ASSOCIATION BETWEEN THIRD TRIMESTER MID-UPPER ARM CIRCUMFERENCE (MUAC) AND ANEMIA IN NEONATUS

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ABSTRACT

Introduction: Nutritional problems in pregnant women in Indonesia reach 50%, this is still a concern. Based on Basic Health Research (Riskesdas) 2018, 17.5% CED pregnant women in Central Java. Mid-Upper Arm Circumference (MUAC) is an examination to determine nutritional status of pregnant women. Poor nutritional status can cause anemic neonates. According to research at RSUP Dr. Hasan Sadikin Bandung 2018, prevalence of anemic neonates is 14.5% which is still a problem.
Objectives: This study aimed to determine relationship between MUAC in third trimester and incidence of anemic neonates.
Methods: This study used a cohort study of pregnant women and neonates at Dr. Oen Solo Baru. The sampling technique was purposive sampling. The samples were 80 respondents with the independent variable being MUAC in third trimester and the dependent variable being anemic neonates. Data were analyzed using Spearman's correlative test.
Results: In 40 (50%) respondents with normal MUAC which is 23.5 – 28.5 cm, there were 31 (77.5%) normal haemoglobin (Hb) neonates and 9 (22.5%) anemic neonates. In 40 people (50%) were malnourished which is <23.5 cm, there were 13 (32.5%) normal Hb levels neonates and 27 (67.5%) anemic neonates. Based on statistical tests, there is a relationship between third trimester MUAC and incidence of anemic neonates with p = 0.000 (<0.05) and the correlation coefficient value is 0.452 which indicates a sufficient correlation.
Conclusions: The conclusion is there is a relationship between MUAC for pregnant women in third trimester and incidence of anemic neonates.

Keywords: *Third trimester pregnant women, MUAC, anemic neonates*

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INTRODUCTION

Nutritional problems in pregnant women in Indonesia reached 50%, which is still a concern because of the high number of nutritional problems. The problem of malnutrition in women can be seen in the high rate of Chronic Energy Deficiency (CED) which is 14.4% and 17.3% in pregnant women, according to the Ministry of Health 2018. Based on the 2018 Basic Health Research (Riskesdas) data, it was found that pregnant women with CED were 17.5 % in Central Java. (1) Pregnant women are susceptible to nutritional problems because there is a relationship between their needs for themselves and the process of fetal growth. (2) The nutritional status of pregnant women is one of the determinants of the health of the baby to be born. (2) Nutritional disorders include chronic energy deficiency, anemia, and iodine deficiency.

The nutritional status of pregnant women can be determined by using one of the following methods, namely weighing or weighing the condition of the body weight and height called Body Mass Index (BMI), Mid-Upper Arm Circumference (MUAC), and checking the mother's hemoglobin (Hb) level. Maternal weight gain during pregnancy is approximately 10-12 kg, the normal value of the MUAC is 23.5 cm, and the normal Hb level is 11-13 g/dL. (3) In this study, the measurement of the nutritional status of pregnant women using the MUAC was due to This requires only one measurement, can be used in an emergency, and in pregnant women who experience edema rarely can affect the upper arm. The thickness of the skin folds of the upper arm indirectly measures fat mass as energy storage and muscle as a protein reserve in the body of pregnant women. (4)

In Indonesia, the prevalence of anemia in newborns is still rarely calculated. According to research at RSUP Dr. Hasan Sadikin Bandung, in 2018, the prevalence of babies born with anemia was 14.5%. (5) Normal Hb in newborns was an average of 17 g/dL. Anemia in infants can be classified into physiological anemia and pathological anemia. In anemic infants, brain function disorders such as motor development disorders, reduced cognitive abilities, behavioral disorders, and hearing and vision problems can appear (6).

Based on the existing theory regarding the relationship between the nutritional status of pregnant women can affect the fetus's growth and development, this study aims to determine the relationship between the third trimester MUAC and the incidence of anemia in babies born.

METHOD

This research is an observational analytic study that was conducted prospectively, which is research that looks for the relationship between variables. The study design used the cohort method regarding the relationship between Mid-Upper Arm Circumference (MUAC) in the third trimester and the incidence of anemic babies born. The independent variable was Mid-Upper Arm Circumference (MUAC) in the third trimester, and the dependent variable was anemic babies born.

The population in this study was 143 pregnant women and their babies born at Dr. Hospital. Oen Solo Baru from 20 July 2021 – 16 September 2021. The samples included in this study were 80 pregnant women and their babies who gave birth at Dr. Oen Solo Baru Hospital and met the inclusion and exclusion criteria. The inclusion criteria were single intra-uterine pregnant women with a gestational age of 37-41 weeks who gave birth at Dr. Oen Solo Baru Hospital; then, the exclusion criteria were pregnant women with hypertension (> 140/90 mmHg), pregnant women with diabetes mellitus, pregnant women with anemia (Hb < 11 g/dL), babies with severe asphyxia (APGAR score 0-3), babies born with severe congenital abnormalities, and babies born weighing <2500 grams.

The tools and materials used for this research are MUAC tape and data from the results of blood tests for newborns. MUAC variable scale is ordinal, and the newborn hemoglobin variable scale is nominal. The statistical test used is the *Spearman* test to determine whether there is a relationship between the two variables.

RESULTS

Table 1 shows the characteristics of the respondents; namely, there are MUAC respondents, 40 people (50%) are normal, ≥ 23.5 – 28.5 cm, and 40 people (50%) are malnourished, < 23.5 cm. In addition to pregnant women, this study also requires babies from these mothers to be respondents. According to the table, there were 44 (55%) newborns or neonates with normal hemoglobin levels and 36 (45%) neonates with anemia.

Table 1. Characteristic of Respondents

MUAC	Total Respondents (n=80)	Persentage (total = %)
> 28,5 cm	0	0
≥ 23,5 – 28,5 cm	40	50
< 23,5 cm	40	50
Neonatus Hb		
Normal	44	55
Anemia	36	45

The relationship between maternal MUAC and newborn hemoglobin levels, as shown in Table 2, is a significance value or p = 0.000 (α = 0.05), so there is a significant relationship between third trimester MUAc and variable hemoglobin levels. The correlation coefficient value from the analysis test is 0.452, which is interpreted as a sufficient correlation. The + value in the correlation coefficient indicates that the relationship between the two variables is unidirectional.

Table 2. Relationship Between MUAC and Newborn Haemoglobin

Variable	Neonatus Hb				
	Hb Normal (%)	Anemia (%)	Total (%)	P Value	Coefficient
LILA > 28,5 cm	0 (0%)	0 (0%)	0 (0%)	0,000	0,452
LILA ≥ 23,5–28,5 cm	31 (77,5%)	9 (22,5%)	40 (100%)		
LILA < 23,5 cm	13 (32,5%)	27 (67,5%)	40 (100%)		
Total	44	36	80		

DISCUSSION

The results of this study showed that in pregnant women with MUAC < 23.5 cm, there were 27 babies (67.5%) with anemia, while in pregnant women with MUAC 23.5–28.5 cm, there were nine babies (22.5%) with anemia. This proves that there is a match between the study's results and the theory Sari stated in 2017. (7) Based on the results of S. de Sá's research, poor nutritional status is one of the factors that cause babies to be born with anemia because the iron storage period begins when the baby is still young. (8) In pregnant women with good nutritional status, babies are still born with anemia. This may occur because there are several other causes, namely thalassemia, hereditary erythrocyte membrane abnormalities such as hereditary spherocytosis, hereditary xerocytosis, hereditary elliptocytosis, and genetic disorders such as Diamond-Blackfan anemia, which is difficult to check (9). Another thing that can affect this is the quality of food pregnant women consume because the number of calories is sufficient, but low nutrients can not help the body work optimally (10).

The results of this study also follow the theory contained in Ningrum's research in 2020 that poor nutrition in pregnant women will affect the fetus and can cause babies born with anemia, infant mortality, miscarriage, congenital disabilities, and

low birth weight. (4) So it is expected that pregnant women can maintain adequate nutrition for maternal energy reserves and for fetal growth, whose nutritional adequacy can be measured by measuring MUAC 23.5–28.5 cm. (4) Pregnant women with MUAC < 23.5 cm are expected to increase consumption of better nutrition to reduce the risk of Chronic Energy Deficiency (CED) in pregnant women.(11)

The conclusion from the results of the research carried out was that normal MUAC pregnant women in the third trimester gave birth to babies with normal hemoglobin levels with a percentage of 77.5%. In the third trimester, pregnant women with malnourished MUAC gave birth to babies with normal hemoglobin levels with a presentation of 32.5%. There was a significant relationship. There was a significant relationship between MUAC for pregnant women in the third trimester and the incidence of anemic babies.

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