

Relationship between Omega-3 Fatty Acid Intake, Nutritional Status of Third Trimester Pregnant Women and the Incidence of Low Birth Weight in Ende Regency, East Nusa Tenggara Province

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Background. Child's growth and development are determined by the condition of the fetus in the womb and the nutritional intake of the mother during pregnancy. Mothers with less food intake during pregnancy will experience growth disorders and Low Birth Weight (LBW).

Purpose. The purpose of this research is to analyze the relationship between omega-3 fatty acid intake, nutritional status of third trimester pregnant women and the incidence of low birth weight in Ende Regency, East Nusa Tenggara (NTT) Province.

Method. This type of research is an observational analytic research with a cohort approach. This research was conducted from January to March 2019. Samples were selected by purposive sampling of 109 research subjects. The data were collected using the SQ-FFQ questionnaire and Form Recall and analyzed using the chi-square test with a degree of confidence of 95% ($\alpha = 0.05$).

Result. There is a relationship between omega-3 fatty acid intake and low birth weight ($p = 0.045$; $RR = 2.060$; 95% CI 0.970 - 4.373) and there is a relationship between nutritional status of the third trimester pregnant women and low birth weight ($p = 0,000$; $RR = .17,931$; 95% CI 6,844 - 46,978).

Conclusion. Pregnant women with deficient omega-3 fatty acids intake are 2 times more likely to give birth to low birth weight babies. Pregnant women with CED are 17.9 times more likely to give birth to babies with low birth weight.

Keywords: omega-3, nutritional status, LBW

Introduction

The quality of human resources has begun since pregnancy. The nutritional status of pregnant women and nutritional intake are important factors for fetal growth and development in the womb. Birth weight is an indicator of the health of newborns. Babies with low birth weight (< 2500 grams) or high birth weight (> 4000 grams) have a risk of experiencing problems later.¹

The fetus has the flexibility in its development period. It will adjust to what is experienced by the mother, including nutrient intake during pregnancy. If the nutrient intake is lacking, the baby will reduce the cells developing its organs and it will be permanent which will cause long-term problems.² According to Kristiyanasari³ cited in the book *Gizi Ibu Hamil* (Pregnant Woman Nutrition), there are several ways to determine the nutritional status of pregnant women, including monitoring weight gain during pregnancy, measuring UAC (Upper Arm Circumference) to find out whether someone suffers from CED (Chronic Energy Deficiency) and measuring Hb levels to determine whether the mother suffers from nutritional anemia.

The results of BHR (Basic Health Research) in 2013, the percentage of children under five (0-59 months) with LBW was 10.2%.⁴ East Nusa Tenggara was the third highest contributor to LBW incidence by 15%. The prevalence of LBW in Ende Regency was 9.5% in 2015, 12.1% in 2016 and 13.5% in 2017.⁵ Based on the description above and the relationship between LBW incidence, nutrient intake and nutritional status of pregnant women, the researcher is interested to research the relationship between omega-3 fatty acid intake, nutritional status of third trimester pregnant women and LBW incidents.

Method

This research is an observational analytic with a cohort design. It was conducted in Ende Regency, NTT Province from January to March

2019. The population were 109 third trimester pregnant women. The samples were selected using purposive sampling technique. The inclusion criteria are third trimester pregnant women who live permanently in Ende Regency, have MCH (Maternal and Child Health) books, have term and preterm labor and are willing to become the research subjects. The exclusion criteria include pregnant women who are hospitalized due to congenital diseases before pregnancy and pregnant women with hyperemesis. The independent variables are the omega-3 fatty acid intake and the nutritional status of the third trimester pregnant women while the dependent variable is the incidence of low birth weight.

Data collection was carried out using the interview technique based on the SQ-FFQ questionnaire and form recall, UAC tape and baby scale. The data taken based on the results of the research were put into the SPSS 22 software program for analysis.

Result

The characteristics of third trimester pregnant women consist of age, gestational age at labor, education, occupation, blood pressure, weight gain, omega-3 fatty acid intake and nutritional status (UAC).

The frequency distributions of the characteristics of the research subjects are listed in Table 1. 72.5% of the mother's age has no risk and 70.6% of mothers give birth with full term. The average mother's education is high at 57.8%. Based on the mother's occupation, 61.5% of mothers are jobless. Based on their blood pressure, most mothers have abnormal blood pressure of 61.5%. 61.5% of the mothers have deficient omega-3 fatty acid intake and the mother's nutritional status (UAC) is not in CED 73.4%.

Table 1. Research subject characteristics

Subject Characteristics	Criteria	N	(%)
Mother's Age	Not risky	80	72.5
	Risky	29	27.5
Gestational Age at Labor	Preterm	32	29.4
	Aterm	77	70.6
Mother's Education	Low	46	42.2
	High	63	57.8
Mother's Occupation	Not working	67	61.5
	Working	42	38.5
Blood Pressure	Abnormal	67	61.5
	Normal	42	38.5
Omega-3 Intake	Enough	42	38.5
	Deficient	67	61.5
Nutritional Status (UAC)	CED	29	26.6
	Not CED	80	73.4

Table 2 shows the analysis of the relationship between omega-3 fatty acid intake, nutritional status of third trimester pregnant women and the incidence of low birth weight.

The bivariate analysis of the relationship between omega-3 fatty acid intake and LBW results in chi-square value of $p = 0.045$. It shows that there is a relationship between omega-3 fatty acid intake and LBW incidence. RR value = 2.060 means that pregnant women with deficient omega-3 fatty acid intake are 2.060 times more likely to give birth to babies with LBW.

The bivariate analysis of the relationship between the nutritional status of third trimester pregnant women with LBW incidence results chi-square value of $p = 0.000$. It implies that there is a relationship between maternal nutritional status and LBW incidence. RR value = 17.931 means that third trimester pregnant women with are 17.931 times more likely to give birth to babies with LBW.

Table.2 The relationship between omega-3 fatty acid intake, nutritional status of third trimester pregnant women and LBW incidence

Variable	LBW				P Value	RR (95% CI)
	Yes		No			
	N	%	N	%		
Omega-3 Intake						
Enough	7	6.4	35	32.1	.045	2.060 (0.970 - 4.373)
Deficient	23	21.1	44	40.4		
Nutritional Status of Third Trisemester Pregnant Women (UAC)						
CED	26	23.8	3	2.8	.000	17.931 (6.844 - 46.978)
Not CED	4	3.7	76	69.7		

Discussion

The results show that there is a relationship between omega-3 intake and LBW incidence. Omega-3 fatty acids are special nutrients for pregnant women. For babies to be born in good condition, the adequacy of essential nutrients should be fulfilled. Therefore, pregnant women need food to meet their energy needs, maintain an increase in maternal tissue and placenta, and provide essential nutrients for the fetus for its development.⁶ Fish are a source of omega-3 fatty acids, which is a nutrient that has an important structural and physiological role in several body systems, including nerves, immune, and cardiovascular. In addition, fish are the main source of DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid).⁷ There are two reasons for weight gain related to consumption of fish rich in omega-3 long-chain fatty acids during pregnancy. First, omega-3 will interfere with prostaglandins in labor so that the duration of pregnancy is longer which decreases blood viscosity to fulfill blood flow to the placenta and increase fetal growth.⁸

Another research shows that each increase in weekly fish fat consumption is associated with weight gain of pregnant women of 0.58 kg.⁹ Several researches have shown that fish consumption during pregnancy is closely related to the weight and length of the baby's birth. This is as Cohort's research about the prospective of 8729 pregnant women in

Denmark, which found that a diet with low fish consumption is a strong risk factor for the incidence of preterm labor and low birth weight (the incidence of preterm labor in women who have never eaten fish is higher than in women who eat fish at least once per week). The research of Mohanty *et al.*⁸ also shows that the prevalence of LBW in fish-consuming populations is relatively low. Then, another research found that increasing fish intake per week during pregnancy is positively related to birth weight. Pregnant women who rarely consume fish (≤ 1 time per week) give birth to babies with lower weight than those often consuming fish (2-3 times per week) and very often (more than 3 times per week).¹⁰ Correspondingly, pregnant women with fish intake more than once a week have a lower risk of LBW incidence than those with fish intake of less than or equal to once a week.

The results of this research show that there is a relationship between the nutritional status of pregnant women and LBW indicated by statistically significant results. The results of the analysis in this research indicate that babies born with good nutritional status of pregnant women reduce the risk of LBW incidence. The assessment of the nutritional status of pregnant women in this research uses anthropometric measurements. Anthropometry of pregnant women commonly done is measurement of Upper Arm Circumference (UAC).¹¹ UAC measurement is quite representative because it is in accordance with maternal BMI. UAC shows the nutritional status of pregnant women where < 23.5 cm belongs to the vulnerable malnourished group.

Nutritional disorders early in life will affect the quality of future life.¹² The nutritional status of the mother is very important for pregnancy. If maternal nutrition is not sufficient to support fetal growth and development, the placenta does not develop properly that fetal development is stunted, the baby is born with defects, the mother will experience miscarriage or stillbirth, and the baby will be premature or

have low birth weight (LBW). In addition, if it occurs in a baby girl, in the future it will hamper her ability to give birth to a healthy baby.¹³

The research conducted by Branca¹⁴ explains that UAC can be a determining factor in infant birth weight and LBW incidence. The research in Madiun explains that pregnant women with CED are 8.24 times more likely to give birth to babies with LBW.¹⁵ This result is in accordance with the research conducted by Nurahmawati¹⁶ that mothers with CED during pregnancy are 3.6 times more likely to give birth to babies with LBW compared to those without CED. There is a direct effect between pregnant women with CED and LBW. The statistical result shows that p value is 0.008 OR-5.61: CI95% 0.21 to 0.79.¹⁷ This is like the research results by Ekowati that pregnant women with CED are 5.6 times more likely to give birth to low birth weight babies (AOR = 5.6; CI 95% 1.41-22.57).¹⁸ The results of hypothesis testing in this research indicate that there is a significant influence of the nutritional status of pregnant women on low birth weight (LBW) with the value of $p < 0.000$; CI 95% 6.844 to 46.978. It can be concluded that there is a direct influence of the nutritional status of pregnant women on LBW incidence. Thus, the findings that have been analyzed support the hypothesis in this research.

Conclusion

Pregnant women with deficient omega-3 fatty acid intake are twice more likely to give birth to low birth weight babies and pregnant women with CED are 17.9 times more likely to give birth to low birth weight babies.

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