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Relationship between Diet Patterns and the Incidence of Anemia among Adolescent Girls at SMA Giki 1 Surabaya

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ABSTRACT

Background: Young women are more prone to anemia because young women on entering puberty experience rapid growth so that the need for iron also increases with the increase in growth. Teenagers often consume fast food, especially at school. The purpose of this study was to analyze the relationship between diet pattern and the incidence of anemia in teenage girls at SMA GIKI Surabaya. **Methods:** This study uses cross sectional approach among teenage girls in class X and XI SMA GIKI 1 Surabaya with a total of 127 students, with simple random sampling and obtained a sample of 98 students. The questionnaires used include dietary habits (amount, type and frequency) and total hemoglobin levels, the data obtained were tested using the Spearman Rho statistical test. **Results:** Based on the results of the study, from 98 respondents, 87 (88.8%) respondents had poor eating pattern, and 11 (11.2%) in the good eating pattern category. While the incidence of anemia obtained data on respondents who are not anemic as many as 57 (58.2%), respondents who experience anemia are 41 (41.8%). Based on the results Spearman's Rho statistical test, was found that $r = 0.003$, $p = 0.05$, indicating that diet has a relationship with the incidence of anemia in teenage girls at SMA GIKI 1 Surabaya. **Conclusion:** Inappropriate eating patterns can cause anemia which can have a negative impact on adolescents. For this reason, adolescents should prevent anemia by limiting their intake of fast food. Applying a healthy diet such as consuming fruits and vegetables, and increasing knowledge can prevent anemia.

Keywords: Anemia; Adolescent Girls; Diet Pattern

INTRODUCTION

Adolescence is a period of growth and development including physical, mental, and other activity so that the need for food containing nutrients becomes quite large (Suryani *et al.*, 2015). Young women are more prone to anemia because on entering puberty they experience rapid growth. So, the need for iron also increases with the increase in their growth. Adolescent girls often forget to intake animal protein needed for the formation of blood hemoglobin (Kemenkes RI, 2018). Anemia reflects in the decreased number of erythrocytes, less than normal in the circulation. As a result, the amount of oxygen delivered to the body tissues is also reduced (Smeltzer, 2013). The biggest cause of anemia is reduced intake of nutrients associated with poor diet due to ignorance and poor lifestyle. Most of the teenagers prefer to consume fast food and junk food. Foods with high salt, more fat and sugar, very low nutritional and mineral content are frequently consumed by this age

group. These foods usually reduce appetite and lessen the consumption of other nutritious foods.

One-third of women in the reproductive age (15–49 years) worldwide are affected by Anemia. This condition is characterized by low blood haemoglobin concentration, which decreases the capacity of the blood to carry oxygen to tissues resulting in symptoms such as fatigue and reduced capacity for physical work. According to the World Health Organization the prevalence of anemia in the world ranges from 40–88% (WHO, 2018). The prevalence of anemia nationally in Indonesia were 21.7%, with anemia among adolescents aged 5–14 years being 26.4% and 18.4%. As many as 50–60% of young women in East Java suffer from anemia or lack of red blood (Kusuma, 2009).

From a preliminary pilot study conducted at SMA GIKI 1 Surabaya it was found that many students eat packaged snacks and packaged drinks. Of the 5 students

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interviewed, they said they rarely eat fresh vegetables and fruits even at home because they dislike the taste and prefer to eat things like crispy chicken and soft drinks. When asked about 100% fast food, the student said that they would definitely like it and definitely like it because the food was delicious. From the examination of hemoglobin levels conducted by researchers on 5 teenage girls, it was found that 2 students had normal hemoglobin levels and 3 students had below normal hemoglobin levels, which means that the three young women were anemic.

Adolescent girls generally have characteristics of unhealthy eating habits, including the habit of unhealthy diet because they want to slim down (ignoring sources of protein, carbohydrates, vitamins and minerals), snacking on low-nutrient foods and eating fast food, not eating breakfast and sometimes lazy to drink water. As a result, teenagers are not able to meet the need for the balanced diet and deficiency of substances needed by their bodies for the synthesis of hemoglobin (Hb). If this habit persists for a long time, it will cause Hb levels to decrease and cause anemia (Suryani *et al.*, 2015). Consequently, Anemia can cause growth and development in adolescence to be disrupted. Anemia also causes fatigue and decreased learning concentration so that learning achievement is lowered and can reduce work productivity. Besides that, it also affects the body's immune system so that it is easy to get infections. Anemia can affect a person's level of physical fitness. Anemia can affect concentration and learning achievement and affects work productivity among teenagers. Given the impact that occurs because of anemia is very detrimental for young women. Therefore, efforts to make optimal prevention and improvement efforts require complete and beneficial information about the diet that causes anemia in adolescents.

Efforts to Accelerate Nutrition Improvement are carried out through specific and sensitive interventions which include integrated anemia prevention programs for the target group on teenage girls and women in the childbearing age. Recommendations, efforts to overcome anemia in adolescent girls and women of childbearing age are focused on promotion and prevention activities, namely increasing the consumption of iron-rich foods, supplementing iron-fortified food supplements and increasing fortification of foodstuffs with iron and folic acid (Kemenkes RI, 2018).

METHODOLOGY

This research uses cross sectional approach. With the population is all teenage girls in grades X and XI SMA GIKI 1 Surabaya with a total of 127 students in grades 10 and 11, with simple random sampling, a sample of 98 students was obtained. The independent variable in this study was the diet of young women at SMA GIKI 1 Surabaya. The dependent variable in this study was the incidence of anemia in young women at SMA GIKI 1 Surabaya. The data were collected using the instrument, namely the demographic data questionnaire, the Food frequency Questionnaire model including eating habits (amount, type and frequency) and a Haemometer and an observation sheet to determine the amount of hemoglobin levels in blood. The data obtained were analyzed using the Spearman Rho statistical test.

Ethical Clearance

This research was conducted following research ethics in which researchers requested permission from related parties before the study began. The procedures related to research ethics, including informed consent, anonymity, confidentiality, fairness, the principle of honesty (veracity), and the principle of fidelity were followed. This research has been conducted with ethical clearance from Hang Tuah Health College Ethics Commission with the number: PE/06/I/2019/KEPK/SHT on January 14, 2019.

RESULTS

Table 1: Respondent Characteristic among Student of SMAGIKI 1 Surabaya

Number	Variable	Frequency (f)	Percent (%)
1	Class		
	10	53	54.1
	11	45	45.9
2	Age (Year)		
	15	15	15.3
	16	52	53.1
	17	31	31.6
3	Menstruation Pattern	98	100
	Reguler		
4	Fast Food Habits		
	Always	36	36.7
	Often	47	48.0
	Sometimes	15	15.3
5	Family income per month		
	Rp 4.000.000-Rp. 12.000.000	71	72.4
	<Rp 4.000.000	27	27.6

Table 2: Characteristic of Variables

Number	Variable	Frequency (f)	Percent (%)
1	Diet Pattern		
	Not good	87	88.8
	Good	11	11.2
2	Anemia incident		
	No Anemia	57	58.2
	Anemia	41	41.8

Table 3: Relationship between Diet and Anemia Incidence in Adolescent Girls in SMA GIKI 1 Surabaya

Anemia	Anemia		No anemia		Total	
	F	%	f	%	n	%
Diet Pattern						
Not Good	41	47.1	46	52.9	87	100
Good	0	0	11	100	11	100
Total	41	47.1	57	52.9	98	100

Uji statistic Spearman's Rho $\rho = 0.003$ ($\alpha = 0.05$)

Based on the Spearman correlation test regarding the relationship between eating patterns and the incidence of anemia in respondents, it was found that $\rho = 0.003$ with a significant value of $\alpha = 0.05$ for comparison. Statistically $\rho = 0.003 < \alpha = 0.05$ indicates there is a relationship between diet pattern and the incidence of anemia. The correlation coefficient is $r = -0.302$, which means that the correlation between diet and the incidence of anemia is getting stronger, significant and inverse, as indicated by the correlation value close to -1 with -value, it can be concluded that there is a relationship between the two variables. The negative sign indicates that the correlation between diet and the incidence of anemia is inversely related, which means that the lower a person's diet, the higher the category of anemia experienced.

DISCUSSION

1. The Diet patterns of adolescent girls at SMA GIKI 1 Surabaya

Based on the Table 2, the results, from 98 respondents obtained as many as 87 (88.8%) respondents in the category of bad eating patterns, and 11 (11.2%) good eating patterns. According to Istiany & Rutilanti, (2013) eating patterns are information about the type and amount of food consumed by a person or group of people at a certain time, so that the assessment of food consumption can be based on the amount and type of food consumed. According to Barasi, (2009) the

factors that have a significant relationship to eating patterns in the category of good eating patterns and bad eating patterns include gender, age, education and occupation. Health education program are effective in improving behaviour by using effective teaching media like videos, role-play, and demonstration (Ragab *et al.*, 2021)

The results of observations in the field showed that 87 (88.8%) respondents in the category of poor eating patterns exhibited that most of the respondents prefer to consume fast food because it is easily available, fast processing and waiting time is less for food such as fried chicken, martabak, chicken soup, noodles, dumplings, fried foods, sempol, cilok pentol, are usually consumed every day. While foods that are rarely consumed include vegetables and fruits, which are consumed once a week and some even eat these only 3-6 times a month. As most of the income of parents are above Rp. 4,000,000. Fast foods can be seen convenient to people who lives a busy lifestyle. Nevertheless, uncontrolled consumption of fast food can lead to obesity. About 84% of Malaysian students consumed fast food and often unable to meet recommended nutrient intake due to snacking habits and skipping meals (Roslinda *et al.*, 2022).

Meanwhile, the eating pattern in the good category was experienced by 11 (11.2%) respondents. Even though their parents have an income above IDR 4,000,000, some teenagers still choose foods such as vegetable soup, spinach and white bread. Researchers assume that adolescent diets are closely related to the economic situation of their parents because parents who have a high monthly income will provide greater opportunities for them to choose various types of food and also provide flexibility to their teenage children in choosing food according to their wishes. Adriana, (2007) in her research suggested that teenagers at the age of 15 are getting more and more fond of fast food. Due to environmental factors teenagers are influenced and they are inclined towards fast food. Lifestyle changes in adolescents have a significant effect on their eating habits. As they become more active they eat more outside food, and get a lot choice of food they will eat, they are also more likely to try new foods, one of which is fast food. Farhatun's research (2012) suggested on fiber consumption in students stated that the presence of high-fiber foods is often less appealing to the appetite than other types of food. Ningsih, (2017) said that a person's income / economy affects eating patterns and consumption of food, it is unlikely that parents with low

income will be unable to serve a variety of food daily.

2. The incidence of anemia in teenage girls at SMA GIKI 1 Surabaya

Based on the Table 2, the results from 98 respondents showed that the incidence of anemia in teenage girls at SMA GIKI 1 Surabaya showed that as many as 57 (58.2%) were not anemic, respondents who experienced anemia were 41 (41.8%). Physical growth that occurs during adolescence is weight and height gain. In adolescent girls, peak weight gain occurs during the growth spurt (rapid growth). Adolescent girls experience weight gain of about 8.3 kg per year, generally occurring at the age of 12.5 years and weight gain begins to stabilize after experiencing menarche and when they enter late adolescence their weight gain is about 6.3 kg. Adolescent girls experience drastic changes in body composition throughout the pubertal period. Muscle mass decreased by 14% while body fat composition increased by 11%. This increase in body fat composition is natural for adolescent girls for their growth and sexual development (Brown, 2005). Teenage are one of the nutritionally vulnerable groups. During this stage, teenage enter the second phase of rapid growth and then physical growth declines as they become young adults. Therefore, teenage need adequate food not only in terms of quantity but also in terms of quality. The more varied or varied the food consumed by adolescents the more it will ensure fulfilment of nutritional adequacy, which in turn will have an impact on their nutritional and health status (Azrimaidaliza & Purnakarya, 2011). According to Umar (Achmadi, 2009) the factors that influence anemia include nutritional consumption, eating habits, family socioeconomic status, infectious diseases, physical activity, menstrual patterns. From the observations of the present study, it was seen that most of the students experienced a decrease in attention, are tired easily, and decreased productivity and can reduce the achievements of adolescents at school. There is a relationship between age and the incidence of anemia in adolescent girls because at the age of adolescence there is an increase in needs due to accelerated growth. In addition, young women are usually very concerned about body shape and weight, so many consume foods that do not contain adequate nutritional needs. As a result, young women are more prone to health problems. Fast food habits can affect development and growth because fast food does not contain enough substances needed for growth and

development, especially substances needed by the body for the formation of adolescent hemoglobin.

3. Relationship between diet patterns and the incidence of anemia in adolescent girls at SMA GIKI 1 Surabaya

Based on Table 3, the results of Spearman's Rho statistical test obtained $\rho = 0.003$, $\alpha = 0.05$, indicating that diet pattern has a relationship with the incidence of anemia in teenage girls at SMA GIKI 1 Surabaya. In case of poor diet, the incidence of anemia was as many as 41 (47.1%) respondents, the poor eating pattern no anemia was as many as 46 (52.9%) respondents while the good diet contributes to the incidence of anemia as much as 0 (0.0%) respondents and for the category of good eating patterns with the incidence of not anemia as many as 11 (100.0%) respondents.

Arisman, (2004) explained that eating habits are a person's way of choosing food and eating it as a reaction to psychological, physiological, cultural and social influences. Sulistyoningsih, (2011) explained that eating patterns are closely related to one's eating habits. Dhaneswara, (2017) said that the factors that influence the choice of food include pleasure and inadvertence (food like and dislike) and habits (food habit). The incidence of anemia in adolescent not only caused by a bad diet. This is evidenced from the results of research which showed that there are respondents who have a bad diet pattern but do not experience anemia as many as 46 (52.9%) respondents. This is because even though students often eat fast food, the intensity is not often only 1 to 2 times and still eats foods that have sufficient and balanced nutritional content such as vegetables. This shows that not only diet affects the occurrence of anemia. But other factors such as the lack of content in food and not all respondents who have bad eating habits necessarily have anemia. This may be due to the fact that iron reserves in the body are still sufficient for the process of forming red blood cells in the body, and the food consumed by respondent already contains all nutrients needed by the respondent's body. So, there is a balance between the nutrients consumed by the respondent and the nutrients needed by the body. Although it does not show such a significant number, it can be seen that half of the respondents who were young women in this study did not experience anemia. This is a good thing, considering the impact that can occur on adolescent students if they are anemic. Researchers

¹⁵ assume that teenagers need more iron, especially women, because every month they experience menstruation which results in a lack of iron intake, which triggers anemia. Sadikin, (2001) stated that the lack of various nutrients can cause anemia, lack of protein or carbohydrates, due to less intake of calories, can result in anemia. Lack of carbohydrate and protein which is a manifestation of lack of food in a long period of time will cause a shortage of various materials needed for the formation of red blood cells. Theoretically many factors influence the occurrence of anemia. Anemia can have an unfavorable impact on adolescents. Anemia that occurs in adolescents can cause delays in physical growth, behavioral and emotional disorders. This can affect the process of growth and development of brain cells so that it can have an impact on decreased body resistance, easily weak and hungry, impaired learning concentration, decreased learning achievement and can result in low work productivity (Daris *et al.*, 2013). Intervention using youth act as change agent that improve health behavior especially change family lifestyle (Lisum, Waluyo, & Supardi, 2021). The effectiveness of the program in improving the

knowledge and practices of students in intervention group was useful (Ahmed, & Saeed, 2021).

CONCLUSION

¹ Diet pattern has a relationship with the incidence of anemia in teenage girls at SMA GIKI 1 Surabaya. Inappropriate eating patterns can cause anemia which can have a detrimental impact on teenagers. For this reason, adolescents should take precaution to prevent anemia by limiting their intake of fast food. Following a healthy diet such as consuming fruits and vegetables and increasing knowledge and awareness regarding healthcare in this adolescent age can prevent anemia.

¹⁴ Conflict of Interests

The authors declare that they have no conflict of interests.

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