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Relationship between the numbers of iron tablets received and of iron tablets consumed with the birth length at Aisyiyah Hospital, Bojonegoro

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ABSTRACT

Background: Birth length is one of the risk factors for stunting in toddlers in the future. Stunting is a condition where a child's height is not by their age, which is indicated by a z score <-2 SD. Stunting can occur since the baby is in the womb, or in the first 1000 days of life which is indicated by a birth length of <48 cm.
Objective: The purpose of this study was to examine the relationship between iron supplementation and birth length at Aisyiyah Hospital, Bojonegoro.
Materials and Methods: The study respondents were 81 mothers and babies who were in the postpartum room of Aisyiyah Hospital, Bojonegoro during the period from March to April 2024. Data on the number of iron tablets received and consumed were obtained from interviews with respondents, and the baby's birth length was obtained from data on the patient's medical records.
Results: The study's results showed that the prevalence of short birth length (stunting) at Aisyiyah Hospital, Bojonegoro was 38.8%. Based on the results of the correlation test conducted with Spearman rho, it was found that there was a significant relationship between the number of iron tablets received and the number of iron tablets consumed with the length of the baby's birth, as indicated by the p-value and r value respectively ($p = 0.013$; $r = 0.439$) ($p = 0.005$; $r = 0.496$).
Conclusion: This study shows a significant relationship between the number of iron tablets received and the number of iron tablets consumed with the length of the baby's birth.

Keywords *: birth length, iron tablets, newborn*

BACKGROUND

Birth length is one of the risk factors for stunting in the future. Stunting is characterized by height according to age of less than -2 SD. It is known that stunting can occur since the baby is in the womb or in the First 1000 Days of Life.[1] Babies who have a short birth length <48 cm at birth are at higher risk of experiencing stunting. Data from the Indonesian Health Survey in 2023 showed that 18.2% of babies born in Indonesia had a birth length <48 cm.[2] When compared with the prevalence category threshold, stunting in newborns in Indonesia falls into the category of moderate nutritional problems.[3]

Previous research has shown that birth length is one of the birth outcome indicators used as a predictor of future growth.[4] Toddlers who have a history of short birth length are four times more likely to experience stunting in childhood.[5] Another study in Indonesia stated that babies with short birth lengths are at greater risk of experiencing stunting and delayed growth and development. This shows that birth length is significantly related to a child's growth and development.[6]

There are several risk factors that determine birth length, including ownership of national health insurance and the number of iron tablets received by the mother during pregnancy.[7] Pregnant women are one of the groups vulnerable to anemia. Anemia is a condition where the body experiences a deficiency of erythrocytes or red blood cells and is characterized by blood hemoglobin levels of less than 11 mg/dL. Data from 2023 shows that the prevalence of anemia in pregnant women in Indonesia is still at 27.7%.[2] This figure still shows a moderate level of public health problem. To prevent anemia in pregnant women, additional protein intake and iron tablet supplementation are required to help the formation of red blood cells and help the growth and development of the fetus.[8]

Consumption of iron supplements can prevent anemia in pregnant women. Based on antenatal care management, pregnant women are required to consume 90 iron supplements received from health services during antenatal visits. However, based on data from the 2023 Indonesian Health Survey, 44% of pregnant women received less than 90 iron supplements and 55.7% of pregnant women consumed less than 90 iron

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supplements.[2] In East Java, pregnant women who received and consumed iron tablets more than 90 tablets were 57.2% and 43.7% respectively.[2]

Several studies have stated that the consumption of iron tablets in pregnant women is closely related to hemoglobin levels. Pregnant women who consume iron tablets have been proven to be able to increase hemoglobin levels to prevent anemia.[9] Meanwhile, pregnant women who do not consume iron tablets during pregnancy are at risk of anemia. This is due to a significant decrease in hemoglobin levels when pregnant women enter the second trimester of pregnancy.[10] Meanwhile, hemoglobin plays an important role in the growth and development of the fetus while in the womb. Research in Bengkulu states that there is a significant relationship between the hemoglobin levels of pregnant women and the length of the baby's birth. Iron deficiency anemia that occurs in pregnant women will affect the cognitive development and motor growth of children.[11]

Local research related to risk factors for infant birth length is still very limited. Previous research shows that factors influencing birth length are ownership of health insurance and receipt of supplemental tablets blood.[7] However, several studies have explained that birth length is a strong predictor of stunting events in the future. By knowing the infant's birth length, it can help understand when stunting prevention should be carried out. This is related to the growth spurt period that occurs during the first 1000 days of life. Therefore, this study aims to examine and analyze the factors of iron supplementation tablets on infant birth length at Aisyiyah Hospital, Bojonegoro.

MATERIALS AND METHODS

This study is an analytical observational study with a cross-sectional approach. The data collection stage was carried out from March to April 2024 in the postpartum room of Aisyiyah Hospital, Bojonegoro. This research has gone through an ethical test conducted by the ethics commission of Aisyiyah Hospital Bojonegoro with ethical clearance certificate number 001/KE.RSA/2024.

The independent variables in this study are infant gender, maternal age, the number of iron tablets received and the number of iron tablets consumed by the mother during pregnancy, maternal hemoglobin level, while the dependent variable in this study is the birth length of the baby. The sample of this study amounted to 80 respondents consisting of a pair of mothers and babies. The sampling technique was consecutive sampling, namely samples were taken sequentially over a certain period of time until the desired number of samples was met. The inclusion criteria in this study were mothers who gave birth at Aisyiyah Hospital Bojonegoro and did not suffer from chronic diseases such as gestational diabetes and cancer. Meanwhile, the exclusion criteria were respondents who withdrew during the research.

Data on infant gender, maternal age, maternal hemoglobin levels, and infant birth length were obtained from respondent's medical record data. Meanwhile, data on the number of iron tablets received and the number of iron tablets consumed were obtained through an interview method with respondents using a questionnaire. The questionnaire used in this study consisted of 5 questions regarding receipt of iron tablets, gestational age when receiving iron tablets, frequency of receiving iron tablets during pregnancy, number of iron tablets received, and number of iron tablets consumed. Infant gender is categorized as male and female. Mother's age data is categorized into <20 years, 20-35 years, and >35 years.[12] Mother's hemoglobin level data is categorized as anemia if hemoglobin level <11 mg/dl and normal if hemoglobin levels are ≥11 mg/dl.[13] Meanwhile, the baby's birth length is categorized short if birth length <48 cm and normal if birth length> 48 cm.[7]

Data processing used SPSS version 25 for Windows software. Data analysis was carried out univariately and bivariately. Univariate analysis was carried out to determine the frequency distribution of variables. Bivariate analysis was carried out to determine the relationship between variables. The bivariate test in this study used the Spearman rho correlation test, and was declared related if the p value was less than 0.05.

RESULTS

In this study, the prevalence of babies with short birth length or <48 cm was 38.8%. Table 1 shows that the majority of subjects in this study were male (57.5%). The proportion of male babies with short birth length was greater than female babies. The characteristics of maternal age are divided into three groups, namely less than 20 years, 20-35 years, and more than 35 years. According to The National Population and Family Planning Board, women under 20 years of age are still in their growth and development period both physically and psychologically, while 20-35 years of age is the best age for women to get pregnant and give birth, while

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over 35 years of age is the age with a high risk of getting pregnant and giving birth.[12] In this study, most of the respondents were mothers aged between 20 and 35 years (96.3%). Based on the results of data analysis from this study, it was found that 38.8% of babies were born with a short birth length or <48 cm. Based on Public Health significance, the prevalence of stunting above 30% is included in the high prevalence category.

Table 1. Respondent Characteristics

Respondent Characteristics	Birth Length				Total	
	Short Birth Length		Normal Birth Length			
	n	%	n	%	n	%
Infant Gender						
Boy	17	54.8	29	59.2	46	57.5
Girl	14	45.2	20	40.8	34	42.5
Total	31	100	49	100	80	100
Maternal Age						
<20 year	1	3.2	1	2	2	2.5
20-35 year	29	93.6	48	98	77	96.3
>35 year	1	3.2	0	0	1	1.3
Total	31	100	49	100	80	100
Maternal Hemoglobin Level						
<11 mg/dl (anemia)	3	9.7	11	22.4	14	17.5
≥11mg/dl (normal)	28	90.3	38	77.6	66	82.5
Total	31	100	49	100	80	100

Table 2 shows the distribution of average birth length of infants. In this study, 38.8% of toddlers with short birth length had an average birth length of 46.4 ± 1.09 cm. In addition, there were 49 babies born with normal body length with an average of 49.2 ± 1.13 cm.

Table 2. Distribution of Average Birth Length and Maternal characteristic

Variabel	Birth Length	
	Short Birth Length (n=31)	Normal Birth Length (n=49)
	Mean ± SD	Mean ± SD
Birth length	46.4 ± 1.09	49.2 ± 1.13
Maternal age	26.5 ± 3.8	27.9 ± 4.1
Maternal Hemoglobin Level	11.9 ± 1.1	11.9 ± 1.4

Based on Table 3, it was found that all mothers received iron tablet in different amounts. The proportion of mothers of infants who received iron tablet 90 tablets in the group of infants with normal birth length was higher (57.1%) compared to mothers of infants with short birth length (35.5%). Table 3 shows that the proportion of mothers of infants who received iron tablet 60 tablets in the normal birth length group was higher than the short birth length group, while the proportion of mothers who received iron tablet 30 tablets in the short birth length group was greater than the normal birth length group.

Table 3. Distribution Number of Iron Tablet Received

Number of iron tablet	Number of Iron Tablet Received				Total		Number of Iron Tablet Consumed				Total	
	Short Birth Length		Normal Birth Length				Short Birth Length		Normal Birth Length			
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
30 tablets	15	48.4	10	20.4	25	31.2	17	54.8	10	20.4	27	33.8
60 tablets	5	16.1	11	22.5	16	20	4	13	12	24.5	16	20
90 tablets	11	35.5	28	57.1	39	48.8	10	32.2	27	55.1	37	46.2
Total	31	100	49	100	80	100	31	100	49	100	80	100

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Table 3 shows the number of iron tablet consumed by the baby's mother. Based on the analysis results, the majority (54.8%) of mothers in the short birth length baby group consumed 30 iron tablets. Meanwhile, the majority (55.1%) of mothers in the normal PB baby group consumed 90 iron tablets.

The results of the statistical test of the relationship between the number of iron tablet received and the baby's birth length are shown in Table 5. The results of the Spearman rho analysis showed that there was a significant relationship between the number of iron tablet received and the baby's birth length. This is indicated by a p value of 0.013 and a correlation coefficient value of 0.439.

Table 5 also shows the results of the analysis of the relationship between the number of iron tablet consumed and the baby's birth weight. The results of the Spearman rho test showed a p value of 0.006 with a correlation coefficient of 0.496. This means that there is a significant relationship between the number of iron tablet consumed by the mother and the baby's birth length and has a positive direction of relationship. This means that the more iron tablet consumed by the mother during pregnancy, the higher the baby's birth weight.

Table 4. The relationship between the number of iron tablet received and the number of tablet consumed with birth length

Variable	Birth Length				p-value	r
	Short Birth Length		Normal Birth Length			
	n	(%)	n	(%)		
Number of iron tablet received						
30 tablets	15	48.4	10	20.4		
60 tablets	5	16.1	11	22.5	0.013	0.439
90 tablets	11	35.5	28	57.1		
Total	31	100	49	100		
Number of iron tablet consumed						
30 tablets	17	54.8	10	20,4		
60 tablets	4	13	12	24,5	0.006	0.496
90 tablets	10	32.2	27	55,1		
Total	31	100	49	100		

DISCUSSION

Based on the results of data analysis from this study, 38.8% of babies were born with short birth length or <48 cm. Based on Public Health significance, the prevalence of stunting above 30% is included in the high prevalence category.[14] In this study, the coverage of iron tablet consumption of 90 tablets in pregnant women was 48.8%. This figure has not yet reached the national target. Based on the Strategic Plan of the Ministry of Health 2015-2019, the target coverage of pregnant women who received iron tablet as many as 90 tablets in pregnant women was 98%.[15] The proportion of iron tablet consumption by pregnant women according to recommendations in this study was lower than previous studies, namely 49.5%.[16]

The majority of infants in this study were male. Research conducted on toddlers gave similar results, gender is significantly related to stunting. Male toddlers are at higher risk of stunting.[17] This is due to differences in energy and nutrient needs between male and female infants. Male infants need more energy and nutrients than female infants.[18] In addition, other studies have mentioned the influence of a combination of biological and social mechanisms and gender preferences that favor female infants.[19]

The characteristics of maternal age in this study were that most respondents were mothers aged between 20 and 35 years. Research conducted in Iran explained that there was a significant relationship between maternal age and birth weight and head circumference of the baby.[20]

Table 2 shows the average birth length of short babies is 46.4 ± 1.13 cm, while the average birth length of normal babies is 49.2 ± 1.13 cm. The length of the baby's body describes the linear growth of the baby that occurs while in the womb. Babies born with a short birth length are greatly influenced by the level of nutritional fulfillment while in the womb, this may be due to the lack of energy, protein, and nutrient intake of the mother during pregnancy.[11]

In addition to iron, there are several macro and micronutrients that play an important role in linear growth, including iodine, zinc, selenium, copper, molybdenum, chromium, vitamin A, and calcium. Although

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pregnant women have consumed enough energy from food, often the intake of these micronutrients is still deficient. So it is important for pregnant women to consume multivitamins or additional supplements to meet micronutrient needs.[11]

Table 3 and table 4 show that the proportion of pregnant women who received and consumed iron tablet in the normal birth length group was greater than in the short birth length group. There is a difference in the proportion between the number of iron tablet consumed and the number of iron tablet received. This is due to the low level of compliance of pregnant women to consume iron tablet which is influenced by several factors including pregnant women who do not feel pain and feel they do not need medication.[13] This study shows that babies from mothers who consume iron tablet 90 tablets have a birth length of >48 cm. Body length is a measure of bone mass growth due to nutritional intake which is used as an anthropometric parameter to describe linear growth.[21]

Pregnant women are advised to consume more iron than when not pregnant. Based on the 2019 The Indonesian Recommended Dietary Allowance (RDA), the recommended iron (Fe) requirement for woman in reproductive age (15-18 years) is 15 mg/day and for ages 19-45 years is 18 mg/day. In pregnant women in the first trimester, there is no additional iron (Fe) requirement, but in pregnant women in the second and third trimesters, the additional iron (Fe) requirement is 9 mg/day. The additional Fe requirement during pregnancy is met by consuming iron tablets. The provision of these iron tablets aims to prevent and overcome anemia due to Fe deficiency in pregnant women, which is one of the factors causing stunted fetal growth and development.

Table 5 shows the results of the analysis of the relationship between the number of iron tablets received and the number of iron tablets consumed with birth length. Based on the results of the analysis of the relationship test with Spearman's rho, the p value and r value of the correlation coefficient were respectively 0.013; 0.439 and 0.006; 0.496. These results indicate that there is a significant relationship between the number of iron tablets received and the number of iron tablets consumed by mothers during pregnancy with the baby's birth length. Based on the results of the correlation coefficient values, both have a strong relationship, meaning that the more iron tablets received and consumed by pregnant women, the lower the risk of mothers giving birth to babies with short birth lengths.

These results are in line with previous studies showing that iron supplement consumption has a significant effect on the birth length of babies. The study explained that there was a significant difference in the birth length of babies between mothers who consumed 90 complete iron supplements and incomplete iron supplements of less than 90 tablets. Mothers who consumed 90 complete iron supplements were 1.9 times more likely to give birth to babies with a birth length of >48 cm.[22] Other studies also explained that there was a significant relationship between iron (Fe) supplementation in pregnant women and the birth length of babies.[23] Consumption of 90 iron supplements during pregnancy containing 60 mg of Ferrous Sulfate and 500 mg of Folic Acid bound with lactose aims to meet the increasing need for Fe along with fetal growth.[16]

Based on the results of statistical analysis, the average maternal hemoglobin was 11.9 ± 1.3 mg/dl. However, as many as 17.5% of mothers experienced anemia or had hemoglobin levels <11 mg/dl. Pregnant women who experience anemia can be at risk for the health of the mother and fetus. Hemoglobin is a content in red blood cells that is responsible for carrying oxygen throughout the body. Low hemoglobin levels can increase the risk of anemia in pregnant women. This anemia condition can increase the risk of miscarriage, postpartum hemorrhage, premature birth under 37 weeks, low birth weight <2500 grams, and the possibility of experiencing congenital abnormalities. One of the government's efforts in preventing and overcoming anemia problems is through an iron (Fe) supplementation program or providing iron tablet to adolescents and pregnant women.

Pregnant women are advised to consume more iron than when they are not pregnant. This is because during pregnancy there is an increase in blood volume in the pregnant woman's body, so additional iron is needed through the consumption of iron tablet. In addition, the additional iron requirement functions to ensure adequate fetal growth and development.[16] Based on the 2019 RDA the Fe requirement for fertile women aged 15-18 years is 15 mg/day, while for ages 19-45 years it is 18 mg/day. For pregnant women, there is an additional recommendation for iron (Fe) of 9 mg/day for pregnant women with gestational age in the second and third trimesters.[24] The additional Fe requirement during pregnancy aims to prevent and treat anemia in pregnant women and to increase the number of red blood cells needed to function in the formation of fetal and placental red blood cells.[25] Therefore, the government has initiated a iron tablet supplementation program of

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at least 90 tablets for pregnant women that can be obtained from health care facilities. The limitation of this study lies in the sampling method, namely nonprobability sampling. So the results of this study cannot be generalized to the research population. The advantage of this research is that we know the importance of consuming iron tablets during pregnancy, namely that it can prevent anemia and can prevent stunted babies from being born.

CONCLUSIONS

This study shows that the prevalence of babies born with short birth length at Aisyiyah Hospital Bojonegoro is 38.8%. The number of iron tablet received, and the number of iron tablet consumed by the mother during pregnancy are significantly related to the birth length of babies at Aisyiyah Hospital Bojonegoro. This is indicated by the r value which states that there is a moderate relationship between the number of iron tablets received and consumed and the length birth.

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