to April 2016. Case population were mothers giving birth to LBW infant with gestation age between 37-42 weeks at six public health centres in Ende District. Control population were mothers giving birth to normal weight infant with gestation age between 37-42 weeks in the same areas as cases. A total of 78 mothers were selected as cases, with case and control ratio of 1:1. Both cases and controls were recruited from the pregnancy cohort, delivery register and infant cohort available at the public health centres. Data were collected using home interviews and were cross checked with data from the ANC book. Samples were selected using a multistage random sampling. Firstly, six subdistricts were randomly selected from 21 subdistricts in Ende District. Secondly, 15 villages were randomly selected from those six subdistricts. Thirdly, sampling frame was developed from these 15 villages. Cases and controls were then selected from this sampling frame. Data were analysed using univariate, bivariate and multivariate technique in 12.1 Stata software. This study protocol has been approved by Human Research Ethics Committee of Faculty of Medicine Udayana University/Sanglah General Hospital.

Results

Table 1 shows the characteristics of cases and controls that include age, employment status, education level and family income. Comparison between cases and controls showed that several variables were not comparable that include age

($p < 0.001$), education level ($p = 0.003$), employment status ($p < 0.001$) and family income ($p < 0.001$).

Table 2 shows crude odd ratio (OR) for each independent variable. It reveals that parity, birth spacing, concomitant diseases (malaria), anemia, nutritional status, ANC quality, traditional dietary restrictions and passive smokers were all associated with LBW.

Table 3 shows the adjusted odd ratio (AOR) between several independent variables and LBW. It shows that age of mother < 20 and ≥ 35 years, parity of < 2 years, anemia status, chronic energy deficiency, malaria, poor ANC quality, employment status and traditional dietary restrictions all contributed to the occurrence of LBW.

Discussion

This study found that age of mother < 20 or ≥ 35 years contributes the most to the LBW occurrence (AOR=6.8; 95%CI: 1.87-25.0). Study in Iran found that mothers aged between 15-19 or < 20 years were more likely giving birth to LBW infants than mothers aged between 25-29 years.⁵ Pregnancy in early age (< 20 years) or in late age (> 35 years) are considered as high risk pregnancies that will negatively impact both mothers and babies.⁶ Pregnancy in early age may alter fetal growth and development due to immaturity of reproductive organs to support the pregnancies. On the other hand, pregnancy in late age may related to the inhibition of nutrition flow from mother to the fetal due to degenerative processes of endometrium.⁷

Traditional dietary restrictions contribute to the occurrence of LBW (AOR=6.7; 95%CI: 1.71-26.8). This finding is consistent with other study in Pekalongan which reported that pregnant women with poor dietary patterns or restrict certain food are 28 times more likely giving birth to LBW infant.⁸

Table 1. Characteristics of cases and control

Characteristic	Cases n (%)	Control n (%)	p value
Age (year)			
<20 or ≥35	30 (38.46)	10 (12.82)	<0.001
20-34	48 (61.64)	68 (87.08)	
Education level			
Low (≤junior high school)	48 (61.54)	29 (37.18)	0.003
High (≥ senior high school)	30 (38.46)	49 (62.82)	
Employment status			
Employed	58 (74.36)	18 (23.08)	<0.001
Unemployed	20 (25.64)	60 (76.92)	
Family income (rupiah)			
Low (<1,300,000)	52 (66.67)	18 (23.08)	<0.001
High (≥1,300,000)	26 (33.33)	60 (76.92)	
Total	78 (100.00)	78 (100.00)	

Table 2. Crude OR of LBW risk factors in Ende District

Variables	Cases n (%)	Control n (%)	Crude OR	95%CI	p value
Parity					
< 2 or > 4	44 (56.41)	16 (20.51)	5.0	2.46-10.18	<0.001
2-4	34 (43.59)	62 (79.49)			
Birth spacing (year)					
< 2	47 (60.26)	16 (20.51)	5.8	2.88-11.97	<0.001
≥ 2	31 (39.74)	62 (79.49)			
Concomitant diseases					
Yes	44 (56.41)	14 (17.95)	5.9	2.84-12.29	<0.001
No	34 (43.59)	64 (82.05)			
Anemia status					
Yes	53 (67.95)	26 (33.33)	4.2	2.17-8.27	<0.001
No	25 (32.05)	52 (66.67)			
Chronic energy deficiency					
Yes	42 (53.85)	11 (14.10)	7.1	3.26-15.46	<0.001
No	36 (46.15)	67 (85.90)			
ANC quality					
Poor	46 (58.97)	13 (16.67)	7.1	3.40 -15.17	<0.001
Good	32 (41.03)	65 (83.33)			
Dietary restrictions					
Yes	32 (41.03)	12 (15.38)	3.8	1.78-8.20	0.001
No	46 (58.97)	66 (84.62)			
Smoke exposure					
Yes	52 (66.67)	29 (37.18)	3.3	1.75-6.52	<0.001
No	26 (33.33)	49 (62.82)			
Total	78 (100.00)	78 (100.00)			

Table 3. Adjusted OR of LBW risk factors in Ende District

Variables	Initial model			Final model		
	AOR	95%CI	p	AOR	95%CI	p
Age of <20 or ≥35 years	6.2	1.63-23.6	0.007	6.8	1.87-25.0	0.004
Birth spacing < 2 years	5.1	0.90-28.6	0.064	6.5	1.78-24.2	0.005
Anemia	4.6	1.45-14.8	0.009	4.2	1.37-13.1	0.012
Chronic energy deficiency	4.5	1.13-18.4	0.032	5.3	1.38-21.0	0.015
Malaria	4.5	1.32-15.5	0.016	3.9	1.21-12.7	0.023
Poor ANC quality	3.1	0.90-10.6	0.072	3.5	1.11-11.3	0.033
Smoke exposure	2.8	0.91-8.75	0.070	2.6	0.88-8.13	0.080
Employed as farm worker	3.6	1.05-12.9	0.041	4.6	1.44-14.9	0.010
Low education level	2.4	0.71-8.62	0.155	2.9	0.89-9.86	0.077
Dietary restriction	6.3	1.54-25.9	0.010	6.7	1.71-26.8	0.006
Low family income	1.8	0.48-7.33	0.365	-	-	-
Parity of <2 or >4	1.3	0.26-7.13	0.699	-	-	-

Nutrient intake during pregnancies should fulfill minimum requirements to support the growth and development of the baby.^{9,10} Our study has documented that the most restricted food for pregnant women in Ende District are: fish, calamari and shellfish (14.10%); egg and chicken (8.97%); legumes (7.69%); jackfruit, eggplants and green leaves (6.42%); and fruits (3.85%). The consumption of these food are restricted to pregnant women due to customary beliefs that they may cause skin diseases to the babies, bleeding during delivery, placenta retention, abortion, big baby and reduced quality of breastmilk. In addition, this study found that as many as 29.5% of pregnant women who practiced dietary restrictions were anemia and 30.5% were malnutrition.

Birth spacing less than 2 years in our study contributes to LBW (AOR=6.5; 95%CI: 1.78-24.2). This finding is consistent with other study in Iran. It reported that pregnant women with birth spacing <2 years are 2.35 times more likely giving birth to LBW infant.¹¹ Other study in Sidoarjo also found similar finding. They reported that pregnant women with birth spacing <2 years are 3.02 times more likely giving birth to LBW infants.¹²

Chronic energy deficiency (CED) during pregnancy is also associated with the occurrence of LBW (AOR=5.3; 95%CI: 1.38-21.0). This finding is consistent with other

study in East Lombok Hospital. It showed that pregnant women with CED are 3.1 times more likely giving birth to LBW infants.¹³ Study conducted in Singkawang reported similar finding that pregnant women with CED are 7.9 times more likely giving birth to LBW infant.¹⁴ It can be explained that lack of nutrition during pregnancy influences growth and development of the babies.¹⁵

Pregnant women who worked during their pregnancy, in particular as farm worker, are also at higher risk of giving birth to LBW infant (AOR=4.6; 95%CI: 1.44-14.9). This finding is consistent with other studies. Study in Semarang reported that pregnant women who work >7 hours and between 4-7 hours daily are 6.11 and 1.7 times more likely giving birth to LBW infant respectively when compared to those who work only less than 4 hours daily.¹⁶ Study conducted in Sulawesi Tenggara also found that employed pregnant women are 3.1 times more likely giving birth to LBW infant than those who are unemployed.¹⁷ The majority of respondents in our study were farm workers or other daily labourers with working time of more than 10 hours daily.

Anemia during pregnancy is also found as another risk factor for LBW (AOR=4.2; 95%CI: 1.37-13.1). This finding is consistent with other studies. Study at Wangaya Hospital, Denpasar District reported that pregnant

women with anemia in trimester I and trimester II are 15.4 and 28.5 times more likely giving birth to LBW infants.¹⁸ In our study, anemia is strongly associated with traditional dietary restrictions. As many as 29.5% pregnant women who follow traditional dietary restriction were found with anemia.

Pregnant women with malaria are more likely giving birth to LBW infant (AOR=3.9; 95%CI: 1.21-12.7). This finding is consistent with several other studies. Study in Bangka Belitung revealed that pregnant women with malaria infection were 2.9 times more likely giving birth to LBW infant.¹⁸ Similarly, study in Bintan reported that malaria infection during pregnancy increases the risk of LBW by 2.6 times.¹⁹

Poor ANC quality increases the risk of LBW (AOR=3.5; 95%CI: 1.11-11.3). This finding is consistent with other studies. Study in Banyumas stated that poor ANC quality increases the risk of LBW by 5.85 times (95%CI: 1.91-17.8).²⁰ Similarly, Roudbari (2007) in Iran also reported that the occurrence of LBW is 59% contributed by the quality of ANC.²¹ Furthermore, study in Wonosobo District found that inadequate ANC services increase the risk of LBW by 1.15 times (95%CI: 0.71-1.90). High risk pregnancies with inadequate ANC services are 2.33 times more likely giving birth to LBW infant (95%CI: 1.47-3.69).²²

Level of education in our study was not a significant risk factor for LBW ($p>0.05$). In contrast, study in Sumenep reported that mothers with low education level are 4.4 times more likely giving birth to LBW infants.²³

Being exposed to smoke was not associated with the occurrence of LBW ($p>0.05$). In contrary, study conducted in Gianyar District found that pregnant women who are exposed to smoke are 7.5 more likely giving birth to LBW infants.²⁴

Our study suggests that there is a growing need to address risk factors of LBW

that include ideal age to be pregnant, birth spacing, nutrition during pregnancy, anemia prevention and adequate ANC services.

Our study, however, has several limitations. Data were obtained by interviewing respondents about their past experiences which result in recall bias. In addition, the study only covers limited areas thus finding of this study can only be generalized into limited areas. Further qualitative study is required to understand complexities of these risk factors and a multicentre quantitative study is also needed to allow generalization into a wider area.

Conclusion

Age of mother <20 or ≥ 35 years, traditional dietary restrictions, birth spacing <2 years, chronic energy deficiency, maternal occupation, anemia, presence of accompanied diseases such as malaria and low quality of antenatal care are risk factors for LBW in the District of Ende.

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