The Correlation Between Socio-Economy, Iron Tablet Consumption, Physical Activity, and the Case of Anemia Among Senior High School Female Students in SMA Laboratorium Malang

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ABSTRACT

In Malang, anemia is one of the highest public health problems for female adolescents in ages 12 to 18 years. A cross-sectional study implemented to examine the related factors of anemia in senior high school female students in SMA Laboratorium Malang. Sixty-eight students included in the study. The research instruments were hemoglobin level examination and a questionnaire. The data analyzed using a chi-square test with a degree of significance 0.05 (α= 5%). The result showed that several factors significantly related to anemia case in female students of SMA Laboratorium Malang, which are the student's mother education level (p= 0.02), student's father occupation (p= 0,046), and student's habit of consuming iron absorption inhibitor (p= 0,024). While factors which were not significantly related were student's consumption of iron supplement (p= 0,361), eating frequency (p= 1,000), student's habit of consuming iron absorber food (p= 0,731), food restriction (p= 0,564), and physical activity (p= 0,833).

Keywords: Anemia, Socio-economic, Consumption of iron supplements, Eating habit, Physical activity.

1. INTRODUCTION

Anemia is a condition where hemoglobin, the protein that carries oxygen in red blood cells, is under the normal category. This condition is mostly caused by iron deficiency factors which are characterized by low hemoglobin levels and a decrease in ferritin levels. Normal levels of hemoglobin in men and women are approximately 12 gr/dl, mild anemia is when the hemoglobin level is 10-12 gr/dl, moderate anemia is 8-10 gr/dl, and severe anemia happens when the hemoglobin level is less than 8 gr/dl [1].

Anemia is a common nutritional problem throughout the world. It estimated that 30% of the world's population, especially developing countries, suffers from anemia caused by iron deficiency. Anemia case, particularly in adolescent girls, remains quite high. According to the World Health Organization (WHO) in 2013, the prevalence of anemia among female adolescents in developing countries ranges from 40-88%. High prevalence of iron deficiency anemia generally caused by several factors such as chronic blood loss, insufficient iron intake, inadequate absorption, and the increasing need for iron [2].

The prevalence of anemia in Indonesia is 21.7%, with a proportion of 20.6% in urban areas and 22.8% in rural areas [3]. In the National Health Survey 2018, a significant number of anemia patients were found and divided according to the age group, which are age 15-24 years at 84.6%, age 25-34 years at 33.7%, age 35-44 years at 33.6% and 24% in the age group 45- 54 years [4].

According to data from the Ministry of Health in East Java, 80.2% of Indonesian female teenagers affected with anemia. Based on the 2014 Indonesia Health Profile report data, the average national coverage for the iron supplement was 5.1%. However, in East Java Province, the average coverage of iron supplements was a bit below average (84.9%) [5].

Anemia in Malang considered one of the highest public health problems in adolescents aged 12 to 18 years. From the data of Malang Local Health Office in 2017, there were 158 girls and 108 for men aged 12-14 years who suffered from moderate anemia. Whereas the mild anemia was found in 273 girls and 42 boys aged 15-18 years old [3].

Puskesmas Arjuno is a health center that recommended as a place of research based on the annual anemia results of the Malang Local Health Office. Based on an interview in December 2018 to the nutritionist of Puskesmas Arjuno, it found that 35 female students in eight Senior High Schools under Puskesmas Arjuno's area coverage were moderately anemic. The highest prevalence was in SMA Laboratorium Malang (37%).

The preliminary data illustrated the prevalence of anemia particularly young women is still relatively high. Anemia is one of the factors causing the high maternal mortality rate in Indonesia. Hence, early detect anemia and give early intervention can help to prevent anemia among female adolescents.

SMA Laboratorium UM Malang is a senior high school in Puskesmas Arjuno's area coverage which has the highest number of anemia among its female students in 2017. Hence, the study aimed to analyze the correlation between risk factors associated with anemia and the 2018 number of anemia cases found among female students in SMA Laboratorium UM Malang.

2. METHOD

The study used a cross-sectional research design. The risk factors associated to anemia measured as independent variables were socioeconomic factor of the family (student's mother education level and student's father work type), consumption of iron tablet supplement, eating habits (frequency, consumption of iron absorption inhibitor, consumption of iron absorbent food, food restriction), and physical activity. The independent variables data will be collected using the questionnaire. Whilst the incident of anemia is measured using the digital Hb measurement tool FamilyDr® and worked as a dependent variable. The sample was a total sampling of all-female students in SMA Laboratorium UM Malang while the dependent variable used is the incidence of anemia. The sampling technique in this study was a total sampling with a total of 68 students. The collected data will be analyzed in univariate and bivariate analysis using SPSS Statistics 25 software.

3. RESULTS

3.1. *The Frequency Distribution of Anemia Occurrence in young women in UM Laboratory High School*

After examination of haemoglobin using the FamilyDr® Hb digital measurement tool, it found as much as 30.9% of the female students have anemia.

3.2. *The Frequency Distribution of Risk Factors Associated to Anemia in female students in SMA Laboratorium UM*

The results of the univariate analysis of the independent variables shown in Table 1. In the socioeconomic sub-variables, most respondents have highly educated mothers (80.9%) and 66.2% of fathers with precarious (non-permanent) work type. Around 77.9% of respondents did not consume iron tablets supplement. Furthermore, the sub-variables eating habit which is the frequency of eating, 52.9% of students eat 3 times a day, as much as 69.1% respondents consumed foods which can inhibit iron absorption by 69.1%, around 80.9% consume foods that boost iron absorption, and 69.1% of students do not have food restrictions. The physical activity variable, 92.6% of young women had moderate activity.

Table 1. Frequency distribution of risk factors associated to anemia in female students in SMA Laboratorium UM

Variable	n	%
Mother;s education level		
High	55	80.9
Low	13	19.1
Father's work type		
Permanent	23	33.8
Precarious	45	66.2
Iron tablet consumption		
No	53	77.9
Yes	15	22.1
Eating frequency		
< 3 times a day	32	47.1
3 times a day	36	52.9
Iron inhibitor consumption		
No	21	30.9
Yes	47	69.1
Iron absorbent consumption		
No	13	19.1
Yes	55	80.9
Food restriction		

Variable	n	%
No	47	69.1
Yes	21	30.9
Physical activity		
Mild	3	4.4
Moderate	63	92.6
Vigorous	2	2.9

3.3. The Bivariate Analysis between Student's Mother Education Level and Anemia

The results of the chi-square test showed there was a significant relationship between student's mother education level and the incidence of anemia in female students with p-value = 0.020.

Table 2. The bivariate analysis between student's mother education level and anemia

Mother education level	Anemia				p-value	Prev. Ratio (PR)
	No		Yes			
	n	%	n	%		
Low	5	38.5	8	61.5	0.020	0.50
High	42	76.4	13	23.6		

3.4. The Bivariate Analysis between Student's Father Work and Anemia

The chi-square test showed a significant relationship between the work type of student's father and the incidence of anemia (p-value = 0.046).

Table 3. The bivariate analysis between student's father work type and anemia

Father's work type	Anemia				p-value	Prev. Ratio (PR)
	No		Yes			
	n	%	n	%		
Precarious	27	60	18	40	0.046	0.69
Permanent	20	87	3	13		

3.5. The Bivariate Analysis between Consumption of Iron Tablets Supplement and Anemia

The analysis using the chi-square test showed there was no significant relationship between consumption of iron tablet supplement and the incidence of anemia in the respondent with a p-value = 0.361.

3.6. The Bivariate Analysis between Frequency of Eating and Anemia

Based on the results of the chi-square test, there was no significant relationship between frequency of eating with the incidence of anemia in female student (p-value = 1,000).

3.7. The Bivariate Analysis between Consumption Habit of Iron Absorption Inhibitor Food and the Incidence of Anemia

The results of the chi-square test showed there was a significant relationship between consuming foods that can inhibit iron absorption and the incidence of anemia with a p-value = 0.024.

Table 4. The bivariate analysis between consumption habit of iron absorption inhibitor food and anemia

Iron absorber inhibitor consumption	Anemia				p-value	Prev. Ratio (PR)
	No		Yes			
	n	%	n	%		
No	19	90.5	2	9.5	0.024	1.5
Yes	28	59.6	19	40.4		

3.8. The Bivariate Analysis between the Habit of Consuming Iron Absorbent Food and the Incidence of Anemia

Based on the results of the chi-square test, there was no significant relationship between consuming foods that can help iron absorption and the incidence of anemia in female studentt of SMA Laboratorium UM (p-value = 0.731).

3.9. The Bivariate Analysis between Food Restriction and Anemia

The bivariate analysis using the chi-square test showed that there was no significant relationship between dietary restrictions and the incidence of anemia in adolescent girls with p-value = 0.564.

3.10. The Bivariate Analysis between Physical Activity and Anemia

According to the result of chi-square test, there was no significant relationship between physical activity and the incidence of anemia with p-value = 0.833.

4. DISCUSSION

4.1. The correlation between Mother's Education Level and Anemia in Female Students

The results of the chi-square statistical test showed there was a relationship between the level of student's mother education level and the incidence of anemia in adolescent girls in the SMA Laboratorium UM Malang (p-value = 0.020 and PR = 0.50). Furthermore, this also showed that respondents who have mothers with a low education level have a 0.50 times greater risk of experiencing anemia.

The results of the study strengthened by the results of Gunatmaningsih's study [6] stating that there was a significant relationship between maternal education and the incidence of anemia in adolescent girls in the Brebes Regency. Moreover, another study also finds that there was a significant relationship between maternal education and the incidence of anemia in adolescent girls in Central Lampung [7].

4.2. The Correlation between Student's Father Work Type and Anemia in Female Students

Based on the chi-square test results obtained p-value = 0.046 and PR = 0.69. This showed that respondents with a non-permanent level of father's work had a 0.69 times greater risk of experiencing anemia. These results showed that there was a relationship between the work of fathers with the incidence of anemia in female students of SMA Laboratorium UM Malang. The results of the study are following the theory which states there is a relationship between the father's work type and the incidence of anemia. The results of the study are similar to the results of Oktalina showing that there is a significant relationship between father's work type and the incidence of anemia in adolescent girls in Pasaman Regency [8].

4.3. The Correlation Between Iron Tablet Supplement Consumption and Anemia In Adolescent Girls

The bivariate test result obtained p-value = 0.361 and PR = 1.21. This showed that respondents who did not consume iron tablets had a 1.21 risk of developing anemia. There was no relationship between the consumption of iron tablet supplement and the incidence of anemia in the respondent in SMA Laboratorium UM. The results of this study was in line with Siahaan who stated there is no significant relationship between the consumption of iron tablet and the incidence of anemia in adolescent girls [9].

4.4. The Correlation Between Frequency of Eating With Anemia in Young Women

Based on the chi-square test results obtained p-value = 1,000 and PR = 1.00. This showed that respondents with the frequency of eating less than 3 times a day have a risk of 1.00 for developing anemia. Based on these results, it showed that there is no relationship between the frequency of eating with the incidence of anemia in female students in SMA Laboratorium UM Malang.

The study in Jambi also found that there is no significant relationship between the frequency of eating with the incidence of anemia in adolescent girls[10]. Moreover, research conducted by Ikhmawati in Surakarta found that there is no relationship between the frequency of eating to hemoglobin levels [11].

4.5. The Correlation between The Habit of Consuming Food which Can Inhibit Iron Absorption and the Incidence of Anemia in Young Women

The bivariate analysis obtained p-value = 0.024 and PR = 1.5. This showed that respondents who have the habit of consuming foods that can inhibit iron absorption have a risk of 1.5 for developing anemia. Furthermore, there was a relationship between the habit of consuming food that inhibits iron absorption and the incidence of anemia in female students in SMA Laboratorium UM Malang.

The test result was following the theory that stated there is a relationship between the habit of consuming foods that can inhibit iron absorption and the incidence of anemia. The result of the study also strengthened by the results of Wijayanti who found that there was a significant relationship between consumption of foods inhibiting iron absorption and the incidence of anemia [12]. Moreover, Listiana stated that there is a significant relationship between tea drinking habits (tea is known for inhibits iron absorption) and the incidence of anemia [7].

4.6. The Correlation Between The Habit of Consuming Iron Absorber Food and the Occurrence of Anemia in Young Women

Based on the chi-square test results obtained p-value = 0.731 and PR = 1.15. This showed that respondents who have the habit of consuming foods that boost iron absorption have a risk of 1.15 for developing anemia. Based on these results, there was no relationship between the habit of consuming foods that can boost iron absorption with the incidence of anemia in the respondent of this study.

The result of the study strengthened by the results of Wijayanti's study in Rembang Regency who stated that there was no significant relationship between the habit of consuming foods that boosted iron absorption with

the incidence of anemia in adolescent girls [12]. Other research by Restuti and Susindra found that there is no relationship between vitamin C intake and anemia [13]. Furthermore, Denistikasari stated that there is no significant relationship between vitamin C intake which can boost iron absorption and anemia [14].

4.7. *The Correlation of Food Restriction and Anemia In Adolescent Girls*

The bivariate analysis obtained p-value = 0.564 and PR = 0.86. This showed that respondents who have dietary restrictions are at risk of 0.86 for developing anemia. Based on this result, there was no relationship between dietary restrictions with the incidence of anemia. The finding was in line with Siahaan's study in Depok City who describes the proportion of young women who have dietary restrictions and suffer from anemia are 38% and the proportion of young women who do not have food restrictions and have anemia are as much as 34.6%, with p-value = 0.675 which concludes there is no significant relationship between food restrictions and the incidence of anemia in adolescent girls [9].

4.8. *The Correlation Between Physical Activity and Anemia in Young Women*

Based on the chi-square test results obtained p-value = 0.833. The PR mild/moderate = 0.71 indicated that respondents who have mild physical activity are at risk 0.71 for anemia and PR (mild/severe) = 1.00 indicated that respondents who have moderate physical activity are at risk 1,00 for anemia. Based on these results, there was no relationship between physical activity and the incidence of anemia in female students in SMA Laboratorium UM Malang.

The study result was in line with Wijayanti research in Rembang Regency who stated there was no significant relationship between physical activity and anemia [12]. Mantika in Purbalingga also found that there was no relationship between physical activity and hemoglobin levels [15].

5. CONCLUSION

Based on the results of this study, it can be concluded that the risk factors associated with the incidence of anemia in female students of SMA Laboratorium UM Malang were student's mother education level, their father work type, and the consumption of food that can inhibit iron absorption. It recommended that young women need to aware of their hemoglobin level while also increasing their consumption of energy, protein, iron, and food which helps the iron absorption such as vitamin C, green vegetables, and meat. Furthermore, young women also need to take notice of the intake of iron containing foods to meet the Nutrition Adequacy Rate (RDA) recommended for their age, both in quality and quantity, and to consume iron tablet supplements regularly during the menstrual period, particularly when they are experiencing symptoms of anemia.

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