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Association of Upper Arm Circumference and Vitamin D Levels in Third Trimester of Pregnancy with Birth Weight and Body Length

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***Abstract*—Background: The aim of the study determine the association of upper arm circumference and vitamin D levels in third trimester of pregnancy with birth weight and body length. Methods: The study was conducted using a cross sectional study. The study was conducted at working area in Pariaman City and West Pasaman, West Sumatera Province, Indonesia from September to December 2018. The population in this study were third trimester of pregnant mother, sample size 58 people. Sampling technique with multistage random sampling. Hypothesis test used pearson correlation. A two-tailed *P*-value of <0.05 was considered statistically significant. Results: The mean of pregnant woman's arm was 26.615 cm. The mean of vitamin D levels in pregnant women was 31.940 ng/ml The mean newborns weight in the normal range. The mean of baby's weight was 3,094 grams. The mean of baby's body length was 48.59 cm. There was a very weak positive correlation and between upper arm circumference pregnant women and newborn weight. There was a very weak positive correlation and not statistically significant between upper arm circumference pregnant women with body length. There was a very weak negative correlation and not statistically significant between Vitamin D levels of pregnant women with body length. There was a very weak negative correlation and statistically significant between the vitamin D levels of pregnant women and the baby's body weight. Conclusion: The better of upper arm circumference is not an indicator of normal birth weight and body length, so does vitamin D levels in the blood.**

***Index Terms*— Upper arm circumference, vitamin D, birth weight, body length**

I. Introduction

Maternal nutritional status in Indonesia is an important problem because of the high number of malnutrition conditions. Many studies have shown that to improve a pregnancy outcomes, such as birth weight, intervention through improving maternal nutritional status before pregnancy is more effective than supplementation during pregnancy. Nutrition improvement program should have been started before pregnancy, including increasing micronutrient intake and increasing body weight before pregnancy [1].

The period of pregnancy is the time a woman needs a variety of nutritional elements that are far more than is needed in ordinary circumstances. anatomy, physiology and biochemistry in the mother have a major impact on the mother's diet and nutritional needs. Changes are useful for regulating the metabolism of the mother, supporting fetal growth, preparation of the mother for childbirth, birth, and breastfeeding [2,3].

Besides upper arm circumference for pregnant women, vitamin D also affects the growth of babies born. Vitamin D is the genetic name of two molecules, namely ergocaliferol (Vitamin D2) and colecalciferol (vitamin D3). Vitamin D precursors are present in sterol fractions in animal tissues (under the skin) and successive plants in the form of 7-dehydrocholesterol and ergosterol. Both require ultraviolet light radiation to change it in the form of D3 (kolekalsiferol) and D2 (ergocalciferol). Both provitamins require conversion into their active form through the addition of two hydroxyl groups. The first hydroxyl group is added to the liver at position 25 to form 25-hydroxy-vitamin D. The second hydroxyl group is added to the kidney to form 1.25 dihydroxycolecalciferol, known as calcitriol, while those from plants form 1,25 dihydroxy elgocalciferol , known as ercalcitriol. Both forms of vitamin D are effective for humans. Plant forms are mainly used as food additives [4]. Factors causing vitamin D deficiency are genetic factors, sun exposure, impaired vitamin D absorption, body characteristics, drug side effects, sunscreen, physical activity and lack of vitamin D intake [5].

Weight and height are one of the important and often used anthropometric measurements. Therefore, body weight can also be a benchmark for assessing physical growth and nutritional status of newborns [6].

The aim of the study determine the association of upper arm circumference and vitamin D levels in third trimester of pregnancy with birth weight and body length.

II. Materials and Methods

A. Study Design and Research Sample

The study was conducted using a cross sectional study. The study was conducted at working area in Pariaman City and West Pasaman, West Sumatera Province, Indonesia from September to December 2018. The population in this study were third trimester of pregnant mother, sample size 58 people. Sampling technique with multistage random sampling

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B. Operational Definitions

The variables of this study included independent variables: upper arm circumference and vitamin D level and dependent variables are birth weight, body length.

C. Data Collection Technique

This study was approved by the Ethical Committee of Medical Faculty, Universitas Andalas. The measurement of upper arm circumference with upper arm circumference band and vitamin D levels used *Enzyme-linked immunosorbent assay* (ELISA) method. Birth weight used birth weight scales and body length used *infantometer*.

D. Data Analysis

The quantitative variables were recorded as Mean±SD, median and percentage. Test the normality of data by Kolmogorov-smirnov test and hypothesis test used pearson correlation. A two-tailed *P*-value of <0.05 was considered statistically significant. Data were analyzed using the SPSS version 21.0.

III. RESULTS

Characteristics of respondents (Table 1).

Table 1: Characteristics of respondents

Characteristics	Mean±SD (n=58)
Age (years)	30.50 ± 7.17
Parity	1.98 ± 1.67
Distance between pregnancies	2.79 ± 2.81

Table 1 showed mean of respondent age (30.50 ± 7.17 years), parity (1.98 ± 1.67) and distance between pregnancies (2.79 ± 2.81)

Table 2: Mean of upper arm circumference, vitamin D level, birth weight and baby body length

Variables	Mean (SD)
Upper arm circumference (cm)	26.62 ± 3.38
Vitamin D level (ng/ml)	31.94 ± 11.43
Birth weight (gram)	3094.83 ± 560.21
Baby body length (cm)	48.59 ± 1.58

Table 2 showed the mean of upper arm circumference (26.62 ± 3.38 cm), vitamin D level (31.94 ± 11.43 ng/ml), birth weight (3094.83 ± 560.21 gram), baby body length (48.59 ± 1.58 cm).

The association of upper arm circumference and vitamin D levels in third trimester of pregnancy with birth weight and body length (Table 3).

Table 3: Association of upper arm circumference and vitamin D levels in third trimester of pregnancy with birth weight and body length

Variables	Pearson correlation (r)	p
Upper arm circumference with birth weight	0.023	0.260
Upper arm circumference with baby body length	-0.031	0.190
Vitamin D level with birth weight	-0.001	0.800
Vitamin D level e with baby body length	0.004	0.600

Table 3 known the mean of vitamin D levels in pregnant women was 31.940 ng/ml The mean newborns weight in the normal range. The mean of baby's weight was 3,094 grams. The mean of baby's body length was 48.59 cm. There was a very weak positive correlation and between upper arm circumference pregnant women and newborn weight. There was a very weak positive correlation and not statistically significant between upper arm circumference pregnant women with body length. There was a very weak negative correlation and not statistically significant between Vitamin D levels of pregnant women with body length. There was a very weak negative correlation and statistically significant between the vitamin D levels of pregnant women and the baby's body weight.

IV. DISCUSSION

The results of this study known the better of upper arm circumference is not an indicator of normal birth weight and body length, so does vitamin D levels in the blood.

Previous study found that children who were given vitamin D supplements were able to influence their height growth. While in children who were not given vitamin D supplements did not experience significant growth. The content contained in Vitamin D is very good for bone health, especially for bone growth in children. Vitamin D works by absorbing calcium to ensure adequate calcium in the body to support the growth of the child's bones [7].

Based on the results of this study states that there is no significant relationship between variables is caused by multifactorial, namely: pregnant women at a young age, demographic factors, maternal biology, obstetric history, maternal morbidity during pregnancy, antenatal care and toxic exposure [8].

In the results of this study states that there is no significant relationship between the levels of vitamuin D and the body length of newborns because there are other influencing factors, namely the maternal environment (age and parity, maternal nutritional status, disease, smoking and alcohol and socio-economic status), uteroplacental and fetal functions [7,8].

The results of this study states that there is no significant relationship between vitamuin D levels and the body length of newborns because there are factors that are small cases of disturbances that limit the absorption of vitamin D in the body. Conversely, the hormones and growth factors produced

by the mother and fetus can also regulate placental development [9,10].

Based on researcher analysis the better of upper arm circumference is not an indicator of normal birth weight and body length, so does vitamin D levels in the blood. So that it does not need to be held by the health department giving vitamin D to pregnant women.

V. CONCLUSION

The conclusion of this study confirmed the better of upper arm circumference is not an indicator of normal birth weight and body length, so does vitamin D levels in the blood.

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