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THE EFFECT OF MATERNAL NUTRITIONAL STATUS (KEK) BASED ON MID-UPPER ARM CIRCUMFERENCE AND BODY MASS INDEX ON BIRTH WEIGHT AT LAMURUKUNG HEALTH CENTER

Indryani[1] Sulfianti[2], Mustar[3] Hasnidar[4]
[1]Universitas sipatokkong Mambo (Indonesia)
[2]Universitas Sipatokkong Mambo (Indonesia)
[3]Universitas Sipatokkong Mambo (Indonesia)
[4]Universitas Sipatokkong Mambo (Indonesia)

[*]Corresponding author: indryani.bidanpendidik@gmail.com

Abstract

The World Health Organization (WHO) reported that the global prevalence of Chronic Energy Deficiency (CED) in pregnancy is 35-75%, with a significantly higher prevalence in the third trimester compared to the first and second trimesters. Moreover, 40% of maternal deaths in developing countries are associated with chronic energy deficiency. The 2020 Performance Report of the Ministry of Health showed that the number of pregnant women at risk of CED in 34 provinces reached 9.7% of 4,656,382 pregnant women. The prevalence of CED among pregnant women in South Sulawesi is 13.8%, placing the province 10th among the 34 provinces in Indonesia. The consequences of CED in pregnant women include anemia, the risk of premature birth, impaired fetal brain development, low birth weight, and an increased risk of stunting. This study aims to investigate the impact of the nutritional status of pregnant women with CED, based on mid-upper arm circumference (MUAC) and body mass index (BMI), on birth weight at Lamurukung Health Center from January to December 2023. This retrospective cohort study used KIA cohort data, and statistical analysis was performed using the chi-square test. The majority of women with abnormal MUAC and BMI had babies with low birth weight. The chi-square test results indicated a p-value of 0.000, signifying a significant relationship between the nutritional status of pregnant women with CED, based on MUAC and BMI, and birth weight. It is hoped that midwives will enhance education and counseling for pregnant women on the importance of maintaining proper nutritional intake during pregnancy.

***Keywords**: Pregnant women, CED, nutritional status.*

1. INTRODUCTION

Pregnancy is a critical period for shaping the quality of future human resources, as growth and development are determined during the fetal stage. Nutritional status is one of the key factors during pregnancy, a period that requires special attention due to its importance, particularly since it falls within a nutritionally vulnerable group. The nutritional status of a pregnant woman affects the baby she will give birth to, including the baby's birth weight. Birth weight is the weight of the baby measured within one hour of birth. If a mother has adequate nutritional intake, she will likely give birth to a healthy baby with a normal birth weight of 2,500-

4,000 grams. Conversely, poor nutritional status during pregnancy can lead to various adverse effects on fetal growth, including impaired brain development, anemia in newborns, premature births, increased susceptibility to infections, miscarriage, and low birth weight (Sri Lestari et al., 2023).

A pregnant woman is considered at risk of CED if her mid-upper arm circumference (MUAC) measures less than 23.5 cm, or if the measurement falls within the red zone on the MUAC tape. Low MUAC indicates nutritional problems in pregnant women, and maternal nutritional status impacts the nutritional issues of the baby. Chronic Energy Deficiency (CED) is one of the leading causes of maternal and infant mortality and low birth weight in Indonesia. Indonesia ranks fourth globally in terms of the prevalence of CED among pregnant women, with a prevalence rate of 35.5%. According to the World Health Organization (WHO), approximately 287,000 women died globally in 2020, equivalent to nearly 800 maternal deaths daily (Who,2023). The WHO also reports that the global prevalence of CED in pregnancy is 35-75%, with a significantly higher prevalence in the third trimester compared to the first and second trimesters. Additionally, 40% of maternal deaths in developing countries are linked to chronic energy deficiency. Pregnant women with poor nutrition, such as CED, are at a higher risk of illness; hence, nutritional deficiencies in pregnant women must be avoided. Pregnant women are a target group that requires special attention

(Lestari et al., 2023)

The global target of the Sustainable Development Goals (SDGs) is to reduce the maternal mortality rate to 70 per 100,000 live births. Chronic Energy Deficiency (CED) is a condition in which an individual experience an imbalance in nutritional intake (energy and protein) during pregnancy or over an extended period. The CED rate among pregnant women in Thailand is around 15.3%, and in Tanzania, 19% of pregnant teenagers aged 15-19 years suffer from CED. Indonesia ranks fourth in the world in terms of the highest prevalence of CED among pregnant women, with a rate of 35.5%. According to data, South Sulawesi ranks 11th with a proportion of CED higher than the national average, the 2020 Performance Report of the Ministry of Health showed that the number of pregnant women at risk of CED in 34 provinces reached 9.7% of 4,656,382 pregnant women. The prevalence of CED among pregnant women in South Sulawesi is 13.8%, placing the province 10th among the 34 provinces in Indonesia (Kemenkes,2023).

Chronic Energy Deficiency (CED) is a common nutritional problem among pregnant women, associated with prolonged deficiencies in energy and protein intake, both during pregnancy and even before conception. CED in pregnant women is indicated by a mid-upper arm circumference (MUAC) measurement of less than 23.5 cm (Simbolon et al., 2019). In addition to adequate energy intake, pregnant women need a balanced diet daily to achieve normal nutritional status ((Hilda yadlin, 2022)). The impact of CED on pregnant women is severe, as it can endanger the health of the fetus. Children born with low birth weight or prematurely are at a higher risk of respiratory problems, infections, and even death. Moreover, infants born with these conditions are more likely to experience growth and developmental issues, including brain development problems. CED in pregnant women also increases the risk of anemia, which negatively impacts both maternal and fetal health by raising the risk of premature labor, low birth weight, and maternal and infant mortality ((Putri et al., 2023). Given the high prevalence of CED among pregnant women and its associated consequences, this study aims to further investigate the effect of the nutritional status of pregnant women with CED, based on MUAC and BMI, on birth weight.

2. METHODOLOGY

This study is an analytical correlational study, a technique used to analyse the independent variable of maternal nutritional status and the dependent variable of birth weight. The retrospective approach was employed, where observations of past events were made to identify factors related to the cause using the KIA cohort at Lamurukung Health Center. The study aimed to determine whether maternal nutritional status, based on MUAC and BMI, affects birth weight. The population of this study included all mothers who gave birth at Lamurukung Health Center, totaling 198 mothers. The sample was selected using purposive sampling based on certain inclusion criteria, resulting in 50 samples.

3. RESULTS

The Chi-Square test results on the effect of MUAC and BMI on birth weight, analyzed using maternal and infant cohort data from the past year, yielded a p-value of 0.000, indicating a significant effect.

3.1 Table The Effect of maternal nutritional status based on MUACH and BMI

Table 1: *The Effect of Maternal Nutritional Status Based on MUAC on Birth Weight*

MUAC of Pregnant Women	Birth Weight				Total		P - Value
	LBW		Non-LBW				
	n	%	n	%	n	%	
High Risk < 23,5 cm	31	61	19	13	50	25	0,000
Low Risk > 23,5 cm	20	39	128	87	148	75	
Total	51	100	147	100	198	100	

Source: Secondary Data

Table 2: *The Effect of Maternal Nutritional Status Based on BMI on Birth Weight*

BMI of Pregnant Women	Birth Weight				Total		*P - Value*
	LBW		Non-LBW				
	n	%	n	%	n	%	
Underwight	15	29	9	6	24	12	0,000
Normal	30	59	85	58	115	58	
Overweight	6	12	53	36	59	30	
Total	51	100	147	100	198	100	

Source: Secondary Data

3.2 The Influence of Upper Arm Circumference (LILA) of Pregnant Women on Birth Weight of Babies

Research results show that respondents with a high-risk LILA measurement of less than 23.5 cm totaled 50 people (25%), among which 31 people (61%) had low birth weight (LBW) babies, and 19 people (13%) did not. Meanwhile, respondents with a low-risk LILA measurement of more than 23.5 cm totaled 148 people (75%), among which 20 people (39%) had LBW babies, and 128 people (87%) did not. Based on the Chi-Square statistical test results, a p-value of 0.000 was obtained, indicating that there is an influence of LILA on birth weight at UPT Puskesmas Lamurukung. LILA (upper arm circumference) measurement in women of reproductive age is a simple method that can be carried out by the general public to detect groups at risk of chronic energy deficiency (CED). The normal LILA limit is 23.5 cm, and measurements below this threshold are considered abnormal. Malnutrition in pregnant women negatively impacts both the

mother and the baby. One parameter for assessing the nutritional status of pregnant women is LILA ((Saifuddin, 2018)).

One factor that influences LILA is the pregnant woman's body weight. A small LILA indicates CED, which may result in LBW in the fetus. Pregnant women with poor nutrition need to receive adequate nutrition in both quantity and quality, as well as access to health education about nutrition. Nutritional deficiencies during pregnancy can result in lower brain weight, fewer brain cells, and an IQ below average after birth. Due to malnutrition, the mother's blood volume decreases, placenta size is reduced, and nutrient transfer through the placenta diminishes, leading to slow or disrupted fetal development, increasing the risk of premature or LBW birth. The nutritional status of pregnant women is crucial for the well-being and development of the fetus. The food intake consumed determines the number of calories and micronutrients absorbed, which provide energy and regenerate body cells. Prolonged deficiencies in carbohydrates, vitamins, and other nutrients can lead to malnutrition, commonly referred to as Chronic Energy Deficiency (CED). This condition poses a risk to pregnant women, causing complications for the fetus, including congenital anomalies, anemia, hypoxia/hypoxemia, LBW, and stillbirth (Arisman, 2018).

This study aligns with (Nuryani & Ayu Mustika Handayani, 2022), which found that LILA, HB, and FE levels influence birth weight in the Tangkit Health Centre area, with a p-value of 0.042. LILA is a more convenient indicator of nutritional status compared to other anthropometric methods, as it remains relatively stable during pregnancy, and measuring LILA once during the first month of pregnancy is recommended.

3.3 The Influence of Pregnant Women's BMI on Baby's Birth Weight

Research results indicate that 24 respondents (12%) had a low BMI, among whom 15 people (29%) had low birth weight (LBW) babies, and 9 people (6%) did not. Meanwhile, 115 respondents (58%) had a normal BMI, among whom 30 people (59%) had LBW babies, and 85 people (58%) did not. Additionally, 59 respondents (30%) had a high BMI, among whom 6 people (12%) had LBW babies, and 53 people (36%) did not. The Chi-Square statistical test results yielded a p-value of $0.000 < 0.05$, indicating that there is an influence of pregnant women's BMI on birth weight at UPT Lamurukung Health Centre in 2024. BMI is used to assess the nutritional status of women before pregnancy and to determine optimal weight gain during pregnancy. In developing countries, pregnant women typically gain 5-7 kg, while in developed countries, the average weight gain during pregnancy is 12-14 kg. The normal weight gain for pregnant women is around 10-12 kg, but for those with malnutrition, the weight gain is only 7-8 kg, which may result in LBW babies.

BMI serves as a guideline for assessing a woman's nutritional status before pregnancy and helps in determining optimal weight gain. Pre-pregnancy weight and changes in weight during pregnancy are important clinical parameters for estimating a baby's weight. Women who are underweight before pregnancy or who gain insufficient weight during pregnancy tend to give birth to LBW babies This study aligns with Partini (2020), where the Chi-Square test results showed a p-value of 0.000, indicating an influence of BMI on baby's birth weight. Additionally, this study is consistent with research conducted by ((Puspita.,2019)) at RSUD Dr. M. Soewandhie in Surabaya in 2019, which found a significant relationship between BMI and baby's birth weight ($p = 0.040 < 0.05$). A healthy mother will give birth to a healthy child. The mother's nutritional

status is a key determinant of the quality of human resources, as malnourished mothers are at risk of giving birth to malnourished babies.

4. CONCLUSIONS

Based on the Chi-Square test results, there is a significant influence of pregnant women's Upper Arm Circumference (LILA) and Body Mass Index (BMI) on babies' birth weight. The study found that mothers with abnormal LILA and BMI from the cohort also had babies with abnormal birth weights.

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