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Description of Iron, Protein Intake, Compliance with Government Activity Blood Supplement Tablets Consumption and Consumption Patterns of Iron Inhibitors in Adolescent Girls at Public High School 1 Barat Magetan District

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ABSTRACT

Anemia is common in developing countries such as Indonesia. Government prevention efforts to overcome iron deficiency are by giving Blood Addition Tablets and also improving diet. Identify the intake of protein iron consumption, compliance consumption of government activity blood supplement tablets and consumption patterns of iron inhibitors in SMA Negeri 1 Barat Magetan District. This research is a descriptive study. Data collection by interview with a questionnaire instrument compliance consumption of blood supplement tablets and food intake interview with SQ-FFQ questionnaire. The number of respondents was 58 students with proportional random sampling technique. The percentage of students who did not consume blood supplement tablets (67.2%). The level of iron intake was deficient (62.1%), students consumed tannin very often (25.9%), consumption of phytic acid often (48.3%), and the level of protein intake was severely deficient (79.3%). Most students did not consume the given blood supplement tablets. Most students had iron deficiency and protein intake levels that were severely deficient. The students also had a frequent category in consuming phytic acid and also had a frequent category in consuming phytic acid. Schools are advised to hold counseling on anemia and balanced nutrition, and blood supplement tablets supplementation activities.

INTRODUCTION

Adolescents undergo rapid physical growth, including increases in height, reproductive organ development, and changes in body composition such as increased muscle and fat mass, as well as strong emotions, including emotional fluctuations, anxiety, and feelings, and anemia.[1] Additionally, in several regions of Indonesia, the prevalence of blood disorders in adolescents exceeds 30%.[2] Various efforts have been made to address the prevalence of blood disorders in adolescent girls. Some methods applied include fortification of iron in food and nutritional counseling to improve iron absorption and availability.[3] Although these measures have been implemented, in various countries, including the United States, efforts to combat blood disorders or anemia in young women often involve a more comprehensive approach than simply focusing on dietary intake.[4] Some methods applied include fortification of iron in food and nutritional counseling to improve iron absorption and availability.[5] Despite these measures, in various countries, including the United States, efforts to combat blood disorders or anemia in young women often involve a more comprehensive approach than simply focusing on dietary intake.[6] In 2016, the Ministry of Health launched a blood supplement

drinking program for adolescent girls, with a target of reaching 30% by 2019. The activity aims to improve the nutritional status of young women with the goal of reducing the risk of malnutrition stunting and preventing blood disorders.[7]

Continuous efforts are needed to increase awareness and understanding among young women regarding the importance of compliance in taking Iron Supplement Tablets for their health.[8] Currently, at the Tebon Health Center, there is no screening activity for anemia among adolescent girls. The provision of Iron Supplement Tablets is carried out through the "Joint Iron Supplement Tablet Consumption" activity, which is conducted once a week at junior high schools and senior high schools, and follow-up has never been conducted to assess the success of this activity. At West Public High School 1 itself, every student receives Iron Supplement Tablets from the Tebon Health Center, with 12 tablets given every three months. The provision of Iron Supplement Tablets is routinely distributed from the Health Center through the SMA Negeri 1 Barat.

Based on the data presented, the researcher is interested in understanding the overview of iron intake and compliance with government Blood Supplement Tablet consumption activities. This is due to the high prevalence of anemia among adolescents in Indonesia. This study focuses on students from SMA Negeri 1 Barat as the research subjects because there are still students who are not compliant in consuming the Blood Supplement Tablets. This is supported by preliminary study results, including interviews with 15 students, revealing that students have not been compliant in consuming the Blood Supplement Tablets obtained from the health center distributed through the School Health Unit, with 20% being compliant and 80% being non-compliant. Based on the preliminary study conducted among 15 female students from SMA Negeri 1 Barat, it was found that 100% of the students had insufficient iron intake.

MATERIALS AND METHODS

The research will be conducted at SMA Negeri 1 Barat, West District, Magetan Regency, from November 2022 to April 2023. The study is descriptive in nature, utilizing a cross-sectional design. The population and respondents were determined using proportional random sampling, consisting of female students from both the tenth and twelfth grades of SMA Negeri 1 Barat, totaling 58 individuals.

Data on protein and iron consumption were collected through interviews on dietary habits using the SQ-FFQ method over a period of one month. Subsequently, the data were processed using the Nutrisurvey 2007 application. The categorization of macro-nutrient adequacy levels was divided into five categories: Severe deficit: < 70%, Moderate deficit: 70-79%, Mild deficit: 80-89%, Normal: 90-119%, Excess: ≥ 120%.[9] Compliance with TTD was measured using a compliance form with categories: Compliant: ≥ 75%, Non-compliant: < 75%[10] The consumption patterns of tannin and phytic acid were measured using an FFQ form categorized into five levels: Very often: > 1 time per

day, Often: 4-6 times per week, Regular: 3 times per week, Sometimes: 1-2 times per week, Rarely: 1 time per week.[11] The data obtained were then analyzed using univariate analysis aimed at describing the distribution of single variables, namely protein intake and iron intake.

RESULTS

Data Characteristics Respondent.

Here is the data on respondent characteristics according to age based on the questionnaire that has been conducted. Results of questionnaire completion.

Table 1 Frequency Distribution of Respondents to Age

Age	n	Percentage (%)
16 Years	23	39.7
17 Years	28	87.9
18 Years	7	12.1
Total	**58**	**100**

Source: Primary Data, 2023

Based on the frequency distribution table of respondents by age above, it can be concluded that the age group with the highest frequency is respondents aged 17 years, contributing 87.9% of the total sample involved in the study.

Table 2 Frequency Distribution of Respondents to Class

Class	n	Percentage (%)
10	30	51.7
11	28	48.3
Total	**58**	**100**

Source: Primary Data,2023

From this research, it can be concluded that the class group with the highest frequency is class 10, which contributes 51.7% of the total sample of teenage girls involved in the study.

Data on Protein and Iron Intake can be Classified as Follows.

Table 3 Frequency Distribution of Respondents According to Protein Intake

Class	n	Percentage (%)
Severe Deficiency	46	79.3
Moderate Deficiency	4	6.9
Mild Deficiency	6	10.3
Normal	2	3.4
Excess	0	0
Total	**58**	**100**

Source: Primary Data, 2023

From this study, it can be seen that the distribution of respondents based on protein intake, the highest frequency is in the severe deficit category, with 46 people accounting for 79.3%

Tabel 4 Frequency Distribution of Respondents According to Iron Intake

Intake Iron Level	n	Percentage (%)
Less (< 77% AKG)	36	62.1
Enough (> 77% AKG)	22	37.9
Total	**58**	**100**

Source: Primary Data, 2023

From the above research results, it can be concluded that respondents have a deficiency in iron consumption, with 36 female students, which is 62.1% of the total 58 respondents.

Data Frequency Distribution of Respondents.

Table 5 Frequency Distribution of Respondents According to Compliance with Blood Booster Tablet Consumption

Compliance with Blood Booster Tablet Consumption	n	Percentage (%)
Compliant	19	32.8
Non-Compliant	39	67.2
Total	**58**	**100**

Source: Primary Data, 2023

From the research results, it can be seen that there are respondents, as many as 36 female students (67.2% of the total 58 respondents), who do not consume the Blood Booster Tablet.

Frequency distribution of respondents based on tannin consumption patterns in students of SMA Negeri 1 Barat can be classified as shown in the table below:

Table 6 Frequency Distribution of Respondents According to Tannin Consumption Pattern

Tannin Consumption Pattern	n	Percentage (%)
Very Often	15	25.9
Often	13	22.4
Usually	11	19
Sometimes	9	15.5
Rarely	10	17.2
Total	**58**	**100**

Source: Primary Data, 2023

Based on the table above, the research results show that the highest frequency of tannin consumption is found in respondents who consume tannin-containing foods very often, totaling 15 female students (25.9%).

Table 7 Frequency Distribution of Respondents Based on Phytic Acid Consumption Pattern

Phytic Acid Consumption Pattern	n	Percentage (%)
Very Often	12	20.7
Often	28	48.3
Usually	11	19
Sometimes	5	8.6
Rarely	2	3.4
Total	**58**	**100**

Source: Primary Data, 2023

From the research results, it is known that the highest frequency of phytic acid consumption is found in respondents who often consume foods containing phytic acid, totaling 28 female students (48.3%).

DISCUSSION

Respondent Characteristics

Understanding that the adolescent period for girls aged 16-18 years is a time when they face many demanding activities and may overlook their food intake is crucial.[12] During this age, adolescents are often engaged in various activities such as school, extracurricular activities, and socializing with peers. This can make them more prone to neglecting or skipping breakfast, which can impact their nutritional intake, including iron. This is because adolescents tend to want and strive to diet. Many young women believe they can control their weight by skipping certain meals, including breakfast and lunch.

Protein Intake

The results indicate that the frequency of severe deficit in protein intake is quite significant, with 46 individuals accounting for 79.3%. Findings from this research suggest that the average protein consumption is at a level consistent with the recommended daily nutritional intake for the age group under study. These results may have positive implications for nutritional intake and overall health. However, the protein intake among young women in this group is still low compared to the Recommended Nutrient Intake for 2019, which stands at 60 g/day.[13] In the study conducted at SMA Negeri 1 Barat, on average, 10th and 11th-grade female students consumed various protein sources, albeit in small and infrequent portions.

Many students tend to consume insufficient protein sources, both animal-based and plant-based, and prefer less nutritious snacks such as instant noodles, fried snacks, spicy macaroni, and others. The types of food consumed by some respondents with normal protein intake are more diverse and contain higher levels of iron sources, such as animal-based foods like chicken and

eggs. Meanwhile, foods high in protein but low in iron come from plant-based sources like bean sprouts, tofu, and tempeh.

Protein plays a crucial role in the immune system, serving as a component of antibodies that help fight infections and diseases.[14] It also serves as a reserve energy source if carbohydrate and fat intake are insufficient. Protein plays an essential role in addressing anemia due to its involvement in hemoglobin production.[15] Hemoglobin itself is a protein composed of polypeptide chains. During adolescence, the need for protein does increase due to the rapid growth and development of the body.

Iron Intake

Based on the research findings, it was found that nearly all respondents (approximately 62.1%) experienced insufficient iron intake, while a small proportion of respondents had adequate iron intake (37.9%). t is important to note that iron consumption among young women is crucial because iron plays a role in the production of hemoglobin, which aids in transporting oxygen in the blood.[16] Iron deficiency can lead to blood disorders and various other health problems. Understanding that respondents obtain their iron intake from two sources, namely Iron Addition Tablets and food items derived from both animal and plant products, it is important to understand the pattern of iron consumption.

The low Fe intake among respondents may be due to a lack of animal food sources, as respondents tend to prefer consuming plant-based foods such as tofu and tempeh, which are inexpensive and readily available in their local environment.[17] Animal food sources frequently consumed by respondents include meatballs, chicken meat, chicken eggs, and sausages. From the research results, it was found that respondents who consumed a variety of foods had normal iron intake levels. Easily accessible and frequently consumed food ingredients can fulfill the body's iron needs if consumed in sufficient portions.

Respondents tend to have limited diversity in food choices. Introducing ingredients and modifying recipes from iron-rich foods abundant in Magetan but rarely consumed by respondents, such as fish, liver, red beans, and moringa leaves, is necessary to help respondents meet their daily iron needs. Moreover, it was found that another portion (approximately 37.9%) had sufficient iron consumption. There needs to be a balance in iron consumption because if the body lacks iron, it risks causing anemia, and if the body has excess iron, it can damage cells, organs, and tissues in the body.[18]

Compliance with Iron Supplement Tablets Consumption

Based on the research results above, it is evident that the majority of respondents do not consume Blood Addition Tablets (67.2%), and only a few students consume them. The reasons for students not consuming Blood Addition Tablets vary widely. The majority of students do not

consume Blood Addition Tablets because they feel dizzy after taking them (39.7%). Most students who consume Blood Addition Tablets take 4 tablets per month (57.9%). All female students at SMA Negeri 1 Barat receive Blood Addition Tablets from the school (100%).

The level of compliance in consuming Blood Addition Tablets among students at SMA Negeri 1 Barat, according to the research conducted, indicates that the majority of students have low compliance levels, amounting to 87 students (58.4%), and there are no subjects with a high compliance level in consuming blood supplements.

According to the regulations set forth in the Minister of Health of the Republic of Indonesia Regulation Number 88 of 2014, it is crucial to adhere to the standards and guidelines regarding the provision of iron (Fe) vitamin supplements, known as Blood Addition Tablets, to women of childbearing age to prevent anemia.[19] The provision of Blood Addition Tablets aims to ensure an adequate iron intake for women of childbearing age, especially during menstruation, which can lead to blood loss. However, the consumption of Blood Addition Tablets among adolescent students at SMA Negeri 1 Barat is not in line with the success index of preventing and controlling anemia in young women and women of childbearing age, which is the compliance of adolescent girls and women of childbearing age in consuming iron supplements.[20]

Inhibitor Consumption Pattern

From the results of this study, it is evident that the habit of consuming beverages containing tannins with the category of very often has a significant frequency, amounting to 15 individuals, or 25.9%. The research findings indicate that female students often consume tannin-containing substances, such as tea and coffee. During breaks at the cafeteria, most students tend to buy tea to accompany their meals. This habit can hinder iron absorption because tannic compounds in tea can bind with some iron compounds, forming complex bonds, thus resulting in iron deficiency and reduced hemoglobin formation.[21] The binding of tannins with mucosal proteins can disrupt iron absorption in the intestine. Iron bound with tannins cannot be efficiently absorbed by the body, leading to insufficient iron available for hemoglobin formation.[22]

Based on the research, it is shown that the habit of consuming foods containing phytic acid with the category of often, which includes 28 individuals, has a significant frequency, accounting for 24 people or 48.3%. Respondents categorized as often in consuming phytic acid do so because they frequently consume plant-based proteins. Phytic acid is found in grains and legumes. If phytic acid is consumed frequently, it binds to iron, making its absorption more difficult.[23]

Respondents often consume foods containing plant-based protein sources such as tofu and tempeh because they are affordable. Tofu and tempeh, made from soybeans, have high phytic acid

content, which can reduce iron absorption.[24] However, in the research, the phytic acid content in soybeans decreases after the fermentation process, as the Rhizopus mold has the ability to produce phytase enzymes.[25]

CONCLUSION

Based on the research findings regarding the overview of iron intake, protein, compliance with government Blood Addition Tablet consumption activities, and the pattern of iron inhibitor consumption among female adolescents at SMA Negeri 1 Barat, the following conclusions can be drawn:

1. Protein intake among young women is highest in the severe deficit category.
2. Iron intake among young adolescents mostly falls into the insufficient deficit category.
3. The pattern of tannin consumption among female adolescents mostly falls into the very frequent category.
4. The pattern of phytic acid consumption among female adolescents mostly falls into the frequent category.
5. Young women who comply with consuming Blood Addition Tablets mostly fall into the category of non-consumption.

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