BREAKFAST AND HEMOGLOBIN LEVEL AMONG FEMALE JUNIOR HIGH SCHOOL STUDENT IN SURAKARTA, CENTRAL JAVA

Ropitasari[1)], Fanny Kartika F[2)], Rachmi Fauziah R [3)]
Sri Anggarini [1)]

[1)] Diploma III of Midwifery, Universitas Sebelas Maret
[2)] Postgraduate Program, Universitas Sebelas Maret
[3)] Radiology Section of Dr Moewardi Hospital, Surakarta

ABSTRACT

Background: Physical activity among school-age adolescents make them skipping the breakfast. Skipping breakfast can cause a loss of energy and nutrients needed for hemoglobin (Hb) synthesis. This study aimed to examine the effect of breakfast on anemia levels among female adolescent.
Subjects and Method: A cross-sectional was conducted by involving 30 female adolescent aged 13-15. The study subjects were divided into 30 female adolescent had breakfast group and 30 female adolescent had no breakfast group. Breakfast was the consumption of food and side dishes from waking up until 10:00 AM. The dependent variable was Hb level and the dependent variable was breakfast. The data were collected by measuring the HB level and questionnaire. The data then analyzed using Chi-square test. The association between breakfast habits and hemoglobin levels was analyzed by means of the Gamma Somers test.
Results: The breakfast habit increased the Hb level among female adolescent (OR= 1.75; p= 0.003), and it was statistically significant.
Conclusion: Female adolescent with a good breakfast habit increase the Hb level and prevent the anemia.

Keywords: breakfast, female adolescent, hemoglobin levels

Correspondence:
Ropitasari. Diploma III of Midwifery, Universitas Sebelas Maret, Surakarta. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia.Email: ropita.uns@gmail.com. Mobile: 08222023585

BACKGROUND

Adolescence is a very important transition period, because there are secondary physical changes and changes in body composition. This results in an increase in the need for nutrients (Alam et al., 2010). The number of activities undertaken by adolescents results in missed mealtime. Apart from this, adolescents tend to be less attentive in choosing the composition of food that enters the body. This results in adolescents prone to experiencing nutritional problems. Based on Basic Health Study (Riskesdas) 2010 data, 54.4% and 38.1% of adolescents aged 13-15 years, respectively, consume energy and protein below the minimum requirements (Depkes RI, 2010).

Low intake of energy and protein as macronutrients can contribute to low intake of micronutrients. Macronutrient intake such as protein plays a role in the storage and transportation of iron (Brox et al. 2003). According to the 2012 Nutritional Adequacy Rate (RDA), protein adequacy for women aged 13-15 years is 69 grams per day (Hardinsyah et al., 2012).

Iron is the main component which plays an important role in the formation of blood (hemopoiesis), namely synthesizing hemoglobin. The adequacy of iron for wo-

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men aged 13-15 years is 26 mg per day (Hardinsyah et al., 2012).

One of the factors that can cause the intake of macronutrients and micronutrients below the minimum requirements is inappropriate dietary behavior that is often done by young girls in order to maintain their appearance and physical characteristics (Foo et al., 2004).

A diet that is too strict, including skipping breakfast, is often done by young women to get a slimmer body shape. Young women skip breakfast more often than any other meal. Total energy needs in a day which aims to meet nutritional needs in the morning (Perdana et al. 2013).

Adolescents who skip breakfast tend not to be able to replace lost energy and nutrients at other meals, so breakfast is an important meal time for adolescents to meet daily nutritional needs (Rampersaud et al., 2005). Based on the description above, we will examine the relationship between hemoglobin levels and the habit of eating breakfast and not eating breakfast among young women who will be held at Junior High School 18 Surakarta.

STUDY METHODS

1. Study Design This

A cross-sectional study with two unpaired groups conducted at Junior High School 18 Surakarta, Central Java, Indonesia.

2. Population and Sample

The target population in this study were all Junior High School 18 students, while the reachable population was girls at Junior High School 18 Surakarta. The calculation of study subjects was carried out using the unpaired categorical sample calculation formula. The study subject was taken using a purposive sampling method, where all subjects who came and met the selection criteria were included in the study until the required number of subjects was met. As many as 30 female adolescents met the inclusion criteria and 30 were taken as study subjects, then divided into breakfast and no breakfast groups, each of which was 15 subjects.

Young women who have met the inclusion criteria, namely adolescents aged 13-15 years, are willing to fill out informed consent, are not taking supplements and drugs, are not sick and undergo fasting at the time of data collection, are not experiencing menstruation and bleeding during blood collection, do not have a history of chronic disease/ infection, do not smoke and do not have physical activity with a very active intensity.

3. Study Variables

The dependent variable of this study was hemoglobin level, the independent variable was breakfast habit. The breakfast habit was defined as the consumption of staple foods and side dishes that takes place from waking up in the morning until 10.00 AM. It was said to have a breakfast habit if in a week they eat breakfast> 3 times and it was said that they do not had a breakfast habit if not at all or in a week they do breakfast ≤3 times a week.

4. Study Instrument

Primary data collected includes the identity of the subject in the form of name, age, history of disease, history of taking supplements and drugs. This identity was obtained through interviews with respondents and recorded on the subject's identity form. Primary data in the form of anthropometric measurements of height using a microtome capacity of 2 meters with an accuracy level of 0.1 cm and body weight weighed using a digital scale with a capacity of 120 kg and an accuracy level of 0.1 kg. Measurement of

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hemoglobin levels is obtained through laboratory examination results. The process of collecting and examining blood was carried out by the Gambarsari Health Center laboratory staff. Secondary study data includes an overview of the study location.

Food intake data were analyzed using the Nutrisurvey program, compared to the 2012 individual's Nutritional Adequacy Rate (RDA) and categorized according to the level of nutritional intake according to the Ministry of Health (2002), which is less <90% and 90-120% good. Physical activity is categorized using a physical activity table adapted from the 2005 Committee Reference Dietary Intake, namely sedentary 1.0-1.39, low active 1.4-1.59, active 1.6-1.89 and very active> 1.9.29.

5. Data Analysis

Comparative Chi-Square test was used to see differences in nutritional status and physical activity between the breakfast and no breakfast groups. The relationship between breakfast habits and hemoglobin levels was analyzed using the Somers D Gamma correlative test.

RESULTS

Characteristics of respondents in this study were used to provide an overview of the object under study, namely a description of motivation based on perception, self-esteem, trust, expectations, and needs.

Table 1. Characteristics of respondents

Variable	Frequency (n)	Percentage (%)
Age		
13 years	22	73.3
14 years	8	26.7
Education		
Class VIII	22	73.3
Class IX	8	26.7
Parents		
Private	20	66.7
Self-employed	6	20
Civil Servant	4	13.3

Table 2. Frequency distribution of study respondents on the relationship between breakfast and hemoglobin levels based on BMI

Breakfast habits	Frequency (n)	Percentage (%)
Always	18	60
Often	7	23.3
Rarely	3	6.67
Never	2	

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Table 3. Frequency distribution of breakfast quality of female respondents at Junior High School 18 Surakarta in 2018.

Work	Frequency (n)	Percentage (%)
Less	4	13.3
Normal	24	80
More	2	6.7

The results of the analysis show that the proportion of young women who always eat breakfast is more (60). %), respondents who have the habit of often eating breakfast are 7 respondents (23.3%). Young girls who never had breakfast (6.67%) while those who rarely ate breakfast were 3 (10%).

Frequency distribution of Hb levels of female respondents at Junior High School 18 Surakarta. The results of the analysis showed that the proportion of adolescent girls who had anemia was 3 respondents (10%), while the majority of respondents had normal HB levels as many as 27 respondents (90%). Five children (16.7%) had anemia.

Table 4. Relationship between breakfast and hemoglobin levels

Hemoglobin levels	Breakfast habits								OR	P
	Always		Often		Rarely		Never			
	n	%	n	%	n	%	n	%		
Low	1	3.3	0	0	2	6.7	2	6.67	1.75	0.005
Normal	17	56.7	7	23.2	1	3.3	0	0		

The logistic regression test results showed that the p-value= 0.003 (p <0.05), which means that there was a relationship between the frequency of breakfast on anemia status. While the OR value= 1.75, meaning that children who had a frequency of breakfast irregularly can had a risk of experiencing anemia 1.75 times. The relation coefficient of 0.76 shows a strong relationship because the value of r is included in the category 0.60-0.799.

DISCUSSION

Five children (16.7%) had anemia as many as 5 children (16.7%). The logistic regression test results showed that the p<0.001, which means that there was an influence between the frequency of breakfast on anemia status. Meanwhile, the OR value = 1.75, which means that children who have a frequency of irregular breakfast can be at risk of experiencing anemia 1.75 times. This study is in line with study (Murphy, 2007) which shows that children who skip breakfast are more likely to show symptoms of

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anemia (iron deficiency) such as pale, lethargic and lack of enthusiasm.

This result is supported by Hoyland et al. (2005), which states that the better the level of energy adequacy can significantly increase blood glucose levels and have an effect on improving memory of elementary school children. In addition, study (Mahoney et al., 2005) shows that high-protein breakfast interventions can slow down the rate of gastric emptying and have adequate blood glucose levels thus affecting learning achievement. Protein plays a role in cell growth and brain function. Amino acids, as the smallest units of protein, help form brain structures and the neurotransmitters at nerve cell junctions. In this case amino acids play a role in regulating the formation of serotonin compounds involved in the nervous system or acetylcholine which is important for memory (Mathys et al., 2007)

School children who rarely or do not eat breakfast will experience a decrease in blood sugar levels so that energy supply is lacking for brain work. The body breaks down glycogen stores to maintain normal sugar levels. When the glycogen reserves are depleted, the body will have difficulty supplying energy from blood sugar to the brain which ultimately results in the body shaking, fatigue and decreased learning desire (Sunarti et al., 2006; Shinta, 2001), which can later cause symptoms of anemia in children. The occurrence of anemia is caused by a decrease in hemoglobin levels in the blood.

The incidence of anemia in elementary school children can be influenced by various factors. The breakfast habit is a risk factor for anemia in school children (Natalie et al. 2007). Breakfast habits can meet 15-30% of daily nutritional needs as part of balanced nutrition. In this study, there are many factors that cause school children to not routinely eat breakfast, including parents who do not get used to breakfast, not providing food in the morning, late getting up early which results in not having breakfast (Tideman, 2019).

Based on the results of the study showed that the frequency of students who had normal hemoglobin levels was 27 students (90%) while those who had abnormal hb levels were 3 students (10%). The results of the analysis show that the proportion of young women who often eat breakfast is more (52.4%) than girls who sometimes eat breakfast (9.5%) while those who rarely eat breakfast are (38.1%). 5 children (16.7%) had anemia without routine breakfast. The logistic regression test results showed that the $p<0.001$, which means that there is an influence between the frequency of breakfast on anemia status. Meanwhile, the OR value= 1.75, which means that children who have a frequency of irregular breakfast can have a risk of developing anemia. This study shows that children who skip breakfast are more likely to show symptoms of anemia (iron deficiency) such as pale, lethargic and lack of enthusiasm.

Based on the above conclusions, the following suggestions can be made to provide education on the importance of regular breakfast to young girls and food providers. A good breakfast is that it contains 20-25% of the energy of the total daily needs by consuming foods such as milk, cereal, and sandwiches in order to prevent low hemoglobin levels.

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