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Article

Relationship Between The Amount Of Protein Intake And The Weight Gain Of Pregnant Women During Pregnancy With Low Birth Weight Babies

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ABSTRACT

Protein intake is the main determinant in the survival, growth and development of the embryo while weight gain during pregnancy is needed to support the development and growth of the fetus in the womb. Birth weight is also related to the fulfillment of nutrition during pregnancy, where the fulfillment of maternal nutrition can be measured through its anthropometry, specifically body mass index during pregnancy. This study aims to prove the relationship between the amount of protein intake and the weight gain of pregnant women during pregnancy with the baby's birth weight. This research method was analytic observational with a case control design. The research subjects were mothers who had babies with normal and low birth weight who met the inclusion and exclusion criteria. The sampling technique was purposive sampling. The research instrument was using the SQ-FFQ questionnaire about protein intake with interviews by nutritionist enumerators. Statistical test was using Chi-square correlation. A total of 32 research subjects, the majority aged 20-35 years (81.2%), moderated educational status (62.5%), low economic status (50%), parity was not at risked (84.4%), weight gain was appropriated (56.3%) and low protein intake (53.1%). The result was a relationship between the amount of protein intake and the weight gain of pregnant women during pregnancy with the birth weight of the baby with a p-value 0.013 and there was a significant relationship between the weight gain of pregnant women during pregnancy and the birth weight of the baby with a p-value 0.021.

INTRODUCTION

Pregnancy is a critical or golden period of short human growth and development and is part of the Window of Opportunity, which affects the health of the mother and fetus[1]. Food intake during pregnancy is different from intake before pregnancy, one of which is protein intake. Protein intake is the main determinant in the survival, growth and development of embryos. The main function

of protein in pregnant women is for metabolism, cell function and fetal formation, changing gene expression in the fetal genome so that the baby can be born normally. It also functions to support, maintain, and distribute food to the baby[2].

The mother's weight gain during pregnancy directly affects the birth weight of the baby, where if the mother's weight changes are inappropriate, it will cause various complications for the fetus. The mother's weight gain during pregnancy is directly related to the weight of her baby and the risk of giving birth to LBW (Low Birth Weight) increases with the lack of weight gain during pregnancy[3]. Birth weight is an indicator of the health of newborns, babies with low birth weight (<2500 grams) or Excess (>4000 grams) will have a greater risk of experiencing future problems[4].

The neonatal mortality rate (AKN) in Central Java in 2019 was 5.8 per 1,000 live births. Efforts to reduce neonatal mortality rate (0-28 days) are important because neonatal deaths contribute to 69.9 percent of infant deaths in Central Java. 46.4 percent of neonatal deaths in Central Java Province in 2019 were caused by LBW[5]. Based on data from the Central Java Province's Central Statistics Agency, highlights a significant increase in the number of LBW babies in Semarang between 2020 and 2021. Specifically, the number of LBW babies increased from 797 in 2020 to 1,094 in 2021, which means an increase of 297 cases. This sharp increase could indicate a variety of potential factors, including changes in maternal health, access to health services, or socioeconomic conditions[6].

In this case, the nutritional intake of pregnant women affects the health of the mother and fetus. The baby's birth weight is also related to nutritional requirements during pregnancy, one of which is the need for macronutrients such as protein intake during pregnancy so that the baby is born healthy. The nutritional intake of pregnant women also greatly influences the mother's weight gain, which is one of the determining factors in the birth weight of the baby[3,7]. Therefore, the author was interested in conducting research on the relationship between the amount of protein intake and weight gain during pregnancy on the birth weight of the baby. at the Kedungmundu Health Center, Semarang City.

METHODS

This research is quantitative research in the form of an analytical observation study, case control method and a retrospective approach. The cases in the study were low birth weight babies, while the controls in this study were normal birth weight babies. In the case sample, the inclusion criteria were mothers who had babies with LBW, had routine records of antenatal care visits during pregnancy at least 4 times, and were willing to be respondents. Exclusion criteria were premature babies, mothers who did not know their pre-pregnancy weight more than 1 month of

gestation, did not have a Maternal and Child Health Handbook (KIA book), twin babies. In the control sample, the inclusion criteria were mothers who had babies with normal birth weight, had routine records of antenatal care visits during pregnancy at least 4 times, and were willing to be respondents. Exclusion criteria were premature babies, mothers who did not know their pre-pregnancy weight more than 1 month of gestation, did not have a KIA book, twin babies. Then it is traced retrospectively to assess whether there are influencing risk factors. This research was carried out November 2020-March 2023 by looking at all the data on babies with Normal Birth Weight (BBLN) and Low Birth Weight (BBLR) by looking at medical record data at the Kedungmundu Health Center. The population of this study was all babies with BBLN and BBLR at the Kedungmundu health center between years 2021-2022. This sample was selected using a purposive sampling technique. There were 16 cases and 16 controls as research subjects. This research has received ethical permission from KEPK FK Unimus with No. 001 / EC / KEPK-FK / UNIMUS / 2023.

RESULTS

Table 1. Univariate Analysis Results

Variable	Case (n=39)		Control (n=39)		Total (n=78)	
	n	%	n	%	N	%
Mother's Age						
At risk (<20/>35)	4	25	2	12,5	6	18,8
No Risk (20-35)	12	75	14	87,5	26	81,2
Educational Status						
Low (Primary to Middle School)	6	37,5	5	31,3	11	34,4
Medium (High School/Senior High School)	10	62,5	10	62,5	20	62,5
High (Bachelor)	0	0	1	6,3	1	3,1
Economic Status						
Low	9	56,3	7	43,8	16	50
Currently	6	37,5	6	37,5	12	37,5
Tall	1	6,3	3	18,8	4	12,5
Parity						
Risky (0/>4x)	3	18,8	2	12,5	5	15,6
No Risk (2-4x)	13	81,3	14	87,5	27	84,4
Weight Gain						
It's not in accordance	11	68,8	3	18,8	14	43,7
In accordance	5	31,3	13	81,3	18	56,3
Protein Intake						
Low (<80%)	12	75	5	31,3	17	53,1
Fair (80-110%)	4	25	8	50	12	37,5
More (>110%)	0	0	3	18,8	3	9,4

Based on the univariate table, the majority of respondent's age is not at risk (81.2%), the majority of respondent's educational status is medium level (High School/Senior High School) (62.5%), the majority of respondents' economic status is low economic (50%), the majority of respondents had no risk parity status (84.4%), the majority of respondents had appropriate weight gain during pregnancy (56.3%) and also the majority of respondents had low protein intake (53.1%).

Table 2. Bivariate Analysis Results

Variable	Category	Low Birth Weight Baby				Total		*P value*
		Case		Control				
		n	%	n	%	n	%	
Amount of Protein Intake of Pregnant Women During Pregnancy	Low	12	75	5	31,5	17	53	0,021
	Enough	4	25	8	50	12	37	
	More	0	0	3	18,5	3	10	
Pregnant Women's Weight Gain During Pregnancy	It's not in accordance	11	68,8	3	18,8	14	44	0,011
	In accordance	5	31,2	13	81,2	18	56	

The results of the bivariate analysis of the 17 pregnant women who had low protein intake, there were 12 (75%) mothers who had babies with LBW. Meanwhile, of the 12 pregnant women who had an nutritional adequacy rate for protein intake, there were 4 (25%) mothers who had babies with LBW. The results of the Chi-square test which was carried out using the Fisher's Exact Test showed that p-value = 0.021 (<0.05), meaning there is a relationship between the amount of protein intake of pregnant women during pregnancy and LBW.

Then, of the 14 pregnant women who experienced inappropriate weight gain during pregnancy, 11 (68.8%) pregnant women had babies with LBW. Meanwhile, of the 18 pregnant women who experienced appropriate weight gain during pregnancy, there were 5 (31.2%) pregnant women who had babies with Low Birth Weight. The results of the Chi-Square Test which was carried out using the Fisher Exact Test showed that p-value = 0.013 (<0.05), meaning there is a significant relationship between the weight gain of pregnant women during pregnancy and LBW.

DISCUSSION

Referring to the results of statistical tests, there is a significant relationship between the amount of protein intake of pregnant women during pregnancy and LBW. The majority of mothers who have LBW babies have a low protein intake compared to those who have sufficient or more

protein intake. The results of this research are in line with research conducted by Fahmil Usman, which shows that mothers who have LBW babies have a lower protein intake[8]. The nutritional intake of pregnant women is divided into macro and micronutrients. The baby's birth weight is related to nutritional requirements during pregnancy, one of which is the need for macronutrients. The nutritional needs of pregnant women increase with increasing gestational age, growth and development of the fetus along with changes in the mother's tissue and body metabolism[7]. However, this study only examined one macronutrient, the protein intake of pregnant women during pregnancy, which will later be linked to the birth weight of the baby. Protein is the main determinant in the survival, growth and development of embryos. The function of protein in pregnant women is important for metabolism, cell function and fetal formation[8]. Protein intake is very helpful in the fetal growth process during pregnancy [8]. Protein intake during pregnancy is very necessary for the fetal growth process and the embryogenesis process so that the baby can be born normally[4].

Referring to the results of statistical tests, there is a significant relationship between the weight gain of pregnant women during pregnancy and low birth weight babies in the Kedungmundu Health Center working area, Semarang City. The majority of mothers who have LBW babies have inappropriate weight gain during pregnancy. The results of this research are in line with research conducted by Een Husanah et al. that mothers who have babies with LBW experience more inappropriate weight gain than those who have appropriate weight gain during pregnancy.[9] Weight gain during pregnancy is a reflection of the rate of fetal growth that needs to be considered because insufficient or excessive weight gain can cause serious problems for the mother and baby[10].

The majority of mothers who had LBW babies in this study were not at risk, between 20-35 years old. This is in line with research conducted by Apriani which stated that there was no relationship between maternal age and the incidence of LBW, because the age of mothers who were the dominant respondents was 20-35 years (no risk age)[11]. In the healthy reproductive period it is known that the age is safe for pregnancy and childbirth is 20-35 years. At reproductive age (20-30 years) there is maximum response readiness either in terms of learning something or in adapting to certain things and after that it gradually decreases with increasing age. In this age range, women's physical condition is in prime condition.

Most of the mothers who had LBW babies in this study had moderate education status (junior high school). This research is in line with research conducted by Sohibien which states that the mother's latest education influences the incidence of LBW, mothers who do not go to school or have not completed elementary school have a tendency to give birth to babies with LBW. This is due to the mother's mindset, the lower the mother's education, the more difficult it is for the

mother to digest information about her pregnancy so that it can have an impact when giving birth to a LBW baby[12]. The level of education is related to the ease with which an individual can receive information compared to someone with low education. This high level of education can influence a person's knowledge regarding pregnancy. However, knowledge is not only obtained from formal education, but can come from non-formal education such as other information media sources, such as radio, newspapers, the internet and magazines. This indicates that a low level of education does not always result in low knowledge.

The majority of mothers who had LBW babies in this study had low economic status. Economic level is related to the family's ability to meet nutritional needs. High income will increase the opportunity to buy foodstuffs with better nutritional quality and quantity, conversely, low income can be related to low purchasing power of foodstuffs with low nutritional quantity and quality so that it will affect the nutritional fulfillment of pregnant women during pregnancy[13].

The research results show that the majority of mothers with LBW babies do not have high-risk parity. This is in line with Apriani's research which states that there is no relationship between parity and the incidence of LBW babies. This is because mothers are usually more experienced in caring for babies and are better prepared to face pregnancy both mentally and physically[11]. The safest parity for pregnancy and childbirth is parity 2-3. Mothers with parity 1 and >3 are at risk of giving birth to LBW, in primiparas this is related to the unprepared function of the organs in maintaining pregnancy and accepting the presence of the fetus, the mother's skills in carrying out care for herself and her baby as well as the mother's psychological factors which are still unstable. Meanwhile, mothers who have given birth to children 4 times or more because parity is too high will result in disruption of the uterus, especially in terms of blood vessel function[14].

The limitation of this study is that when collecting data through interviews regarding the history of maternal protein intake during pregnancy, there is a possibility that the answers given do not match the truth, respondents tend to forget because the incident was in the past. This research does not differentiate between animal protein and vegetable protein, only protein in general.

CONCLUSION

There is a relationship between the amount of protein intake of pregnant women during pregnancy and low birth weight babies and there is a relationship between the weight gain of pregnant women during pregnancy and low birth weight babies.

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