Analysis of Nutritional Patterns and Preeclampsia During Pregnancy on the Incidence of low birth weight (LBW)

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ABSTRACT

Every year in developing countries, approximately 20 million babies are born with low birth weight and 13 million babies are born with growth disorders in the womb. The high infant mortality rate in Indonesia, namely 30 per 1000 live births, makes Indonesia rank fifth with the highest number of LBW in the world and the birth of babies with low birth weight is identified as the largest contributor to the infant mortality rate. This study aims to determine the analysis of nutritional patterns and preeclampsia during pregnancy on the incidence of LBW. This research uses this type of research *analytical observational* with research design *cross-sectional*. The population of this study was 150 post-partum mothers who had given birth at term, had pregnancy complications (CED/Preeclampsia) and gave birth in the delivery room at Merauke District Hospital from January 2021 – December 2022. Statistical test using *chi square* to find out the relationship between 2 variables. Research results from 150 respondents were obtained The nutritional pattern of respondents is at risk of developing CED, namely 87 respondents (58.0%), Most of the preeclampsia respondents were at risk of developing preeclampsia, namely 60 respondents (40.0%) and the majority of respondents' birth weight was LBW, namely 119 respondents (79.3%). Analysis using tests *Chi-Square* for KEK the results were obtained $p = 0.002$ (< 0.05) and preeclampsia was obtained $p = 0.036$ (< 0.05) so it can be concluded that there is a relationship between nutritional patterns and preeclampsia during pregnancy with the incidence of LBW in the Merauke District Hospital. Whether or not many pregnant women experience the nutritional status of pregnant women is also influenced by the performance of health service workers. For this reason, health workers, especially midwives, should continue to motivate through counseling and IEC as well as educating mothers about the incidence of LBW.

Keywords : Low Birth Weight, Nutritional Patterns, Preeclampsia

INTRODUCTION

The pregnancy period is part of the Window of Opportunity period or also called the golden period for the short process of fetal growth and development. This period is a time where we can make efforts that can improve the baby's growth and development process. According to the field of nutrition science, the Window of Opportunity period is the period before birth until the child reaches 2 years of age or commonly referred to as the first 1000 days of pregnancy (Mayulu & Kawengian, 2016). Malnutrition during pregnancy can hinder the growth and development of the fetus. A fetus that is malnourished is at risk of being born with a low birth weight (LBW). Every year in developing countries, approximately 20 million babies are born with low birth weight and 13 million babies are born with growth disorders in

the womb. (Popkin BM, et al in Mayulu & Kawengian, 2016). The high infant mortality rate in Indonesia, namely 30 per 1000 live births, makes Indonesia rank fifth with the highest number of LBW in the world and the birth of babies with low birth weight is identified as the largest contributor to the infant mortality rate. One of the reasons for the high rate of LBW births in Indonesia is the lack of adequate nutritional intake for fetuses and mothers. One indicator that a baby is in the healthy category is if the baby is born at term with a birth weight between 3000 grams and 4000 grams, if it is below or less than 2500 grams it is said to be Low Birth Weight (LBW). LBW is a major factor in increasing mortality, morbidity and disability of neonates, infants and children and has a long-term impact on their lives in the future. The incidence rate in Indonesia varies greatly from one region to another, ranging between 9%-30%. The results of the 2019 Inter-Population Survey (SUPAS) show that IMR is 22.23 per 1,000 live births and LBW is a complication that is one of the most common causes of death.

According to research (Nengsih et al, 2016) babies born with low birth weight (LBW) also have a risk of experiencing delays in child growth at toddler age. Based on 2018 Riskesdas data, it shows that the incidence of LBW in Indonesia has increased significantly. The prevalence of LBW in 2018 was (6.2%) increased compared to 2013 of (5.7%). The prevalence of LBW in 2018 in Indonesia was 10.2% and the majority of LBW babies who died during the neonatal period were babies with birth weight <2,500 grams. Based on the results of collecting provincial health data from health service facilities, five provinces have the highest percentage of LBW, namely Papua Province (27%), West Papua (23.8%), NTT (20.3%), South Sumatra (19.5%). %), and West Kalimantan (16.6%). Meanwhile, the five provinces with the lowest LBW percentages are Bali (5.8%), West Sulawesi (7.2%), Jambi (7.5%), Riau (7.6%), and North Sulawesi (7.9%) (Riskesdas, 2018).

According to the Papua Province health profile, the number of cases of LBW babies in 2018 was 1,256 cases. Factors that cause LBW are maternal factors, namely age, nutritional status, birth spacing, disease, socio-economic conditions, and maternal smoking. Where the maternal factors that most cause LBW are the mother's nutritional status and Hb levels. The nutritional status of the mother before and after pregnancy will greatly determine the baby she gives birth to. Meanwhile, if the Hb level in pregnant women is less than 11gr/dl, it can also affect the baby they give birth (Kristianasary, 2020).

There are many factors that influence the occurrence of LBW births, originating from maternal factors, fetal factors, and placental factors. Maternal factors include age, parity, pregnancy disease, malnutrition, trauma, fatigue, smoking, and unwanted pregnancy. Maternal factors include maternal characteristics and pregnancy complications. Maternal characteristics were age, number of parities, gestational age, and previous history of LBW. Pregnancy complications include pregnancy with hydramnios, hyperemesis gravidarum, antepartum bleeding (placental abruption and placenta previa), preeclampsia/eclampsia. Placental factors such as vascular disease and multiple pregnancies. Fetal factors are congenital abnormalities and infections (MOH RI, 2015).

Research conducted by Salawati et al in 2016 saw that 93.0% of pregnant women who were not at risk did not give birth to LBW babies, while 75.0% of pregnant women who were at risk gave birth to LBW babies. These data show that pregnant women who are not at risk tend not to give birth to LBW babies. On the other hand, pregnant women who are at risk tend to give birth to LBW babies.

The nutritional status of pregnant women can be seen, one way, by measuring LILA. LILA measurement is a way for early detection of CED in pregnant women and expectant mothers. LILA's normal size is 23.5 cm, if it is less than 23.5 cm then the mother has CED. Mothers with CED that occurred before pregnancy will really need adequate nutrition because the mother must be able to provide sufficient nutrition for the growth of her fetus and for herself. If nutrition during pregnancy cannot be met properly it can cause LBW. Apart from

LILA, the nutritional status of pregnant women can be seen by Hb levels. Hb levels are an indicator to assess whether a pregnant woman is anemic or not. During pregnancy, it is physiological, but there are some who experience pathological anemia which causes abortion, LBW, congenital defects, IUFD and anemia in babies born (Waryana, 2016). This research is supported by research by Ayu Rahma & Al Muqsith (2015) regarding the relationship between LILA of pregnant women and birth weight of babies at RSU Cut Meutia, North Aceh Regency and RS Tk IV IM.07.01 Lhokseumawe. It was found that there was a relationship between LILA of pregnant women and birth weight of babies with p value = 0.006.

Of the many predisposing factors for LBW, the author wants to know to what extent these predisposing factors influence the incidence of LBW. In this study, the factors that will be studied are maternal factors, namely maternal pregnancy complications that can influence the incidence of LBW. Pregnancy complications here consist of preeclampsia. The nutritional status of pregnant women will be studied, one of which is by measuring LILA to determine CED in pregnant women in the study "Analysis of Nutritional Patterns and Preeclampsia During Pregnancy on the Incidence of LBW".

METHOD

This research uses a research design *Observational Analytics* with approach *cross sectional*. With technique *total sampling* namely the sample is the same as a population of 150 respondents, the independent variables are nutritional patterns and preeclampsia and the dependent variable is the incidence of LBW. Statistical tests are used *Chi-Square* to find out the relationship between the two variables. Analysis uses statistical tests *Chi-Square* obtained mark $p = 0.002$ (< 0.05) then it can be concluded that there is a relationship between nutritional patterns during pregnancy and the incidence of LBW in the Maternity Room of Merauke District Hospital and the value $p = 0.036$ (< 0.05) so it can be concluded that there is a relationship between preeclampsia during pregnancy and the incidence of LBW in the Maternity Room at the Merauke District Hospital.

RESULTS

Univariate Analysis Results

Table 1. Frequency Distribution of Nutritional Patterns in the Maternity Room of Merauke District Hospital

Characteristics	f	%
Nutritional Patterns		
CED	87	58
No CED	63	42

Source: Research Checklist, February 2024

Based on table 1 above, it can be seen that the majority of respondents' nutritional patterns are at risk of developing CED, namely 87 respondents (58.0%).

Table 2. Frequency Distribution of Preeclampsia in the Maternity Room of Merauke District Hospital

Characteristics	f	%
Preeclampsia		
Not Preeclampsia	60	40
Preeclampsia	90	60

Source: Research Checklist, February 2024

Based on table 2 above, it can be seen that the majority of preeclampsia respondents are at risk of developing preeclampsia, namely 90 respondents (60.0%).

Table 4. 3. Frequency Distribution of Birth Weight in the Maternity Room of Merauke District Hospital

Characteristics	f	%
Birth Weight		
LBW	119	79,3
LBW	31	20,7

Source: Research Checklist, February 2024

Based on table 3 above, it can be seen that the majority of respondents' birth weight was LBW, namely 119 respondents (79.3%).

Bivariate Analysis Results

Table 1.   Analysis of the relationship between nutritional patterns and the incidence of LBW in the Maternity Room of Merauke District Hospital

Crosstab

			BBL		
			LBW	BBLN	Total
NUTRITIONAL PATTERNS	CED	Count	77	10	87
		% of Total	51.3%	6.7%	58.0%
	NO CED	Count	42	21	63
		% of Total	28.0%	14.0%	42.0%
Total		Count	119	31	150
		% of Total	79.3%	20.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.629[a]	1	.001		
Continuity Correction[b]	9.339	1	.002		
Likelihood Ratio	10.581	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	10.559	1	.001		
N of Valid Cases	150				

Based on table 1 above, all 77 respondents with CED experienced LBW. Of the 63 respondents without KEK, there were 42 respondents experiencing LBW and 21 respondents LBW. Based on the results of the Chi square test, it was found that the value of p = 0.002 (< 0.05), it can be concluded that there is a relationship between nutritional patterns and the incidence of LBW in the Maternity Room at the Merauke District Hospital.

Table 2. Analysis of the relationship between preeclampsia and the incidence of LBW in the maternity room at Merauke District Hospital

Crosstab

| | | | BBL | | |
			LBW	BBLN	Total
PREECLAMPSIA	NO PREECLAMPSIA	Count	42	18	60
		% of Total	28.0%	12.0%	40.0%
	PREECLAMPSIA	Count	77	13	90
		% of Total	51.3%	8.7%	60.0%
Total		Count	119	31	150
		% of Total	79.3%	20.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.313[a]	1	.021		
Continuity Correction[b]	4.407	1	.036		
Likelihood Ratio	5.217	1	.022		
Fisher's Exact Test				.025	.019
Linear-by-Linear Association	5.278	1	.022		
N of Valid Cases	150				

Based on table 2 above, 77 respondents with preeclampsia experienced LBW births. Of the 60 respondents with normal birth weight, there were 42 respondents who were LBW and 18 respondents were LBW. Based on the results of the Chi square test, it was found that the value of p = 0.036 (< 0.05), it can be concluded that there is a relationship between preeclampsia and the incidence of LBW in the Maternity Room at the Merauke District Hospital.

DISCUSSION

Univariate Analysis Results

Identification of Nutritional Patterns in the Maternity Room at Merauke District Hospital.

Based on the research results, there were 87 (58.0%) respondents with KEK. This research is in line with research conducted by Siti et al (2015). The research results showed that the nutritional status of pregnant women at risk of CED experienced LBW at 12 pregnant women or (11.8%). Nutritional status is a state of adequacy and use of nutrients or more that affects a person's health. A person's nutritional status is essentially the result of a balance between the consumption of food substances and the person's needs. Measuring the nutritional status of pregnant women is determined by measuring the LILA with the condition that if the LILA of a pregnant woman is <23.5 cm, it means that the pregnant mother has CED and if the LILA of the mother is >23.5 cm, it means that the mother does not experience CED.

Malnutrition status indicates that the mother has experienced a state of malnutrition for quite a long period of time, so the nutritional needs for the growth and development of the fetus are hampered, resulting in giving birth to a LBW baby (Ibrahim, 2018). For pregnant women whose nutritional needs are met, it is indicated by weight gain during pregnancy. Weight gain during pregnancy should be 10-12 kg. A woman during pregnancy has increased energy needs. This energy is used for fetal growth, formation of the placenta, blood vessels and new tissue. Fulfilling the nutritional status of pregnant women can be influenced by the mother's own diet.

Identification of Preeclampsia in the Maternity Room of Merauke District Hospital

Based on the research results, there were 90 (100%) respondents with preeclampsia. This research is in line with research conducted by Utami (2022), which showed that the majority of types of childbirth were abnormal, namely 34 (51.5%) respondents. According to research by Jumhati (2018), as many as 89 (91.8%) mothers gave birth with preeclampsia due to hereditary factors in the family where the family had a history of hypertension.

The high incidence of preeclampsia occurs because blood flow decreases to the placenta and causes disruption of the placenta, resulting in impaired fetal growth and lack of oxygen resulting in fetal distress. In pre-eclampsia and eclampsia, there is often an increase in the muscle tone of the uterus and its sensitivity to stimuli, resulting in premature parturition. The occurrence of PEB was also experienced by mothers who had just had their first child in this study due to a lack of education and knowledge about pregnancy. Preeclampsia can be a problem for both the mother and the fetus due to vasospasm of the blood vessels. Preeclampsia will cause invasion of trophoblast cells in some of the spiral arteries in the myometrium area, causing disruption of uteroplacental function.

RESULTS

Analysis of the Relationship between Nutritional Patterns During Pregnancy and the incidence of LBW in the Maternity Room of Merauke District Hospital

Based on the research results, respondents with KEK experienced LBW, namely 87 (58.0%) respondents with a value of p=0.002 (<0.05).

The results of statistical tests using Chi Square obtained a value of $p = 0.002$ (< 0.05), which means that statistically there is a significant relationship between nutritional patterns and the incidence of LBW. Mayanda's research (2017), supports the research results, showing that mothers whose LILA is abnormal (<23.5 cm) are at risk of giving birth to babies who are LBW 8 times compared to mothers with normal LILA. Pregnant women really need a lot of nutrition to be given to their fetus in the womb, so mothers who experience CED before and after pregnancy should routinely do ANC because they will get a lot of information such as about nutrition during pregnancy, providing additional food for pregnant women, the impact of poor nutritional status. , which can later prevent LBW babies from being born.

The intake of a mother during pregnancy is very important because the child's growth and development is largely determined by the condition of the fetus in the womb. If the nutritional needs of pregnant women are inadequate, this will also have an impact on the baby later. Mothers with CED not only provide for their fetus but also for themselves, so their nutritional intake must be considered. Pregnancy causes an increase in energy metabolism, therefore the need for energy and other nutrients will increase, especially for mothers who had poor nutritional status before pregnancy. This increase is to meet the needs of the mother and fetus, because mothers with poor nutritional status can give birth to babies with low birth weight. low birth, easily get sick, and affect his intelligence (Kristyanasari, 2017).

Nutritional status is a state of adequacy and use of nutrients or more that affects a person's health. A person's nutritional status is essentially the result of a balance between consumption of food substances and the person's needs. CED during pregnancy will inhibit fetal growth, thereby creating a risk of LBW. Nutritional and health problems in pregnant women can be addressed with routine pregnancy checks so that disorders/abnormalities in pregnant women and their unborn babies can be immediately treated by health workers.

Analysis of the Relationship between Preeclampsia and the incidence of LBW in the Maternity Room of Merauke District Hospital.

Based on the research results, preeclampsia respondents who experienced LBW were 90 (100%) respondents with a p value = 0.036 (<0.05).

The results of statistical tests using Chi Square showed a value of p = 0.036 (< 0.05), which means that statistically there is a significant relationship between preeclampsia and the incidence of LBW. The results of research conducted by Hartati (2018), found that 86 mothers who experienced pre-eclampsia gave birth to LBW babies. The results of statistical tests show a relationship between pre-eclampsia and the incidence of LBW and mothers who have pre-eclampsia are 4.75 times more likely to give birth to LBW babies than mothers who do not experience pre-eclampsia.

The research results of Setiati and Rahayu (2017) show that pre-eclampsia/eclampsia influences the incidence of LBW with a value of p=0.049. This research is also in line with research conducted by Tiara, Dewi (2016) which states that there is a relationship between pre-eclampsia and the incidence of LBW, namely with a p value of 0.006.

In preeclampsia, cytotrophoblast invasion of the myometrium is impaired, the spiral arteries remain shallow and blood flow to the fetus is restricted. In preeclampsia, maternal endothelial dysfunction occurs, resulting in placental ischemia and disrupting and reducing placental circulation, which then causes the baby not to get an adequate supply of nutrients and oxygen, causing LBW.

CONCLUSION

1.	Nutritional patterns during pregnancy on the incidence of LBW showed that 87 respondents experienced CED.
2.	 Preeclampsia during pregnancy on the incidence of LBW was 90 respondents.
3.	The incidence of LBW was 119 respondents.
4.	There is a significant relationship between nutritional patterns during pregnancy and the incidence of LBW in the Maternity Room at Merauke Regional Hospital.
5.	There is a significant relationship between preeclampsia during pregnancy and the incidence of LBW in the Maternity Room at Merauke Regional Hospital.

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