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Eating Behavior and Protein Intake in Adolescent Girls with Anemia in Junior High School Krispa Silian the Regency of Southeast Minahasa North Sulawesi Indonesia

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***Abstract*—Adolescents girls are at risk of anemia because at this time there is rapid growth and development so the needs of macro and micronutrients are higher especially during menstruation. Young women, in general, have characteristics of unhealthy eating habits. Among other habits do not take breakfast is usual, because they want to loose weight (ignore the source of protein). The purpose of this study was to determine the relationship between eating behavior and protein intake in adolescent girls with anemia. A cross sectional study was applied at Junior High School Krispa Silian of Southeast Minahasa Regency Indonesia. A total of 55 subjects participated in this study people (stratified random sampling) eating behavior, protein intake and anemia were variables collected. Using interview for eating behavior, protein intake using 24 hours food recall and hemoglobin using Autocheck. Chi-Square test analyses was employed. The results showed that, adolescents girls suffering from anemia were 52.7%, with eating behavior is dominantly not good (61.8%), and with less than 60% protein intake. Conclusion, there is a significant relationship between eating behavior with the incidence of anemia and protein intake with the incidence of anemia in adolescents girls at Junior High School Krispa Silian Southeast Minahasa North Sulawesi.**

***Index Terms*—anemia, eating behavior, protein**

I. Introduction

Basic Health Research Results 2013 mentioned that the prevalence of anemia in Indonesia reached 21.7%, the detailed were as follows for age group of 5-14 years was 26.4% and 15-24 years was 18.4%. The Prevalence of anemia by region in Indonesia was found in rural area was 22.8% and the urban was 20.6%, while the prevalence of anemia by sex was in female was 23.9% and male was 18.4% [1].

Adolescents girls are more at risk of anemia because at this time there is rapid growth and development, therefore the needs of macro and micronutrients are higher especially during menstruation [2], [3]. Study in Turkey conducted by Yasemin, (2011) among adolescents idicated that 59% of adolescents experienced in iron deficiency anemia and 41% anemia due to iron deficiency and vitamin B 12 [4].

Nutritional problems that frequently occur in teenagers, are deficiency of iron nutrients called as iron nutritional anemia (AGB). Iron nutritional anemia is a continuation of the macro nutrient deficiencies of carbohydrates, proteins, fats and also lack of micronutrients, like vitamins, and minerals [5].

Adolescence is a period when growth and development, both physically and, mentally, as well as activity are the highest therefore needs higher nutrients to meet the requerement [6]. Young women are experiencing of nutritional deficiencies. Iron deficiency is considered the most common cause of anemia globally, but some other nutritional deficiencies (including folate, vitamin B12, and vitamin A), acute and chronic inflammation, infectious parasites may cause anemia [7], [8].

Young women, in general, have characteristics of unhealthy eating habits, such as do not take breakfast, delay to drink water, unhealthy diet because they want to slim (ignore the source of protein, carbohydrates, vitamins, and minerals), the habit of snacking low-nutrient foods and eating fast food. Therefore, adolescents are not able to meet the diversity of nutrients needed by the body for the synthesis of hemoglobin formation (Hb). When this happened over long periods of time the Hb levels will continue to decrease and cause anemia [9].

Teenage girls often get stuck with unhealthy diet, wanting to lose weight drastically, low-nutritional snacking habits, eating habits of ready-to-eat foods (fast food) with unbalanced nutritional contents with to high in

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energy and is usually accompanied by fizzy drinks which is excessive [10].

World Health Organization (2005) said that anemia is a condition that red blood cell count is not sufficient to meet the physiological needs of the body. A person's physiological needs vary by age, sex, place of residence, smoking behavior and pregnancy stage [11]. The causes of anemia are generally due to iron deficiency, deficiency of folic acid, vitamin B12, and vitamin A. Acute and chronic inflammation, parasitic infections, congenital disorders that affect hemoglobin synthesis, red cell production deficiency can cause anemia. The problem of an iron deficiency anemia becomes a nutritional problem, especially in teenagers, means young women because of experience in menstruation [12].

The results of Paputungan, et al (2016) study at SMP Negeri 8 Manado showed that iron intake was good (48.6%), and 51.4% had less iron intake, and anemia was 15.7% [13]. The purpose of this study to determine the relationship between eating behavior, protein intake with anemia in young women at SMP Krispa Silian Southeast Minahasa Regency in North Sulawesi Indonesia.

II. Methods

This study was an observational study with the cross sectional design. Research at SMP Krispa Silian in South Minahasa Regency. Popululation was all students of VII to class IX classes in SMP Krispa Silian amounted to 123 female students. The number of samples obtained (Slovin formula) amounted to 55 people. Inclusion Criteria; not being menstruating, healthy and not suffering from serious illness. Exclusion criteria were taking iron tablets. Sampling technique applied was stratified random sampling.

The independent variables were eating behavior and protein intake. The dependent variable was anemia. Data collected were characteristic of subject including (age, body weight, height); data of eating behavior; protein intake and anemia test. Body weight were measured using digital scales, height using microtoise, feeding behavior by interview (questionnaire), protein intake was taken using 24 hour food recall and Hemoglobin determination to measure anemia status was obtained using Hematocrit method (by health personnel). Data were processed descriptively and analytically. Data of protein nutrient intake were processed by using the Nutrisurvey software. Statistical test was applied using Chi-Square test.

III. Results

Respondents were 55 subjects of junior high school students consisting of 7th grade was 19 subjects, 8th grade was 16 subjects and 9th grade was 20 subjects. The mean age of the study subjects was 12,7 years, mean body weight 41 kg, mean height 146 cm, IMT/U averaged 19.1 kg/m2, mean hemoglobin 11,7 g/dl and an average protein intake of 49.9 grams.

A. Respondent Eating Behavior

The eating behavior (Table I), most of them has a poor eating behavior (61,8%).

TABLE I. Respondent' Eating Behavior

Respondent Eating Behavior	n	%
Good	21	38,2
Poor	34	61,8
Total	55	100,0

B. Protein Intake

Most of the protein intake (Table II) of the subjects was less (60%).

TABLE II. Distribution of Respondents Based on Protein Intake

Protein Intake	n	%
Sufficient	22	40,0
Not Sufficient	33	60,0
Total	55	100,0

C. Anemia Status

The respondent's anemia status (Tabel III) was largelyfound had a positive anemia (Hb <12 gr/dl); (52.7%).

TABLE III. Anemia Status of Respondents

Anemia status	n	%
Normal	26	47.3
Anemia	29	52.7
Total	55	100.0

D. The Relationship of Eating Behavior with Anemia

TABLE IV. Relationship Eating Behavior with Anemia Status (N=55)

Eating behaviour	Anemia status				*p Value*
	Anemia		Normal		
	n	%	n	%	
Good	7	12.7	14	25.5	0,024*
Poor	22	40.0	12	21.8	
Total	29	52.7	26	47.3	

*= significant p<0.05

Results of statistical analysis using Chi Square Test (Tabel IV) showed a significant relationship between adolescent eating behavior with anemia status in adolescents p <0.05).

E. Relationship of Protein Intake with Anemia

TABLE V. RELATIONSHIP OF PROTEIN INTAKE WITH THE INCIDENCE OF ANEMIA (N=55)

Protein intake	Anemia status				*p-value*
	Anemia		Normal		
	n	%	n	%	
Not Sufficient	21	38.2	12	21.8	0,047*
Sufficient	8	14.5	14	25.5	
Total	29	52.7	26	47.3	

*= significant p< 0.05

The results in Table V showed a significant association between protein intake and the incidence of anemia in adolescents (p <0.05).

IV. DISCUSSION

Adolescent eating behavior includes breakfast habits, eating frequency 3 times a day, the composition of meals, fish consumption, meat, chicken, eggs, green vegetables and milk, the habit of doing food restriction (diet), consumption habits of snack and spew food that has been eaten. In general, young women have characteristics of unhealthy eating habits. Other unhealthy habits were do not eat breakfast, delay to drink water, unhealthy diet because they wanted to slim (ignore the source of protein, carbohydrates, vitamins, and minerals), the habit of snacking low-nutrient foods and eating fast food. Research in Ranchi India, showed that 78% of adolescent girls consume junk food [14]. As a result, adolescents were not able to meet the diversity of nutrients needed by the body for forming hemoglobin (Hb). If this happened over a long period of time it will lead to the decrease of Hb level and it caused anemia [8]. In this research, it was found that most of respondent had not good (poor) eating behavior (61.8%). Eating behaviours among adolescent girls in Jeddah Saudi Arabbia, some eating behaviours were found to be particularly prevalent, including snack consumption, eating outside the home, consumption of sugar-carbonated drinks, and very low consumption of vegetables and fruit [15].

Teenagers who do not have breakfast habits have twice the risk of anemia compared to breakfast. The results of this study was in line with Permaesih and Herman's (2005) study which found there is a significant relationship between breakfast habit and the incidence of anemia in adolescent in Indonesia (p = 0,0057), where the relative risk is 1.6 times. This means that teenagers who did not take breakfast had anemia risk almost twice as likely as adults who took breakfast [16]. A similar study by Wijiastuti (2006) in Tsanawiyah Cipondoh, found a significant relationship between breakfast with incidence of anemia in young women. This is supported by Roizen's statement, where young girls should not skip breakfast because breakfast would speed up metabolism and prepared teenagers to spend the day well [17].

We recommend that teenagers should take breakfast with complete nutrition, especially carbohydrates, fats and protein, amounted one-third of lunch portions. They will meet the needs and avoid anemia. Teenagers in SMAN 8 Muaro Jambi still did not take breakfast that reached 60%. The data also showed that teenagers still did not take breakfast at home with complete nutrition food before leaving home for school and just eating or drinking snacks at school in the form of snacks or other unhealthy foods. Teenagers who had physical activity that requires a sufficient calories, protein, and micronutrients both qualitatively and quantitatively from food consumed at breakfast time should contain a source of energy, enough protein, and regulating substances in a balanced amount with amount approximately one-third of nutritional adequacy in a day and adolescents are in dire need of nutrition in the morning before doing the activity [18].

Breakfast is very important because it used to maintain body condition and improve the concentration of learning. Breakfast also serves as a source of energy to perform activities, so breakfast is recommended to be done by teenagers before leaving home for school because it will reduce the consumption of snack foods with low nutrition content. Moreover, breakfast before starting the activity can provide enough energy in conducting their activities.

Adolescents in SMP Krispa also mostly ate less than <3 times a day, with the arrangement of imbalance od dishes. The frequency of eating less than three times a day as many as 33 people, 21 of them have anemia so statistically, there is a significant relationship of eating frequency with the incidence of anemia, p = 0,047. The frequency of eating less will affect the intake of incoming nutrients that will affect the metabolism of nutrients in the body [19].

In this study, most of the respondents had good eating habits. The respondents often consumed fish, egg, pork, milk that is source of protein and also often consumed green vegetables although statistically, consumption of fish, chicken, egg, milk, and vegetable green did not show any significant association with the incidence of anemia. Although often teenagers consumed food protein sources, the amount of protein intake was mostly low because the amount of food consumed was still relatively small. In this study also obtained that most respondents did not have the habit of doing dietary restrictions or restrict food (diet) for a specific purpose.

Anemia occurs where the amount of erythrocytes (red blood cells) or Hb levels in the blood is less than normal. The causes can vary such as severe bleeding, lack of iron levels in the body, deficiency of folic acid, vitamin B12 deficiency, worms, leukemia, chronic diseases and so on. Several studies had found a high prevalence of anemia among adolescents, in which Isati (2013), Permaesih and Herman (2005) studies showed respectively 41%, 25.5% and 88% [16]. In this study, 52.7% adolescents suffering from anemia. The results of this study are still higher

than studies in Ranchi India which shows the prevalence of anaemia (Hb <12 g / dl) was 29% [14].

Red blood cell production requires nutrients, such as iron, vitamin B12, folic acid, vitamin B6, and protein. Deficiency of one element of nutrients will inhibit the formation of red blood cells that cause anemia [20]. Protein is part of all living cells and is the largest part of the body after water. A fifth part of the body is protein, half is in the muscle, one fifth in the heart and cartilage, one tenth in the skin, and the rest in other tissues and body fluids. Protein has a unique function that can not be replaced by other substances, which is to build and maintain cells and tissues [21].

The role of proteins in the formation of red blood cells is as a means of transporting iron. There is no free iron in the body. The iron will join the protein to form transferrin. Transferin will bring iron to the bone marrow to merge to form hemoglobin [22]. A person who lacks transferrin in his body causes the failure of iron to be transported to the erythroblasts present in the bone marrow. As a result, the formation of hemoglobin is disrupted and can cause anemia [23].

The results of this study showed that protein intake of junior high school girls in Krispa Silian, were less (60%), means so that 33 people with protein intake less (not sufficient) 21 people (63,7%) had anemia. Aritonang research on students in Medan North Sumatra showed only 23.1% of the sample a "Good" level of protein consumption, and 25.0% were at a moderate level [24]. This is very clearly related because for hemoglobin is a protein rich in iron. Globin from hemoglobin is broken down into amino acids to be used as proteins in the tissues; an iron in the hem of hemoglobin is excreted for use in the formation of the next red blood cell [25]. Protein also serves to transport iron through transferrin. Lack of protein intake can lead to iron transport disorders as well as the formation of hemoglobin and red blood cells that can ultimately lead to iron deficiency anemia. The results of this study indicate a significant association of protein intake with the incidence of anemia in adolescent girls in SMP Krispa ($p < 0.05$).

Kirana research at State Senior High School 2 Semarang in 2011, also showed the relationship between protein intake, vitamin A, vitamin C, and iron with the incidence of anemia. The Syatriani and Aryani studies, (2010), also show similar results[26].

Weaknesses of this research were data collection of food consumption (protein intake) rely heavily only on respondents' memories that can cause information bias. Hb status was measured only using Autocheck.

V. Conclusion

Adolescent girls suffering from Anemia were 52.7%, adolescent girls eating behavior is dominantly not good (61.8%), adolescent girls protein intake is mostly less (60%) than requirement. There was a significant relationship between eating behavior and protein intake with the anemia in adolescent girls in Junior High School Krispa Silian Southeast Minahasa Regency.

VI. Recommendation

The need for nutritional education about the importance of good eating behaviors such as good breakfast habits, eating habits based on balanced diet, and to avoid excessive dietary habits and unbalanced consumption of snack foods for teenagers to prevent the occurrence of nutritional anemia

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