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Effect of Insulin-Like Growth Factor-1 Serum Maternal with Newborn Baby Weight in Pregnant Women Chronic Energy Lack

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ABSTRACT
Pregnancy is the most important period for fetal growth. One of the factors that influence the success of pregnancy is the nutritional status of the mother previously and during pregnancy. Dietary status is said to be good if there is a balance between the amount of energy entering the body and the energy expended according to individual needs. The process of fetal growth requires energy obtained from the calories that the mother consumes. Along with the increase in gestational age, the need for energy for the process of fetal growth also increases. The purpose of this study was to determine the relationship between IGF-1 levels and newborn body weight in pregnant women with chronic energy deficiency. This research was conducted at the Lubuk Kilangan Health Center and the Bungus Health Center in May-July 2021. This study utilized a cross-sectional review strategy with an example of 40 pregnant women with persistent energy insufficiency. The consequences of this study concluded that there was a critical connection between maternal serum IGF-1 levels and infant birth weight at the Lubuk Kilangan Health Center and the Bungus Health Center Regency (p = 0.001; r = 0.493).

Keywords: *Chronic Energy Deficiency, IGF-1, Birth Weight*

1. INTRODUCTION

Pregnancy is an important period for fetal growth. One of the factors that influence the success of pregnancy is maternal nutritional status before and during pregnancy.[1] Nutritional status is said to be good if there is a balance between the amount of energy entering the body and the energy expended according to individual needs. The process of fetal growth requires energy obtained from the calories that the mother consumes. Along with the increase in gestational age, the energy requirements for the process of fetal growth increase.[2]

Problems that occur in pregnancy-related to nutritional status and deviant energy intake, one of which is chronic energy deficiency. Chronic energy deficiency (CED) is a condition where pregnant women suffer from food shortages or malnutrition that lasts a long time (chronic) with the emergence of various health problems in pregnant women.[3]

Based on Basic Health Research data, it is known that the prevalence of ladies of childbearing age who experience the ill effects of ongoing energy inadequacy in Indonesia reaches 24.2%. Meanwhile, the number of WUS in West Sumatra Province who experienced chronic energy deficiency was 20.9%. From the survey results in Padang City Health Department in 2014, there were 944 people or 4.9% of pregnant ladies who experience the ill effects of ongoing energy insufficiency. This expanded from the year 2013, which just got 888 votes or 4.4% of pregnant ladies who experience persistent energy lack.

Pregnant ladies with ongoing energy lack are in danger of bringing forth coddles with low birth weight (LBW) and short babies (stunting) (Ministry of Health of the Republic of Indonesia, 2015). Short babies (stunting) will grow into stunted adults and are at high risk of cognitive and neurological disorders. In addition, babies with low birth weight are more at risk for cardiovascular disease and type 2 diabetes mellitus as adults.[4]

The pervasiveness of births with low-birth-weight babies and stunting in Indonesia based on Riskesdas 2013, was reported to be 10.2% and 37.2%, respectively. Meanwhile, the LBW and Stunting rates in West Sumatra Province are 7.3% and 40%, respectively. The incidence of stunting in the city of Padang in 2015 was 15%, and the incidence of LBW in the city of Padang in 2014 was

reported to be 1.74% This number increased from the previous year, where in 2013 the incidence of LBW in the city of Padang was 1%.

The interaction between genetic factors, maternal nutrition, hormonal, intrauterine environmental factors and the ability of the placenta to transport maternal nutrients to the fetus greatly affects fetal growth. Ideal intrauterine development is fundamental for fetal turn of events and adds to long haul wellbeing. Pregnant women with chronic energy deficiency or malnutrition are associated with several side effects on the endocrine system, including reduced concentrations of circulating insulin-like growth factor 1 (IGF-1) in the mother's body.[5]

Insulin-like Growth Factor 1 (IGF-1) is a polypeptide chemical delivered basically by the liver because of improvement Endocrine Growth Hormone (GH)8. Insulin-like Growth Factor 1 is one of the fundamental controllers of intrauterine development. As indicated by Gluckman (2013), IGF-1 assumes a part in fetal development, particularly at cutting edge gestational age. During pregnancy, maternal IGF-1 might influence fetal development through consequences for maternal and placental digestion.[6], [7]

Maternal IGF-1 can affect several nutrient transporters in the placenta, including glucose, protein and fatty acid transporters, where during pregnancy protein and micronutrients are needed to build potential height (rapid increase in cell number) and energy is needed to build potential bodyweight (rapid growth). increase in cell size).[2]

2. RESEARCH METHODS

The research design used was a cross-sectional study. The study was conducted in the period May-July 2021 at the Lubuk Kilangan Health Center and the Bungus Health Center. The population of this study were all pregnant women (37-42 weeks) with chronic energy deficiency who were at the Lubuk Kilangan Health Center and Bungus Health Center. The number of study samples as many as 40 pregnant women with chronic energy deficiency were selected consecutively sampling that met the criteria of inclusion and exclusion until all the required samples were met. The examination factors were pregnant ladies with ongoing energy lack and maternal IGF-1 levels. The data were collected through examination of maternal IGF-1 levels, then the data was entered into Microsoft Excel and processed using the SPSS application with the Chi-Square test (α=0.05)

3. RESULTS

Characteristics of Research Respondents

Characteristics	N	Median	Mean ± SD	Min-Max
Age (years)	40	26	28,83±3,86	20-35
age Pregnancy	40	39	39,15±0,86	37-41
parity	40	2	1,83±0,95	0-4
Mother's Weight Gain	40	9,5	10,28±1,28	7-12
Mother's Height	40	154	156,57±4,73	147-165
IMT (kg/m^2)	40	16,5	17,62±0,45	16-17,3

Table 1. Characteristics of Pregnant Women

Table 2. Mean IGF-1 and Newborn Weight

Family History of Diabetes Mellitus	N	Median	Mean±SD	Min-Maks
IGF-1 levels (ng.mL)	40	151,44	153,47±27,68	110,92-198,72
Birth Weight (grams)	40	2800	2780±222,11	2300-3100

Based on table 2. the average value of the intervention group before is 0.75 with a standard deviation of 0.46, while after the intervention the average value is 0.12 with a standard deviation of 0.35 for nausea and vomiting in the Intraoperative Anesthesia Patient Intervention Group. Spinal in the Central Surgical Installation of the Padang Panjang City Hospital in 2019.

4. DISCUSSION

The results of the univariate analysis in Table 1 show that the average maternal age is 28.83±3.86 with a minimum value of 20 years and a maximum of 35 years, the average maternal gestational age is 39.15±0.86 with a minimum value of 37 weeks. and a maximum of 41 weeks, the average maternal parity was 1.83±0.95, with a minimum value of 0 children and a maximum of 4 children, the average maternal

weight gain was 10.28±1.28 with a minimum value of 7 kg and a maximum of 12 kg, on average, the mother's height is 156.57±4.73 with a minimum value of 147 cm and a maximum of 165 cm, the average maternal BMI is 17.62±0.45 with a minimum value of 16 kg/m² and maximum 17.3 kg/m². Table 2 shows that the median IGF-1 level of CED pregnant women is 151.44 ng/mL with an average value of 153.47±27.68, the median birth weight of infants is 2800 grams with an average value of 2780±222. ,11.

Bivariate analysis using Spearman correlation can be seen in Figure 1 Scatter Plot which shows that there is a huge positive relationship with moderate strength between maternal serum IGF-1 levels and infant birth weight (p = 0.001; r = 0.493). Can be seen in the picture below R^2=0.241 means that 24.1% of IGF-1 levels affect newborn weight while 75.9% is influenced by other factors.

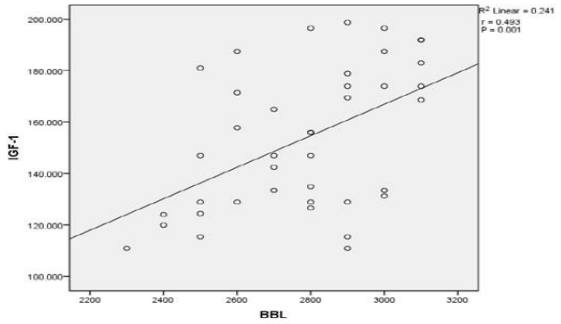

Figure 1. Scatter Plot of Relationship between IGF-1 Levels and Infant Birth Weight

Figure 2 in the Box Plot shows that there are differences in maternal serum IGF-1 levels between moms who brought forth indulges weighing 2,500 grams and moms who brought forth pampers gauging > 2,500 grams (p=0.007).

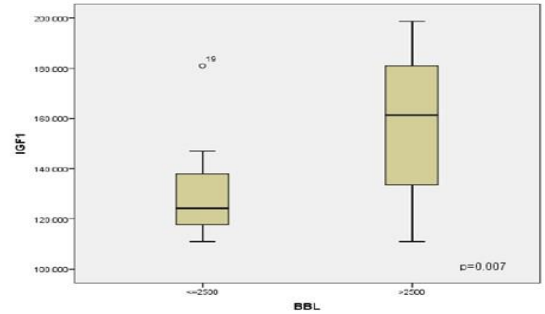

Figure 2. Box Plot of the difference in IGF-1 levels between mother and baby 2500 grams and babies > 2500 grams

The results of statistical tests showed that there was a significant positive relationship with moderate strength between maternal serum IGF-1 levels and newborn child birth weight (p=0.001; r=0.493 and R^2=0.241). , the greater the birth weight of the baby, where maternal IGF-1 contributed 24.1% to birth weight, while the remaining 75.1% was influenced by other factors not studied.

The aftereffects of this review are in accordance with the exploration of Lima et al. (2004) who discovered a connection between maternal IGF-1 levels and birth weight with a worth of r=0.37 ($p<0.05$). The review configuration utilized was a case-control study with two example groups, healthy pregnant women with a fetal weight <2,500 grams and healthy pregnant women with a fetal weight of 2,500 grams.[8], [9]

IGF-1 and mTOR persilan in the trophoblast is the main regulator of the transport of amino acids in the placenta obtained through the mother's hormone insulin, where the fetus needs amino acids for the process of forming tissues and organs.In addition, what is needed for fetal growth is glucose which is one of the important nutrients, where the production of fetal blood sugar is very minimal, making the fetus rely entirely on the supply of glucose from maternal circulation through the placenta.[9]

Maternal hormones such as insulin, IGF-1 and mTOR signalling in the trophoblast are the main regulators of amino acid transport in the placenta, where amino acids are needed by the fetus for the process of forming tissues and organs. Glucose is also one of the important nutrients in fetal growth, the production of fetal blood sugar is very minimal, making the fetus fully dependent on the supply of glucose from the maternal circulation through the placenta.[10], [11]

5. CONCLUSIONS

Based on the results of research at the Lubuk Kilangan Health Center and Bungus Health Center, there is a significant positive relationship between maternal IGF-1 levels and newborn weight, meaning that the higher the maternal IGF-1 level, the greater the birth weight of the baby.

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