

LOW BIRTH WEIGHT IS A RISK FACTOR OF MALNUTRITION IN CHILDREN UNDER FIVE YEARS OLD IN COASTAL AREAS

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Received: 24 January 2019 | Revised: 24 February 2019 | Accepted: 16 April 2019

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ABSTRACT

Background: Malnutrition is a public health problem, especially in developing countries. Malnutrition of children can affect brain development during growth and increase morbidity and mortality. Low birth weight (LBW) plays an important role in child morbidity and mortality. The prevalence of malnutrition in children under five years old and LBW in Indonesia are still high.

Objective: This study aimed to assess the risk of LBW on the incidence of malnutrition in children under five years old in coastal areas.

Method: This was an observational analytic study with case control approach. The study was conducted on 64 respondents in the coastal area of Kendari City, Southeast Sulawesi on November to December 2018. Case group (n=16) was children under five years old who experienced malnutrition in the working area of Abeli, Mata and Benu-Benu Health Center in October 2018. Control group (n=48) was taken by measuring body weight and then adjusted to the category and threshold of nutritional status based on the body weight index according to age. Sixteen respondents of case group were recruited using total sampling. Forty-eight respondents of control group were also recruited using purposive sampling with non-matching method according to the inclusion and exclusion criteria. The Odd Ratio (OR) statistical test was used with a 2x2 contingency table and a 95% confidence level with a significance level of $\alpha = 0.05$.

Results: The majority of respondents were 25-48 months old, and maternal age was mostly 36-45 years old in the case group (37.5%) and 26-35 years old in the control group (50.0%). The majority of maternal education level was junior high school in the case group (43.7%) and high school in the control group (47.9%). The statistical test results were obtained OR = 5.923 (CI=95%) with Lower Limit (1.724) and Upper Limit (20.346).

Conclusion: Infants with LBW had a 5 times higher risk for experiencing malnutrition in childhood in coastal areas. Therefore, knowledge of LBW and malnutrition is needed to improve public health status.

Keywords: children, coastal areas, LBW, malnutrition

BACKGROUND

Malnutrition is a public health problem, especially in developing countries. The prevalence of malnutrition in children under five years old in Indonesia is still high. Based on data from the Basic Health Research in

2013, the prevalence of malnutrition in children under five years old in Indonesia was 19.6% (Kemenkes, 2014). Malnutrition of children increases the risk of mortality. Malnutrition leads to increased infection severity, prolonged

healing and recovery period ([UNICEF, 2018](#)). Malnutrition in children can affect brain development during growth ([Marimbi, 2010](#)).

Low birth weight (LBW) is an important factor that plays a role in child morbidity and mortality ([Alexander, Wingate, Bader, & Kogan, 2008](#)). LBW is associated with an increased risk of infection, malnutrition and poor academic performance. LBW is associated with problems related to mental behavior and learning difficulties during childhood ([Kader & Perera, 2014](#)). The Basic Health Research data in 2013 showed that the prevalence of LBW in Indonesia was 10.2%, increased in groups of households that do not have regular income such as fishermen and farmers ([Kemenkes, 2014](#)).

Topographically and geographically, part of the Southeast Sulawesi is located in the coastal areas. Around 27% of the population live in coastal areas ([Dinkes, 2016](#)). Coastal areas are mixture of land and sea areas ([Government, 2007](#)). Coastal communities have characteristics that are related to fisheries business, which is influenced by environmental, seasonal, and market factors. The main problems are lack of capital, quality of human resources, lack of facilities and infrastructure, lack of understanding of resource values and institutional problems including utilization and authority conflicts and legal uncertainty issues ([Khusaini & Badriyah, 2008](#)).

Education, health and welfare issues are the most common problems in coastal communities. Most people in coastal areas work as traditional fishermen and self-employed, so they do not have a regular income. The impact of low socio-economic status is inadequate food intake and health care ([Kemenkes, 2014](#); [Wahyudin, 2003](#)). The data showed that the percentage of LBW and malnutrition in coastal areas of Kendari City was still high. There was 8.9% LBW in coastal areas. There was 8.8% under the red line status of children under five years old. Under the red line status is at risk of suffering from malnutrition ([Dinkes, 2016](#); [Saimin, Azizah, &](#)

[Wicaksono, 2019](#)). Therefore, this study aimed to assess the risk of LBW on the incidence of malnutrition in children under five years old in the coastal areas of Kendari City.

METHODS

Study design

This was an observational analytic study with case control approach. The study was conducted on 64 respondents consisting of 16 cases and 48 controls in the coastal area of Kendari City, Southeast Sulawesi, on November to December 2018.

Sample

Case group was children under five years old who experienced malnutrition in the working area of Abeli, Mata and Benu-Benu Health Center in October 2018. Sixteen respondents of case group were recruited using total sampling. Forty-eight respondents of control group were recruited using purposive sampling with non-matching method according to the inclusion and exclusion criteria. The inclusion criteria of the case group are 6-59 months old, poor nutritional status and lived in the coastal areas of Kendari City. The inclusion criteria of the control group were 6-59 months old, good nutritional status and lived in the coastal areas of Kendari City. Exclusion criteria were those with premature birth, chronic illness, congenital disease, and relocation.

Instrument

Low birth weight data was obtained from medical records. Control group was taken by measuring body weight and then adjusted to the category and threshold of nutritional status based on the body weight index according to age.

Data analysis

Statistical analysis in this study was conducted to assess the relationship between dependent and independent variables. This study was case control design, so the Odd Ratio (OR) statistical test was used with a 2x2 contingency table and a 95% confidence level with a significance level of $\alpha = 0.05$.

Ethical consideration

This study had been approved by Health Research Ethics Commission of Halu Oleo University, with approval number: 2528/UN29.20/PPM/2018. Each respondent received an explanation and signed an agreement.

RESULTS

The majority of respondents in the case group were 25-48 months (62.5%), similar with those

in the control group (52%). The majority of maternal age in the case group was 36-45 years (37.5%), while in the control group was 26-35 years (50.0%). The majority of maternal education level in the case group was junior high school (43.7%), while in the control group was high school (47.9%) (see **Table 1**).

Table 2 shows that the result of odd ratio (OR) was 5.923 (>1), which indicated that the history of LBW was significantly a risk factor of the incidence of malnutrition with lower limit (1.724) and upper limit (20.346).

Table 1 The characteristics of respondents

Variable		Case		Control	
		n	%	n	%
Child age (months)	6-24	6	37.5	21	43.7
	25-48	10	62.5	25	52.0
	49-59	0	0	2	4.1
Maternal age (years)	17-25	5	31.2	13	27.0
	26-35	5	31.2	24	50.0
	36-45	6	37.5	9	23.5
	≥46	0	0	2	18.7
Maternal education level	Elementary school	5	31.2	6	12.5
	Junior high school	7	43.7	15	31.2
	Senior high School	4	25.0	23	47.9
	College/University	0	0	4	8.3

Table 2 Analysis of low birth weight for malnutrition

LBW	Case		Control		Total	OR	95% CI	
	n	%	n	%	n		Lower	Upper
No	5	31.2	35	72.9	40	5.923	1.724	20.346
Yes	11	68.7	13	27	24			
Total	16	25	48	75	64			

DISCUSSION

Nutrition plays an important role in the human life cycle from the fetus to the elderly. Infants and children under 59 months are vulnerable to malnutrition. Malnutrition in children causes disorders in growth and development that can continue into adulthood if it is not treated early. This present study showed that the majority of malnutrition in the coastal areas of Southeast Sulawesi was children aged 25-48 months. Previous research conducted in the coastal areas of Central Sulawesi showed the majority of malnutrition was aged 12-36 months ([Baculu & Jufri, 2017](#)). This result

study was almost the same as the malnutrition cases in slum areas in Bahir Dar City, Ethiopia, which the prevalence of malnutrition in children aged 24-36 months was high ([Demilew & Abie, 2017](#)).

Our study showed that the LBW was a significant risk factor for malnutrition in children under five years old in coastal area. Infants with LBW had a 5 times higher risk for experiencing malnutrition in childhood. This was similar with previous study, which found that one of the risk factors for malnutrition was LBW. LBW caused imperfect anatomical and physiological conditions that affect

immunology, digestive system and nutrient absorption, and cause inadequate nutrient intake, as well as was vulnerable to infectious diseases in increasing the risk of malnutrition ([Rahman, Howlader, Masud, & Rahman, 2016](#)).

LBW occurs due to several factors such as maternal, fetal and placental factors. Maternal factors have an important role in the growth and development of their children both during pregnancy and after childbirth. Birth weight is significantly related to the nutritional status of pregnant women. Maternal nutritional before and during pregnancy affect fetal growth. Pregnant women with chronic energy deficiency can give birth to infant with LBW. Therefore, it is important to determine the nutritional status of pregnant women. The nutritional status of pregnant women is measured by several methods, including maternal weight gain and upper arm circumference ([Saimin, Faisal, Asmarani, & Wicaksono, 2019](#)). Weight gain during pregnancy occurs due to fetal growth, placenta and changes of maternal metabolic. Increasing the body weight of pregnant women is influenced by the maternal nutritional status, both before and during pregnancy. The nutritional status of a woman before pregnancy illustrates the availability of maternal nutrients to support fetal growth during pregnancy. The upper arm circumference can indicate the status of pregnant women who experience chronic energy deficiency ([Saimin & Manoe, 2006](#)). The nutritional status of pregnant women is also influenced by the consumption of nutrients and energy during the pregnancy ([Shalini & Vipul, 2010](#)).

The results of the present study also showed that the majority of mothers of malnutrition children aged 36-45 years, which were older than mothers of children who were not malnutrition. They also had lower levels of education than those who were not malnutrition. It was similar with previous study which found that maternal age and maternal education level were determinants of infant birth weight in coastal areas ([Saimin, Azizah, et al., 2019](#)). Previous study also

showed that malnutrition in children is one of the problems that occur in coastal areas. Malnutrition in children under five years old is associated with low levels of energy and protein intake, low income and low maternal education levels ([Baculu & Jufri, 2017](#)). Low socioeconomic status impacts on inadequate food intake and reduced the ability to carry out health care.

CONCLUSION

Low birth weight had a 5 times greater risk for malnutrition in children under five years old in coastal areas. Thus, knowledge related to low birth weight and malnutrition is required to improve public health status, especially in the coastal area of Kendari City, Southeast Sulawesi, Indonesia.

Declaration of Conflicting Interest

None declared.

Funding

This study was self-funded.

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Cite this article as: Saimin, J., Nugraha, A. F., Asmarani., Ashaeryanto. (2019). Low birth weight is a risk factor of malnutrition in children under five years old in coastal areas. *Public Health of Indonesia*, 5(2): 25-29.