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The relationship between pregnant mothers' mid upper arm circumference (MUAC) and estimated fetal weight

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Abstract

The nutritional status of pregnant women can be determined by measuring the mother's mid upper arm circumference (MUAC). If the mother's MUAC is less than 23.5 cm, it indicates the presence of Chronic Energy Deficiency (CED), which puts the baby at risk of low birth weight (LBW). Estimated fetal weight is one method of determining the fetus's growth in the womb. The purpose of this study was to see if there was a link between pregnant women's MUAC and the fetus' estimated weight at the Watampone Community Health Center, Bone Regency, and PMB Jumiani, S.ST. The research design used was analytic observational with a cross sectional study design. The sample in this study was 100 people selected using accidental sampling technique in accordance with the inclusion criteria. The results showed that 79.2 percent of normal pregnant women MUAC (not CED) were in accordance with the estimated fetal weight (EFW) and 20.8 percent were not according to EFW. There were 27.9 percent MUAC of abnormal pregnant women (CED) which was in accordance with EFW and 82.1 percent which did not conform to EFW. Thus, there is a relationship between the upper arm circumference (MUAC) of pregnant women and the estimated weight of the fetus with a p value = 0.000. This indicates that a pregnant woman's upper arm circumference has a significant impact on the fetus's development in the womb.

Keywords: Pregnant women MUAC, estimated fetal weight

Introduction

The nutritional status of pregnant women is critical to the health of both the mother and the fetus. Pregnant mothers who are in good health will give birth to healthy children. Pregnancy is the golden period of the first 1000 days of life, and it requires special attention to ensure that the child develops and grows to his or her full potential (Ariyani, Achadi, & Irawati, 2012). Pregnant women's nutritional intake has a significant impact on the fetus' development. Pregnant mothers with good nutritional status can avoid having babies with low birth weight (LBW). Pregnant women with poor nutrition are more likely to give birth to malnourished newborns. A malnourished fetus in the womb can be at risk of stunting (Kemenkes RI, 2013).

Protein Energy Deficiency is caused by insufficient protein and energy intake in pregnant women. Based on the 2017 Indonesian Health Profile, 53.9 percent of pregnant women in Indonesia have an energy deficiency (<70% Energy Adequacy Rate) and 13.1 percent experienced a mild energy deficiency (70-80% Energy Adequacy Rate). In terms of protein adequacy, 51.9 percent of pregnant women have a protein deficiency (80% Protein Adequacy Rate), whereas 18.8 percent have a minor deficiency (80-99 percent Protein Adequacy Rate) (Kemenkes RI, 2017). According to Riskesdas (2018), prevalence of Protein Energy Deficiency of pregnant women according to their characteristics, in South Sulawesi Province is 16.87 percent (Riskesdas, 2018).

One of the assessments that can be performed on pregnant women with Chronic Energy Deficiency (CED) is the Mid Upper Arm Circumference (MUAC) measurement. The size of the MUAC of pregnant women who are at risk of CED is <23.5 cm (Fakier, Petro, & Fawcus, 2017). Lack of supply of nutrients to the fetus is a condition experienced by pregnant women with Chronic Energy Deficiency so that it can affect the blood

supply and body reactions that cause premature labor, postpartum hemorrhage, anemia, infection and maternal death (Kuche et al, 2015).

One way to measure the weight of the fetus while it is still in the womb is to estimate its weight. The weight of the fetus has an influence on how care is delivered; knowing the weight of the fetus in the womb before birth can assist identify whether referral action is required so that there is no delay in handling it (Nindrea, 2017).

Fetal weight needs to be estimated prior to delivery to anticipate possible complications during pregnancy, birth, and the puerperium. As a midwife, it is very important to estimate the weight of the fetus. Estimated fetal weight can be done by measuring the height of the uterine fundus or in other ways, which will affect birth care (Rianti & Aminah, 2017).

Research Method

The research design used was analytic observational with a cross sectional study design. This study was undertaken at UPT Puskesmas Watampone and PMB Jumriani, S.ST for the period 17 May – 17 July 2021. Sampling was carried out by accidental sampling according to the inclusion criteria. The participants in this study were 100 pregnant women in their third trimester (28-40 weeks) who came in to check their pregnancy. The mother's MUAC was measured with a measuring tape, and fetal weight was estimated using Leopold's examination to determine the height of the uterine fundus with the measuring tape (metlin).

The data analysis used was univariate analysis to determine the frequency and percentage of the MUAC and EFW variables and bivariate analysis to assess the relationship between the two variables which was carried out using the *Chi-Square* statistical test.

Results and Discussions

Result

a. Univariate analysis

Table 1. Frequency Distribution of Respondents based on MUAC

MUAC	Frequency (f)	Percentage (%)
Normal (Not CED > 23.5 cm)	72	72.0
Abnormal (CED < 23.5 cm)	28	28.0
Total	100	100.0

Source: Primary data, processed in 2021

Table 1 shows that out of 100 respondents, 72 (72.0%) had normal MUAC and 28 (28.0%) had abnormal MUAC.

Table 2. Frequency Distribution of Respondents based on EFW

EFW	Frequency (f)	Percentage (%)
Appropriate	62	62.0
Inappropriate	38	38.0
Total	100	100.0

Source: Primary data, processed in 2021

Table 2 depicts that out of 100 respondents, 62 (62.0%) had appropriate EFW and 38 (38.0%) had inappropriate EFW.

b. Univariate analysis

Table 3. The relationship between Pregnant Mothers' Mid Upper Arm Circumference (MUAC) and Estimated Fetal Weight (EFW).

MUAC	EFW						P Value
	Appropriate		Inappropriate		Total		
	F	%	F	%	F	%	
Normal (> 23.5 cm)	57	79.2	15	20.8	72	100	
Abnormal (< 23.5 cm)	5	17.9	23	82.1	28	100	0.000
Total	62	62.0	38	38.0	100	100	

- *Chi-Square* test

Source: Primary data, processed in 2021

Table 3 shows that out of 100 respondents, 57 (79.2%) have a normal MUAC with a appropriate estimated fetal weight (EFW) and 23 (82.1%) have an abnormal MUAC with an inappropriate EFW. The p value for the chi-square statistical test was determined to be 0.000 < 0.05, indicating that there was a relationship between MUAC of pregnant women and estimated fetal weight. This suggests that a pregnant woman's upper arm circumference has a significant impact on the fetus's development in the womb.

The MUAC test can be used to assess whether or not a pregnant woman has Chronic Energy Deficiency (CED). CED can cause the fetus' nutritional reserves in the womb to be insufficient, resulting in impaired fetal development (Ningrum and Cahyaningrum, 2020). The higher the MUAC of pregnant women, the larger the baby to be born; conversely, the lower the MUAC of pregnant women, the smaller the baby to be born and not according to gestational age. So by monitoring the nutritional status of pregnant mothers, we can find out the development of the fetus in the womb (Hidayah, Khusna, & Azizah, 2015).

Discussion

A p value of 0.000 < 0.05 was obtained from the results of the chi-square statistical test, indicating that there is a relationship between MUAC of pregnant women and estimated fetal weight. This indicates that a pregnant woman's upper arm circumference has a significant impact on the fetus's development in the womb.

To determine the CED status of pregnant women, MUAC measurement is required with the aim of being able to anticipate and monitor nutritional status during pregnancy. If the mother's nutritional needs are not met for an extended period of time, the fetal growth process will be impeded (Liu, Sowmya, & Khamis, 2018). As a result, it is critical to monitor CED moms as early as possible to avoid delaying the development of the placenta, which is a critical tool for the fetus in the womb to obtain nutritional intake, oxygen, and other needs in order to maintain fetal growth and development (Ningrum & Cahyaningrum, 2020).

The measurement of nutritional status in pregnant women is critical in order to understand how the nutrition of pregnant women affects the fetus' growth. Furthermore, because the nutritional status of pregnant women influences the weight of the infant born, it is critical to keep track of the mother's nutritional status. To help the growth and development of the fetus in the womb, enough maternal nutritional intake is required both before and after pregnancy. If the mother is malnourished, the intake given to the fetus will be difficult to meet, resulting in stunted fetal growth (Fitriyani, Aisyah, & Suparni, 2020).

According to Puspitasari's (2019) research, there is a correlation between the circumference of the mother's upper arm and the estimated weight of the fetus. Pregnant women receive counseling in their communities that pregnant women with MUAC 23.5 cm are at risk of having low birth weight babies (Puspitasari, 2019). As a result, they place a higher priority on nutritional consumption during pregnancy. Fitriyani (2020) found a significant relationship between pregnant women's MUAC and birth weight. 95.8 percent of moms who have CED are at risk of giving birth to babies with low birth weight (Fitriyani, Aisyah & Suparni, 2020).

Conclusion and Suggestion

The conclusion in this study is that there is a relationship between pregnant women's Mid Upper Arm Circumference (MUAC) and their estimated fetal weight. The mother's nutrition during pregnancy will affect the weight of the fetus in the womb. Mother with better nutrition will give birth to a healthy baby. Following this study, it is hoped that more research will be needed on other factors that can affect the growth of the fetus in the womb.

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