Influence of Knowledge Level about Anemia and Menstrual Patterns on Adherence to Consumption Iron Supplement in Adolescents at A Public Senior High School in Magelang

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Abstract

Anemia is a health problem in all age groups, from toddlers to old age. Adolescent girls are prone to anemia due to their monthly menstrual cycle, so iron supplementation is needed, one of which is Supplementary Blood Tablets. This study was to find out the influence of the knowledge level about anemia and menstrual patterns on compliance of iron supplement consumption in adolescents at a public senior high school in Magelang. This analytical research was carried out in December 2022 using a survey method with a research instrument in the form of a questionnaire in the form of a Google Form which was distributed via the Whatsapp application. The sampling technique was probability sampling in the form of proportionate stratified random sampling with the inclusion criteria for young women, active high school students, menstruating, aged 15-18 years, as well as exclusion criteria for high school students who were not willing to participate as research respondents. A population of 500 students came from grades 10, 11, and 12 and was calculated using the slovin formula (e = 5%) to obtain a sample of 250 students. The research questionnaire was adapted from four different studies with a total of 39 question items that had been tested for instrument validity content using the Aiken index calculation, and all questionnaire items tested valid with results > 0.8. The results showed that young women at a public senior high school in Magelang had a "good" level of knowledge about anemia with a percentage of 58.8%, 85.2% experienced normal menarche, 77.2% had normal menstrual cycles, 71.6% experienced dysmenorrhea, and adherence to iron supplement consumption was low. 84.4% of respondents "didn't comply" and 66.4% "forgot to consume" so it is necessary to increase socialization from health and education agencies regarding the importance of consumming iron supplement in adolescents . While the SPSS version 26 analysis was carried out using normality and homogeneity tests, non-parametric statistical tests were used with chi-square test yielded P values of 0.624>0.05 and 0.275>0.05, meaning that the level of knowledge about anemia and menstrual patterns had no effect on the adherence to iron supplement consumption in adolescents at a public senior high school in Magelang.

Keywords: Anemia, Menstrual Patterns, Iron Tablets.

INTRODUCTION

Anemia is a condition in which the rate of hemoglobin in the blood is lower than normal (WHO, 2011). Hemoglobin is incorrect component of red or erythrocyte blood that functions to bind oxygen and deliver it to all cells in the body's network. The network body requires oxygen to function properly. Lack of oxygen in brain and muscle tissue will cause symptoms including lack of concentration and less fit in doing activities. Hemoglobin is formed from the combination of protein and iron in red blood cells or erythrocytes. Anemia is a symptom for which the cause must be determined and its managed implemented (Ministry of Health, 2018). The global prevalence of anemia occurred in 204 countries from 1990 to 2019. Research conducted in 2020 found an increase in total cases of anemia from 1.42 billion in 1990 to 1.74 billion in 2019. This research also shows that the 3 regions with the highest contribution to anemia are Africa West, South Asia, and Central Africa (Gardner and Kassebaum, 2020). Anemia was found in 31.2% of women of reproductive age (15-49 years) in Indonesia in 2019, with the most common age range being 20-44 years (WHO, 2019). According to the 2018 Basic Health

Research, the incidence of anemia in Indonesian youth aged 15-24 years was 32%, with women experiencing anemia at a higher rate (27% of the total) than men (20%) (National Riskesdas Report, 2019). According to an anemia survey conducted by the Papua Provincial Health Office, it was found that the incidence of anemia was 57.1% in young women aged 10–14 years and 39.5% in women of childbearing age (Siauta et al., 2020).

Anemia is a health problem that can occur in all age groups, from toddlers to the elderly. Adolescent girls are prone to anemia due to their monthly menstrual cycle. Anemia can cause decreased endurance and productivity. Anemia caused by rheumatoid arthritis can be dangerous during pregnancy because it affects the growth and development of the fetus in the womb, and it has the potential to cause complications in pregnancy and childbirth, as well as the death of mother and child (Ministry of Health, 2022).

Adolescent girls will experience natural processes such as menstruation every month. Menstruation is bleeding from the uterus that takes place periodically and cyclically. This is the result of the release (desquamation) of the endometrium due to ovarian hormones (estrogen and progesterone), which change levels at the end of the ovarian cycle, usually starting on the 14th day after ovulation (Novita, 2018).

During menstruation, adolescent girls will lose a lot of iron, so iron supplementation is needed, one of which is Iron Supplement Tablets. Giving iron-containing supplements on a regular basis over a set period of time aims to increase hemoglobin levels quickly and must be maintained in order to increase iron storage in the body. The supplementation of Iron Tablet on adolescent girls and women of reproductive age is incorrect; it is one effort by the Indonesian government to meet iron intake. Giving Iron Supplement Tablets with an appropriate dose can prevent anemia and increase iron reserves in the body (Ministry of Health, 2018). Global experts recommend the

WHO (2019) recommendations. Iron tablets containing 30-60 mg of elemental iron are given to adolescent girls and women of reproductive age in areas with a 40% prevalence of anemia every day for three months in a year. Meanwhile, for areas where the prevalence of anemia is 20%, supplementation consists of 60 mg of elemental iron and 2800 mcg of folic acid, given once a week for 3 months `on` and 3 months `off` (WHO, 2011).

Research on the level of knowledge of adolescent girls about anemia at a public senior high school in Pekalongan, found that 27 adolescent girls (64.3%) did not know about anemia. As a result, efforts are required to carry out activities related to health education about the dangers of anemia and how to prevent it in order to reduce the incidence of anemia in adolescent girls (Fajriyah and Fitriyanto, 2016). According to research on and adherence to iron supplement consumption in adolescent girls at junior high schools located in administrative city areas and in areas far from urban centers, 100% of respondents consume iron supplements that have been received in schools in the regions. Meanwhile, students who spend less than 50% of their blood sugar levels in urban areas are at a higher risk. It can be concluded that there are still many cases of anemia in female students who are participating in the iron supplement consumption program. This can be attributed to a lack of knowledge about the use of iron tablets. It is recommended that the school assist in making students aware of the importance of consuming iron tablets provided by the government (Widiastuti and Rusmini, 2019).

Based on the data presented above, it can be seen that the problem of anemia among adolescent girls in Indonesia is a moderate public health problem that requires fast steps to overcome it. Lack of knowledge about anemia in adolescent girls and abnormal menstrual patterns makes adolescent girls more at risk of developing anemia. Research on the level of knowledge about anemia,

menstrual patterns, and compliance with iron supplement consumption in Magelang, especially among adolescent girls in a school, has not been carried out much. In addition, there are limited data related to the incidence of anemia and adherence at the Health Office of Magelang, so the researchers are interested in researching the description of the level of knowledge about anemia, menstrual patterns, and adherence to iron supplement consumption in adolescents at one of the schools, at a public senior high school in Magelang.

RESEARCH METHODOLOGY

This research is a type of descriptive analytic research using a survey method to determine the effect of the level of knowledge about anemia and menstrual patterns on compliance with iron supplement consumption in adolescents. The research was conducted at a public senior high school in Magelang during December 2022 using an instrument in the form of a questionnaire in the form of a Google Form, which was distributed via the WhatsApp application. The sampling technique was proportionate stratified random sampling with inclusion criteria for adolescent girls, active high school students, menstruating, aged 15-18 years, and exclusion criteria for high school students who were unwilling to participate as research respondents. The population of 500 students came from three levels, namely grades 10, 11, and 12, and was calculated using the Slovin formula (e = 5%) to obtain a sample of 250 students.

The content validity instrument was tested by 3 experts, and then for each question item, the content validity index was calculated using the following calculation (Aiken, 1980):

$$V = \frac{\sum s}{[n\,(C-1)]} \dots\dots(1)$$

Information:
S   = r – lo
Lo   = minimum validity score (1)
C   = maximum validity score (4)

R   = score given by the validator
N   = number of expert judgments (3)

Deal index:
< 0.4   = low validity
0.4-0.8   = moderate validity
> 0.8   = high validity

The research data used is primary data. Analysis and processing of descriptive data using Microsoft Excel were used to describe the level of knowledge about anemia, menstrual patterns, and iron tablet compliance among adolescents at a public senior high school in Magelang. The data was then presented in percentage form. Previously, the normality test with the Kolmogorov-Smirnov Test and the homogeneity test with the Levene Test were performed while processing analytical data using the Statistical Program for Social Science (SPSS) version 26 with the Chi Square test. The Chi Square test aims to determine the effect of the level of knowledge about anemia and menstrual patterns on the compliance of iron tablet consumption in adolescents at a public senior high school in Magelang.

RESULT AND DISCUSSION
Instrument Test

This study used instruments in the form of questionnaires adapted from several sources, including the knowledge level questionnaire adapted from Rokhmawati's research (2015), the menstrual pattern questionnaire adapted from Aprillia's research (2019), and the iron supplement consumption compliance questionnaire adapted from Alfiah et al. (2019) and Rasni *et al*(2019). The assembled instruments are then subjected to content validity testing. Content validity is a rational analysis by expert judgment test of the feasibility or relevance of the test content.The content validity of the measurement ensures that it includes an adequate set of items and accurately represents the research variables. The greater the content validity, the more the scale items reflect the area or overall variable

being measured. In other words, content validity is a function of how well the dimensions and elements of a concept have been described (Sekaran, 2006).

The total number of question items on the knowledge level variable used was entirely 27, according to the previous research questionnaire, and obtained an average validity value of 0.868313, or high validity criteria. Question items related to menstrual patterns consisting of 7 questions get an average validity value of 0.857143, or high validity criteria. This menstrual pattern questionnaire item was adapted from Aprillia's study (2019), which had not previously been tested for validity. The number of questionnaire items regarding menstrual patterns is the same as in previous studies.

The number of questions related to compliance with iron supplement consumption totaled 5 and obtained an average validity value of 0.888889, or high validity criteria. The items in the iron supplement consumption compliance questionnaire were adapted from research by Rasni *et al* (2019) and Alfiah et al. (2019), which had not previously been tested for validity. The number of question items adapted from Rasni's research questionnaire (2019), are 4 question items and 1 item related to reasons for not consuming iron tablets, was adapted from research by Alfiah et al. (2019). Based on the questionnaire test instrument with validity content sourced from four different researchers, a total of 39 question items were tested valid on the validity content test by three experts, consisting of 27 items related to level of knowledge about anemia, 7 items related to menstrual patterns, and 5 items related to compliance with iron supplement consumption.

Characteristics of Respondents

The research was conducted using primary data, and the purpose of the characteristics of the respondents was to wanted to know about the level of knowledge about anemia, menstrual patterns, and iron supplement compliance. provide an overview of what the respondents The following is a presentation of data on the characteristics of

Table 1. Characteristics of Respondents

Characteristics	Respondents	(%)
Age		
15 years	50	20%
16 years	78	31.2%
17 years	74	29.6%
18 years	48	19.2%
Total	**250**	**100%**
Class		
10	80	32%
11	84	33.6%
12	86	34.4%
Total	**250**	**100%**

Source: Primary data processed in 2023

the respondents obtained through distributing questionnaires based on age and class.

Based on **Table** 1, the characteristics of respondents according to age were found to be the most aged 16 years with a total of 78 respondents and a percentage of 31.2%, and the least was age 18 with a total of 48 female students and a percentage of 19.2%. High school-level adolescents in Indonesia are 15 to 18 years old. This age is categorized as mid-adolescence. The personality of adolescents is still childish, but a new element has emerged, they are awareness of their own personality and bodily life. In this age range, self-esteem begins to emerge, which has more weight. Adolescents begin to discover themselves or their identities around this time (Kartono, 1990). There are 3 levels of class distribution data at a public senior high school in Magelang, grades 10, 11, and 12, where each level has 8 classes, so there are a total of 24 classes. Total respondents in the study who met the inclusion criteria was 250.

Level of Knowledge about Anemia, Menstrual Patterns, and Adherence to Consumption Iron Supplement

Adherence to consumption iron supplement in adolescents at a public senior high school in Magelang was measured using a questionnaire. The questionnaire consisted of five questions regarding compliance with iron supplement consumption, the number of

Table 2. Frequency Level of Knowledge about Anemia, Menstrual Patterns, and Adherence to Consumption Iron Supplement

Variable	Frequency	%
Adherence to Consumption Iron Supplement		
Comply	39	15.6
Didn't comply	211	84.4
Level of Knowledge about Anemia		
Good	147	58. 8
Sufficient	74	29.6
Less	29	11.6
Menstrual Pattern		
Normal menarche age	213	85.2%
Normal menstrual cycle	193	77.2%
Cycle disorders		
Polimenorea	83	33.2%
Oligomenorrhea	47	18.8%
Stage I hypermenorrhea	124	49.6%
Stage II hypermenorrhea	64	25.6%
Dysmenorrhea	179	71.6%

Source: Primary data processed in 2023

tablets for each consumption, the frequency of taking iron tablets, and the reasons for not consuming iron tablets. The responses were based on respondents' iron content consumption over the previous month. Blood supplement tablets are a supplement needed by a woman because every month she will experience menstruation. Iron tablets are taken by adolescent girls not only during menstruation, but also once a week or four times a month (Rasni, *et al* 2019). Giving iron-containing supplements on a regular basis over a set period of time aims to increase hemoglobin levels quickly and must be maintained in order to increase iron storage in the body. According to Rahmadi's research (2018), it was stated that there was a significant difference in iron nutritional anemia status between female students in high school iron and non-iron supplementation programs, and the results of female students at public vocational school in Bandar Lampung who carried out the iron supplementation program did not experience anemia by 76%, while students in private senior high school in Lampung were 56.9% who did not have anemia and the rest had anemia ranging from mild, moderate, and even severe levels. Supplementation for young women and women of childbearing age is one of the Indonesian government's efforts to meet iron intake.

Giving iron tablet with an appropriate dose can prevent anemia and increase iron reserves in the body (Ministry of Health, 2018). Based on **Table** 2, it was found that 211 female students (84.4%) did not comply with taking iron tablets. Results from other studies showed that there was no significant difference between obedient and non-adherent female students in taking iron tablets. According to Ningtyas et al. (2021), 39 respondents (54.9%) were compliant in taking iron supplements, while 32 respondents (45.1%) were not. The level of knowledge about anemia in adolescents at a public senior high school in Magelang was measured using a questionnaire. The questionnaire consists of 27 questions regarding anemia, including understanding, symptoms, causes, impacts, prevention, and treatment. The questionnaire on the level of knowledge of adolescents at a public senior high school in Magelang regarding anemia, which was completed by the respondents, was then given a score for each question item, with the correct answer receiving a score of 1 and the incorrect answer receiving a score of 0,

and the results of the responses obtained were percentage into three categories, namely good (76-100%), sufficient (56-75%), and less (55%). According to Notoatmodjo, the youth's lack of knowledge about anemia results in their lack of understanding about anemia. Knowledge included in the cognitive domain has six levels: knowing, understanding, application, analysis, synthesis, and evaluation. Knowledge among young women about anemia only reaches the knowing stage and is not followed by application in everyday life, such as eating foods that contain lots of iron. (Fajriyah and Fitriyanto, 2016). Age is one of the factors that influence one's knowledge. The older you are, the more your comprehension and mindset will develop, so that the knowledge you gain will improve. At a young age, individuals will play an active role in society and social life and make more preparations for successful adjustment to old age; besides, young people will spend more time reading. Intellectual abilities, problem-solving skills, and verbal abilities are reported to have almost no decline at this age (Notoatmodjo, 2012).

In this study, menstrual patterns in adolescents at a public senior high school in Magelang were measured using a questionnaire. The questionnaire consisted of 7 questions regarding menstrual patterns, including age at menarche, menstrual cycle,

Table 3. Normality Test
Kolmogorov-Smirnov

	Statistics	dff	Sig.
Level of Knowledge about Anemia	.364	250	.000
Menstrual Pattern	.541	250	.000
Adherence to Consumption Iron Supplement	.510	250	.000

and menstrual disorders. The menstrual pattern questionnaire aims to find out how the cycle and bleeding that occur during menstruation match what the respondent experienced during the last 3 months. Respondents answered "yes" if the circumstances matched what they experienced and "no" if they did not match what they experienced. The results of the answers obtained from the respondents were then percentaged into normal and abnormal categories if the age of menarche was more or less than 11–13 years, they experienced a cycle menstruating more or less than 1 month or 28 days, and they experienced menstrual pattern disturbances including polymenorrhea, oligomenorrhea, stage I and II hypermenorrhea, and dysmenorrhea.

Based on table 2, 85.2% experienced normal menarche, 77.2% had normal menstrual cycles, and 71.6% experienced dysmenorrhea. Disorders of the menstrual

Table 4. Homogeneity Test
Test of Homogeneity of Variances

		Levene Statistics	df1	df2	Sig.
Level of Knowledge about Anemia	Based on Means	.009	1	248	.923
	Based on Median	.159	1	248	.691
	Based on Median and with adjusted df	.159	1	247.769	.691
	Based on trimmed mean	002	1	248	.963
Menstrual Pattern	Based on Means	4,550	1	248	.034
	Based on Median	1,187	1	248	.277
	Based on Median and adjusted df	1,187	1	226.361	.277
	Based on trimmed mean	3,329	1	248	.069

Source: Primary data processed in 2023

cycle are a problem that is often complained of by adolescents, especially dysmenorrhea. Menstrual pain, or dysmenorrhea, is a gynecological complaint due to an imbalance of the hormone progesterone, which results in pain experienced by women. The normality test is carried out to find out whether the data is normally distributed or not. Data is considered normal if the sig value is > 0.05 on the Kolmogorov-Smirnov test and abnormal if the sig value is 0.05. The results of the normality test will determine the next data analysis technique using parametric or non-parametric tests. **Table** 3 shows the results of the analysis of the Sig value for the level of knowledge about anemia, menstrual patterns, and iron supplement compliance. The value of Sig 0.000 < 0.05 means that the data is not normally distributed, so data analysis uses a non-parametric test with the Chi-Square method.

Table 5. The Influence of Level of Knowledge about Anemia and Menstrual Patterns on Adherence to Consumption Iron Supplement

Variable	Adherence to Consumption Iron Supplement				Total		P Value
	Comply		Didn't Comply				
	F	%	F	%	F	%	
Level of Knowledge about Anemia							
Good	25	64.1	122	57.8	147	58.8	0.624
Sufficient	9	23.1	65	30.8	74	29.6	
Less	5	12.8	24	11.6	29	11.6	
Menstrual Pattern							
Normal	3	7.7	8	3.8	11	4.4	0.275
Abnormal	36	92.3	203	96.2	239	95.6	

Source: Primary data processed in 2023

A homogeneity test is a test conducted to find out whether two or more sample data groups come from populations that have the same variance (are homogeneous). This can be done with the Levene test. The data tested is said to be homogeneous based on its significance value. A Sig. value greater than 0.05 indicates that the data group is from a population with the same (homogeneous) variance. A significance level of 0.05 indicates that each group of data is from a population with a different variance (not homogeneous). **Table** 4 depicts the level of anemia knowledge with a Sig.0.923 > 0.05 means that the data group comes from a population that has the same variance (homogeneous), while menstrual patterns get a Sig value. 0.034 < 0.05 means that the data group comes from populations with different variances (not homogeneous). Table 5 shows that respondents with a high level of knowledge and adherence to iron supplement consumption account for 64.1%, while respondents with a low level of knowledge and adherence to iron supplement consumption account for 11.6%. The results of the Chi-Square hypothesis test obtained a p value of 0.624 > 0.05. It can be concluded that the level of knowledge about anemia has no effect on the compliance with iron supplement consumption in adolescents at a public senior high school in Magelang. Respondents who had normal menstrual patterns and adhered to taking iron tablets were 7.7%, while respondents who had abnormal menstrual patterns and were not adherent to taking iron supplements were 96.2%. The results of the Chi-Square hypothesis test obtained a p value of 0.275 > 0.05. It can be concluded that menstrual patterns have no effect on iron supplement consumption compliance in adolescents at a public senior high school in Magelang.

The Influence of Anemia Knowledge on Adherence to Consumption Iron Supplement

Table 3 shows the effect of anemia knowledge on iron tablet compliance in young women at a public senior high school in Magelang. The result was that 25 (64.1%) respondents had good knowledge and adherence to taking iron tablets, and 122 (57.8%) respondents had good knowledge but were not obedient in consuming iron supplements. Meanwhile, for the category of respondents with less knowledge, 5 (12.8%) adherents consumed iron supplements, and 24 (11.6%) respondents were disobedient in consuming iron supplements.

Statistical test results obtained a P value of 0.624 > 0.05, so it can be concluded that there is no difference in compliance between respondents who have good knowledge, sufficient knowledge, and lack adherence to taking iron tablets, meaning that Ha is rejected and Ho is accepted. So, there is no significant effect between the level of knowledge and compliance and iron tablet consumption. This result is supported by Ningtyas's research, which obtained a P value of 0.414 > 0.05, so it can be concluded that there is no difference in compliance between respondents who have good, sufficient, and poor knowledge of consuming iron tablets, meaning that Ha is rejected and Ho is accepted. So, there is no significant relationship between the level of knowledge and compliance with iron tablet consumption (Ningtyas et al., 2021). The results of the previous research, with Kendall Tau correlation coefficient were -0.181 with a significance number of 0.155, so there was no relationship between attitudes of young women about anemia and the behavior of consuming iron tablets (Sulistyorini and Maesaroh, 2019). According to Suryani, some adolescents have good knowledge of anemia related issues, but this knowledge does not always influence their daily food choices, including the use of iron tablets (Suryani, 2015).

The Influence of Menstrual Patterns on Adherence to Consumption Iron Supplement

Menstrual patterns have an impact on iron supplement compliance in young women at a public senior high school in Magelang, as shown in Table 3. The results showed that 3 (7.7%) respondents had normal menstrual patterns and were adherent to consuming iron tablets, and 8 (3.8%) respondents had normal menstrual patterns but were not adherent to consuming iron tablets. Meanwhile, for the category of respondents with abnormal menstrual patterns, 36 (92.3%) adhered to taking iron supplements, and 203 (96.2%) were disobedient.

The statistical test results obtained had a P value of 0.275 > 0.05, so it can be concluded that there is no difference in compliance between respondents who have normal and abnormal menstrual patterns in compliance with taking iron tablets, meaning that Ha is rejected and Ho is accepted. So, there is no significant relationship between menstrual patterns and adherence to consumption iron supplement. According to Amir's research, there are factors that determine the relationship between iron consumption and pregnancy in adolescent girls in Indonesia, both internal and external factors. Based on the five studies extracted, the factors associated with the consumption of iron tablets are teacher support, attitudes, culture, environment (family support), perceived treats, perceived benefits, perceived barriers, and self-efficacy. Unrelated factors are knowledge, purchasing power, availability, parental support, parental income, perceived susceptibility (perceived vulnerability), and seriousness (Amir and Djokosujono, 2019). Based on research that has been conducted on young women at a public senior high school in Magelang, the results show that the level of knowledge about "good" anemia is 58.8%. However, 95.6% experienced abnormal menstrual patterns, and 84.4% were not compliant with taking iron tablets, so there is a need for increased socialization from health and education agencies regarding the importance of consuming iron supplements. Meanwhile, in

the analysis of the relationship, it was found that the level of knowledge and menstrual patterns had no effect on compliance with iron supplement consumption.

CONCLUSIONS

The results showed that adolescent girls at a public senior high school in Magelang had a "good" level of knowledge about anemia with a percentage of 58.8%, 85.2% experienced normal menarche, 77.2% had normal menstrual cycles, and 71.6% experienced dysmenorrhea. Meanwhile, in terms of compliance with iron supplement consumption, 84.4% of respondents were "non-compliant" and 66.4% said they "forgot to consume", so there is a need to increase socialization from health and education agencies regarding the importance of iron consumption in adolescents. Based on the research, the level of knowledge about anemia and menstrual patterns had no effect on the adherence to iron supplement consumption in adolescents at a public senior high school in Magelang. Further research should be conducted using the interview method to collect comprehensive data and examine the sociodemographic relationship with the level of knowledge about anemia, menstrual patterns, and adherence to iron supplement consumption and its associated diseases in greater depth.

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