ORIGINAL ARTICLE

The Relationship between Hemoglobin Levels in Pregnant Women and Liner Growth of New Borns in Bengkulu City Bengkulu Province of Indonesia

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ABSTRACT

Anemia was a public health problem that affect countries with low, middle, or high income. Anemia in pregnant women was very influential on the baby to be born. During pregnancy, the hemoglobin level of pregnant women will decrease due to the hemodilution process, the increased maternal needs and fetus, and the lack of iron intake through supplemented foods. For this reason, the needs of the mother and fetus for iron should be fulfilled. The effect of iron deficiency was not only experienced by the mother but also in the fetus because it caused fetal growth disorders so that the baby will have low birth weight and premature birth. This research objective was to determine the relationship between hemoglobin levels in pregnant women and the growth of newborn liners in Kota Bengkulu. This research used an observational study with a prospective cohort approach. The population was the third-trimester pregnant women with gestational age about 32-40 weeks. The research sample consisted of 89 people, and the sampling technique was the total population. Data analysis was univariate and bivariate using a regression test. The study showed that pregnant women with hemoglobin levels <11 mmHg were 20.2%, and short toddlers were 9.3%. Based on the results of the study, the researchers concluded there was no relationship between hemoglobin levels in pregnant women and the body length of newborns in Kota Bengkulu

INTRODUCTION

In developing countries, pregnant women experience a decrease in iron and vitamin preparations. It was mainly due to inadequate nutrient intake, recurrent infections, frequent menstrual blood loss and pregnancy, socioeconomic conditions, lifestyle, and health search behaviors in various cultures[1]. Pregnant anemia was a risk factor for adverse pregnancy outcomes such as low birth weight, postpartum bleeding, cesarean section, and premature birth. Postpartum bleeding was more often in the hemoglobin group <11 g/dL compared to other groups[2].

Then, pregnant women in Bengkulu Province in 2016 were 43,768 people, while in Kota Bengkulu, out of 7322 pregnant women, 1398 were anemia (19.1%). Moreover, in 2017, pregnant women who received Fe tablets were 82.6% (target 90%), and from 7455 pregnant women, there were 843 people with anemia (11.3%). Based on the explanation of pregnant women's high anemia above, the researchers conduct the research about the relationship between hemoglobin levels in pregnant women and linear growth in Kota Bengkulu in 2018.

MATERIALS AND METHODS

This study was an observational study with a prospective cohort approach that consisted of independent variables (hemoglobin levels, nutrient intake, carbohydrates, protein, fat, vitamin C, and maternal arm circumference) and the dependent variable (body length of newborns). This study used a questionnaire about the respondents' characteristics and the intake of nutrients using a food recall form. Then, the researchers checked hemoglobin levels with a digital easy touch tool and liner growth by measuring the newborn's body length using a length board.

The researchers conducted the research in all Puskemas in Kota Bengkulu with 20 Puskesmas that started from May to October 2018. The population was pregnant women in the third trimester, with inclusion criteria of 32-40 weeks of gestation who visited the Puskesmas in Kota Bengkulu from July to October 2018. the total sample was 89 people. Univariate and bivariate data analysis using regression test.

RESULTS

Table 1 showed that out of 89 pregnant women, most of them were not at risk (87.6%), most of the mother's education that in the middle category (74.2%). Then, the table showed 83.7% of pregnant women who did not work, the mother's height was average about 83, 1%, the mother category's nutritional status that not lack of energy chronic 91%.

Moreover, most of the mother's hemoglobin level was not anemia (79.8%), most of the father's education that in the middle category (77.5%), most of the fathers that working (97.8%), and the father's height was average about (64%). Furthermore, most of the babies' body length was in the normal category (90.7%), and as many as 96.5% of the babies had an average body west.

Table 2 showed pregnant women with no risk of having eight babies born short and obtained p-value 0,589. Then, mothers with nutritional status are not at risk of having seven short babies, obtained p-0.545. The mother's height was not at risk for seven short babies, it obtained p-1.00. Also, mothers with secondary education having six short babies obtained p 0.025. The mothers that did not work having four babies that were born short, obtained p-0.032.

Table 1. The Characteristics of Respondents in research on the Relationship between Hemoglobin Levels and Liner Growth in Kota Bengkulu in 2018

No	Research Variable	n	%
1.	Age of Mothers		
	a. At risk (≤20 years,.>35 years)	11	12,4
	b. Not at risk (>20-35 years)	78	87,6
2.	Education of Mothers		
	a. Middle (≤ Senior High School)	66	74,2
	b. Higher (Academic/Collage)	23	25,8
3.	Occupation of Mothers		
	a.Working	73	82,0
	b.Not working	16	17,9
4.	Height of Mothers		
	a.< 150 centimeter	15	16,9
	b.≥150 centimeter	74	83,1
5.	Nutritional Status of Mothers		
	a. < 23,5 centimeter	8	9
	b. ≥23,5 centimeter	81	91
6.	Hemoglobin Levels of Mothers		
	a. Anemia	18	20,2
	b. Not anemia	71	79,8
7.	Height of Fathers		
	a.< 162 centimeter	31	34,8
	b.≥162 centimeter	58	65,2
8.	Body Length		
	a. Short	8	9,3
	b. Normal	81	90,7
9.	Birth Weight		
	a. Low birth weight	1	3,4
	b. Normal birth weight	88	96,6

Table 2. Results of bivariate analysis of the relationshipbetween maternal hemoglobin levels and liner growth of newborns in Kota Bengkulu

No	Variable	Birth Length				Total		OR	P value
		Short		Normal					
		n	%	n	%	n	%		
1.	Hemoglobin Levels								
	a. Anemia	2	11,1	16	88,9	18	100	1,354	0,661
	b. No Anemia	6	8,5	65	91,5	71	100		
2.	Age of Mothers								
	a. At risk	0	0	11	100	11	100	1,11	0,589
	b. Not at risk	8	10,3	70	89,7	78	100		
3.	Nutritional Status of Mothers								
	a. At risk	1	12,5	7	87,5	8	100	1,51	0,545
	b. Not at risk	7	8,6	74	91,4	81	100		
4.	Height of Mothers								
	a. At risk	1	6,7	14	93,3	15	100	0,68	1,00
	b. Not at risk	7	9,5	67	90,5	74	100		
5.	Education of Mothers								
	a. Middle	3	4,5	63	95,5	66	100	0,171	0,025
	b. Higher	5	21,7	18	78,3	23	100		
6.	Occupation of Mothers								
	a. Working	4	25	12	75	16	100	0,174	0,032
	b. Not working	4	5,5	69	94,5	73	100		
7.	Weight of Newborn								
	a. Low birth weight	0	0	1	100	1	100	0,910	1,00
	b. Normal	8	9,1	80	90,9	88	100		

DISCUSSION

Babies born with short body lengths were influenced by the fulfillment of the baby's nutrition while still in the womb. Body length for newborns described the linear growth of the baby during pregnancy. Low linear measurements usually indicated under nutrition due to lack of energy and protein from infants and mothers[4].

Inadequate maternal nutritional intake before pregnancy caused growth problems in the fetus, causing the baby to be born short. The babies who have a normal birth length if the length was 48-52 centimeters, and it was short if the length was <48 centimeters. The study then showed that pregnant women with hemoglobin levels <11 mgHg were 20,2% and short toddlers 9,3%. The prevalence of anemia in the study of Wachi et al. 2010 was 15,3%, it was lower than the research conducted in Semarang by Ruchayati 2012 which found that pregnant women with anemia were 53,3% and 70% for short toddlers[5.6].

The study showed no relationship between hemoglobin levels of pregnant women and the growth of newborn liners in Kota Bengkulu (p>0,05). Since there was no relationship in this study, the sample in this study may be few who have low hemoglobin levels, and most of them have babies born in the normal category. The nutritional status of the mother influenced the baby's length at the time of pregnancy. Then, maternal nutritional status can be seen from the circumference of pregnant women's upper arm and hemoglobin levels. In line with research conducted by Yi et al, (2013) that hemoglobin levels of 8-10,9 g / dL were not associated with an increased risk of body length and low water weight[7]. In contrast to Ruchayati (2012) stated, there was a relationship between maternal hemoglobin levels and newborns' body length. Low hemoglobin levels can cause abnormal birth weight due to a lack of supply of nutrients and oxygen to the placenta that affects the fetus's function in the fetus[6].

Low birth weight was a factor that had a statistically significant correlation with hemoglobin concentration during pregnancy8. Iron deficiency anemia affects cognitive and motor development. It may cause fatigue and low productivity, and if it occurs during pregnancy, it may be

associated with low birth weight births and an increased risk of maternal and perinatal infant mortality[9].

The results of the bivariate study showed that some variables had no relationship tested. It was possible because the study's duration was not long enough, and the number of samples was a little short for babies in the short category. Besides, many factors that can affect the newborn's body length were still not reached in this study, such as LILA data since the early trimester of pregnancy, infection, and micronutrient levels in the body of pregnant women. Micronutrient deficiency during pregnancy can cause the fetus to experience slower linear growth during the postnatal period. The micronutrients that very influential in linear growth were iodine and zinc, and other micronutrients that also influential were selenium, copper, molybdenum, chromium, vitamin A and calcium. In addition, a pregnant woman who consumes adequate energy could still experience a lack of various micronutrients. It occurred because the food consumed had low bioavailability and micronutrient content. Determination of good intake was essential to catching the proper body length. Then, newborn weight, gestational age, and parenting style were some of the factors that influence the incidence of stunting. The length of the baby at birth was one of the risk factors for the incidence of stunting in toddlers.

Moreover, this study showed that energy intake was not related to liner growth. It was in line with research conducted by Ruchayati in 2012; the level of energy consumption was not related to the length of the baby born6. This study showed that maternal protein intake was not related to the length of the baby born as well; it was in line with Rahayu's (2011) research in Boyolali Regency that showed there was no influence between protein intake and body weight and length of babies born. Lack of protein in pregnant women will impact the length and weight of the baby born. Mothers who suffer from protein deficiency cause the placenta to be smaller in size so that the supply of nutrients from the mother to the fetus is insufficient[10].

This study showed a relationship between maternal occupation and birth length (p> 0.05). It was probably because mothers who do not work be able to make food for the family rather than mothers who work. Meanwhile, pregnant women who were not working have more time to concentrate on pregnancy and preparing for delivery. Research in Jakarta showed that the prevalence of fetal growth disorders was lower in the middle class than in the economically disadvantaged group.[11] Research in Nepal showed that 11% of babies born to mothers who have jobs have a smaller body size compared to mothers who do not have a job. Sufficient families have more opportunities to achieve better food availability so that the intake of nutritious food sufficient[12]. Mothers can also access better health services. This can reduce the risk of impaired fetal growth and development[13].

The results of other studies indicate that the level of maternal education had a significant relationship with anemia[14]. This finding supported by other findings that female literacy had a significant relationship with the use of antenatal care services as education had an impact on awareness of health service that was used among the population[15].

In addition, this study showed that there was no correlation between maternal height and infant length (p>0.05) and father's height with infant length (p> 0,05). In contrast to research in Egypt, it showed that babies born to mothers with a height <150 cm, were more at risk of stunting[16]. Research in Semarang also stated that the father's height <162 cm was a risk factor for stunting[17].

Furthermore, the study showed that there was no relationship between maternal arm circumference and liner growth, in contrast to research in Semarang that showed hemoglobin levels influenced the results that the length of a baby born, upper arm circumference in the third trimester, and weight gain during pregnancy. Various other factors such as gender, family economic status, and maternal energy intake also influence the incidence of stunting in newborns[7].

CONCLUSION

This study showed that hemoglobin levels in pregnant women were in the normal category. The nutritional status of pregnant women was not at risk. The body length of newborns in Bengkulu was normal. Then, the intake of nutrients for pregnant women (energy, carbohydrates, protein, fat) was in a low category. Also, there was no correlation between hemoglobin levels in pregnant women and newborns' body length in BengkuluI City

Conflict of Interest: The authors declare that there is no conflict of interest.

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