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THE RELATIONSHIP OF MENSTRUAL PATTERNS WITH HEMOGLOBIN LEVELS IN ADOLESCENT WOMEN IN BONDOWOSO STATE 3 HIGH SCHOOL

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ABSTRACT

Introduction: Anemia in adolescents can cause decreased concentration in learning, often feel tired, easily sleepy and decreased endurance. Hemoglobin levels are influenced by the adequacy of iron in the body and protein content. Low protein consumption in daily food so that it does not meet the body's nutritional adequacy. Protein is a component of hemoglobin and plays an important role in transporting oxygen and nutrients. One of the triggers for anemia is an abnormal menstrual cycle. Losing a lot of blood during menstruation is thought to cause anemia. Objective: To determine the relationship between menstrual patterns and hemoglobin levels in female adolescents at SMA Negeri 3 Bondowoso. **Method:** The type of research is a correlational analytical study with a cross-sectional design. The population in this study were all female adolescents at SMA Negeri 3 Bondowoso, totaling 159 female students. The number of samples was obtained from the Slovin formula, namely 61 respondents, using the nonprobability sampling method with simple random sampling. Univariate analysis with frequency distribution, and bivariate analysis using the chi square test. The instrument in this study adopted the menstrual pattern questionnaire from Sunirah (2024) and the Easy Touch tool on hemoglobin levels. **Results:** Most respondents had normal menstrual patterns as many as 36 (59.0%), almost half had abnormal menstrual patterns as many as 25 (41.0%), and most respondents had normal hemoglobin levels as many as 38 (62.3%), almost half of the respondents had low hemoglobin levels as many as 23 (37.7%). From the chi-Square analysis, it was obtained p value (0.001) <α (0.05) meaning Ha was accepted, namely there was a positive relationship with a contingency coefficient value of 0.412 which means a moderate relationship. **Conclusion:** There is a relationship between menstrual patterns and hemoglobin levels in female adolescents at SMA Negeri 3 Bondowoso. **Suggestion:** It is hoped that female adolescents will be willing to consume blood-boosting tablets during menstruation, in order to avoid anemia which can interfere with their concentration in learning. And consume foods that can prevent anemia such as beef, liver, nuts and vegetables.

Keywords: Hemoglobin Level; Menstruation Pattern; Young Women

1. INTRODUCTION

In adolescence, the process of early puberty occurs until the process of maturity. One of the signs of puberty in adolescent girls is characterized by the onset of menstruation. Irregular or excessive menstrual patterns can affect hemoglobin levels in the blood which can potentially lead to anemia. Anemia in adolescent girls is a condition in which the number of red blood cells or the concentration of hemoglobin in them is lower than normal (Dineti et al., 2022). This can cause anemia due to many changes in hemoglobin levels in adolescent girls which are influenced by several factors, including inadequate nutrient intake, menstruation, unbalanced diet, rapid growth during adolescence, and social and economic factors. Adolescent girls are said to be anemic if their hemoglobin level is less than 12 g/dl (Karimah et al., 2024).

Anemia in adolescent girls is still quite high. According to the World Health Organization (WHO) (2015), the prevalence of anemia in the world ranges from 50-80%. The prevalence of anemia in adolescent girls was 26.5%, and in fertile women was 26.9%. In fact, every year 1 million to 4.4 million adolescents in developing countries experience anemia and most adolescents experience anemia during menstruation. Based on Riskesdas 2018 data, the prevalence of anemia in adolescents has increased from the previous 22.70% in 2013 to 32% in 2018, meaning that 3-4 out of 10 adolescents suffer from anemia. Meanwhile, the incidence rate of anemia in East Java in 2021 shows a percentage figure of 57.1 After a preliminary study was conducted in November 2024 with interviews with 10 students out of 159 female students at SMA Negeri 3 Bondowoso, data was obtained on 4 students whose menstrual patterns were irregular in their menstrual cycles, namely 1 student whose menstrual cycle was >35 days and 3 students whose menstrual cycle was < 21 days, they also said they complained of dizziness, abdominal pain, until their faces were pale during menstruation. Of the 4 students whose menstrual patterns were irregular, there was one student who said that she had experienced anemia before.

Anemia in adolescent girls is high due to different menstrual patterns due to menstrual cycles, menstrual length, and amount of bleeding (Andriani et al., 2021). This is due to the amount of blood that comes out and the length of menstruation, because women do not have a low supply of iron in the body so they cannot replace the iron lost during menstruation. The impact of low hemoglobin levels can result in anemia with symptoms of paleness, lethargy or fatigue, shortness of breath and lack of appetite and growth disorders. In addition, the causes of anemia include the level of parental education, economic level, level of knowledge about anemia, consumption of Fe,

Vitamin C and the length of menstruation (Alifah, 2020).

Based on the results of the study (Nabila et al., 2022) which states that there is a significant relationship between menstrual patterns and hemoglobin levels in adolescent girls in the Wonokerso Village Area, Pakisaji District. This can be seen from the results of the data analysis test using spearman rank which shows that the p-value < α 0.05 so that H0 is rejected. This is in line with research conducted by (Patonah et al., 2018) stated that there is a relationship between the menstrual cycle and hemoglobin levels in adolescent girls. Hemoglobin levels in adolescent girls are normal if the menstrual cycle experienced is also normal, which is between 21-35 days. If the cycle is prolonged (> 35 days) or shortened (< 21 days), the amount of hemoglobin levels will tend to be abnormal. The results of this study are also in line with the research (Alifah, 2020) there was a relationship between the menstrual cycle and hemoglobin (Hb) levels in adolescent girls at SMP Plus-Albidayah, Mande District, Cianjur Regency in 2023 (pvalue = 0.000 < 0.05; PR = 4.310).

Various efforts can be made to prevent and overcome anemia such as screening to identify anemia early in adolescent girls (Riyanto et al., 2024). A routine program of consuming blood-boosting tablets in adolescent girls with recommendations every week of 1 tablet and 1 tablet daily during menstruation as a prevention of anemia in adolescents taken before bed to prevent the effects of nausea (Rasyid et al., 2022). And increase nutritional intake by consuming foods that contain iron (chicken liver, red meat, beets, dark green vegetables), consuming foods that contain vitamin C because it helps the absorption of iron in the body (oranges, strawberries, dragon fruit), and iron supplementation (Karimah et al., 2024).

Most adolescent girls who experience anemia are not aware of this condition, because they have never checked their hemoglobin levels. The variation in menstrual patterns of adolescent girls is an interesting thing to study purely whether it is the cause of anemia in adolescent girls. Based on the data and description above, the author is interested in conducting research on "The Relationship between Menstrual Patterns and Hemoglobin Levels in Adolescent Girls at SMA Negeri 3 Bondowoso".

2. METHODS

The design of this study is correlational analytics with a cross-sectional design. This study was conducted at SMA Negeri 3 Bondowoso in January 2025. Data collection was carried out once for 2 days. The population in this study is all young women at SMA Negeri 3 Bondowoso as many as 159 students. The number of samples was obtained from the slovin formula, which was 61 respondents. The sample in this study was taken according to the inclusion criteria of female students aged 16-19 years, female students who have experienced menstruation, female students who have been menstruating for 1 week and female students who are willing to be respondents while the exclusion criteria are those who are not willing to be respondents. The sampling technique in this study uses nonprobability sampling with simple random sampling. The instrument in this study adopted a menstrual pattern questionnaire from Sunirah (2024) with a validity value that the value of r calculated > r of the table based on a significant test of 0.05. The R value of the table obtained on the instrument shows a number (0.316), and the R calculation on the four questionnaires is 1. First questionnaire: 0.425 2. Second questionnaire: 0.509 3. The third questionnaire: 0.316, based on what has been mentioned that the three questionnaires are valid, because the r-value is calculated above the r-table while the reliability value shows the number (0.629), the value of the number can be said to be a reliable instrument while checking hemoglobin levels using the Easy Touch tool. The data analysis in this study was univariate analysis used by adolescents aged 16-19 years in adolescent girls, while bivariate analysis was used to see the comparison of menstrual patterns with hemoglobin levels using the Chi-Square test. Followed by a contingency coefficient test to see the strength of the 2 variables. This research has been carried out an ethical test and received ethical feasibility from the research ethics committee of the University dr. Soebandi with number: 594/KEPK/UDS/I/2025

3. Results

The following table shows the characteristics of respondents in the study on the relationship between menstrual patterns and hemoglobin levels in adolescent girls at SMA Negeri 3 Bondowoso:

Table 1. Characteristics of Respondents by Age in Young Women At SMA Negeri 3 Bondowoso in 2025

Information	n	(%)
Age (Years)		
16 Years	15	24,6
17 Years	27	44
18 Years	11	18
19 Years	8	13,5
Sum	61	100

Based on table 1. The above shows that almost all of the final adolescent respondents with an age mayor 17 years (44%).

Table 2. Characteristics of Respondents Based on the First History of Menstruation in Adolescent Girls at SMA Negeri 3 Bondowoso in 2025

Information	n	(%)
Usia Menarche		
Early Teens (10-12 years old)	40	65,6
Middle Teens (13-15 years old)	21	34,4
Late Teens (16-19 years old)	0	0
Sum	61	100

Based on table 2. The above shows that most of the respondents have a history of first menstruation in early adolescents with an age range of 10-12 years, which is as much as 40 (65.6%) and almost half of the respondents have a history of first menstruation in middle adolescents with an age range of 13-15 years, which is as much as 21 (34.4%).

Table 3. Menstruation Patterns in Adolescent Girls at SMA Negeri 3 Bondowoso in 2025

Information	n	(%)
Menstrual Patterns		
Normal	36	59,0
Abnormal	25	41,0
Sum	61	100

Based on table 3. The above shows that most of the respondents have a normal menstrual pattern of 36 (59.0%) and almost half have an abnormal menstrual pattern of 25 (41.0%).

Table 4. Hemoglobin Levels in Adolescent Girls at SMA Negeri 3 Bondowoso in 2025

Information	**n**	**(%)**
Up to Hemoglobin		
Low	23	37,7
Normal	38	62,3
Sum	61	100

Based on table 4. The above shows that most of the respondents have normal hemoglobin levels of 38 (62.3%) and almost half of the respondents have abnormal hemoglobin levels of 23 (37.7%).

Table 5. The Relationship of Menstrual Patterns and Hemoglobin Levels in Adolescent Girls at SMA Negeri 3 Bondowoso in 2025

Menstrual Patterns	**Up to Hemoglobin**				**Total**	
	Low		Normal			
	n	%	n	%	N	%
Abnormal	16	26,2	9	14,8	25	100
Normal	7	11,5	29	47,5	36	100
Total	23	37,7	38	62,3	61	100
				P Value = 0.001		
				Contingency Coefficient = 0.412		

Based on table 5. above, it shows that of the 25 respondents who had abnormal menstrual patterns, almost half experienced low hemoglobin levels, which was 16 (26.2%), and of the 36 respondents who had normal menstrual patterns, almost half experienced normal hemoglobin levels, which was 29 (47.5%). The results of *the Chi-Square* test showed that p *vallue* (0.001) < α (0.05) then Ha was accepted, namely there was a positive relationship with a contingency coefficient value of 0.412 which means a moderate relationship so that it can be interpreted that there is an overall relationship between menstrual patterns and hemoglobin levels in adolescent girls at SMA Negeri 3 Bondowoso.

4. DISCUSSION

a) Menstruation Patterns in Adolescent Girls at SMA Negeri 3 Bondowoso in 2025

The results of this study show that the menstrual patterns of adolescent girls at SMA Negeri 3 Bondowoso mostly have a normal menstrual pattern of 36 (59.0%). And most of the respondents had a history of first menstruation in early adolescents with an age range of 10-12 years, which was as much as 40 (65.6%) and almost half of the respondent

had a history of first menstruation in middle adolescents with an age range of 13-15 years, which was 21 (34.4%).

In line with the research conducted Patonah (2018) Stating that hemoglobin levels in adolescent girls are normal if the menstrual cycle experienced is also normal, which is between 21-35 days. If the cycle is prolonged (> 35 days) or shortened (< 21 days), the amount of hemoglobin levels will tend to be abnormal.

According to Series (2019) Menstrual patterns are said to be normal if the frequency of menstruation is once a month, the duration of menstruation is ≤ 6 days and the change of sanitary napkins ≤ 5 times/day. Meanwhile, it is said that it is abnormal if the frequency is more than once a month, the duration of menstruation is more than 6 days and and changing > sanitary napkins 5 times/day. Factors that affect menstrual patterns are menarche age, nutritional status, stress, and physical activity (Ilmi & Selasmi, 2019). One of the factors that causes normal menstrual patterns is the early age of menarche. When a teenager has his first menstruation, it means that his reproductive hormones start working. This is explained by the theory mentioned by April (2024) that the beginning of the functioning of the reproductive system is marked by the arrival of the first menstruation.

Menstrual patterns in adolescents are mostly normal because the age of adolescent menarche starts from the age of 10-15 years so teenagers already understand about maintaining menstrual patterns to be regular with regular exercise, a healthy diet, adequate rest, and not stress, but most of the normal menstrual patterns are in adolescents who are in grades 10 and 11 because they do not experience much stress, maybe because the learning is not too hard, have not faced the final exam, adaptation is better because they are used to the high school environment after going through the transition period from junior high school to high school while teenagers in grade 12 may be because they want to face the national final exam and their responsibility is greater because they are considered more mature and ready to face the outside world. There are also some whose menstrual patterns are abnormal, possibly a stressful factor where a physical and psychological reaction to any demands causes tension and disrupts the stability of daily life and irregular diet.

b) Hemoglobin Levels in Adolescent Girls at SMA Negeri 3 Bondowoso in 2025

The results showed that most of the respondents had normal hemoglobin levels of 38

(62.3%), which illustrates that most of the respondents did not have anemia or had hemoglobin levels ≥12 gr/dl and almost half of the respondents had low hemoglobin levels of 23 (37.7%).

The results of this study are also in accordance with those conducted by Alifa (2020) which stated that the results of the study on hemoglobin levels in adolescent girls were found that as many as 27 respondents did not experience anemia (69.2%), and as many as 12 respondents experienced anemia (30.8%). This study showed that there was an increase in hemoglobin levels after consuming Fe tablets. The intervention given to the respondents by consuming Fe tablets was very helpful to overcome iron anemia. The factors that affect the increase in hemoglobin levels in adolescent girls are age, frequency of menstruation, nutritional status, diet, type of food consumed, consumption of Fe tablets and physical activity (Putra et al., 2020). Fe is an important micronutrient for the body. Fe is needed in the process of forming hemoglobin structures that play a role in distributing oxygen throughout the body. Another cause of anemia is a deficiency of folic acid or vitamin B9 and vitamin B12 (Journal et al., 2025).

Hemoglobin levels in adolescents mostly have normal hemoglobin levels because adolescents routinely consume Fe tablets distributed by schools once a week every Friday. Adolescent girls also have a healthy lifestyle, consume food that fulfills enough nutrition, enough rest, regular exercise, and optimal growth where in adolescence the body is in a phase of rapid growth with a good metabolism so that the production of red blood cells and hemoglobin takes place optimally even though menstruation every month does not experience a lot of bleeding so that it does not experience anemia. adequate nutritional intake so that many adolescents get enough nutrition from their daily diet especially if they consume foods rich in iron, protein, vitamin B12, and folic acid which are necessary for hemoglobin production, balanced physical activity where physically active adolescents tend to have good blood circulation and a smooth metabolism to help healthy hemoglobin production, However, there are also adolescents who are at risk of anemia or low hemoglobin levels due to an unbalanced diet, heavy menstruation in adolescent girls, or other health problems. Therefore, it is important to ensure adequate nutritional intake and a healthy lifestyle to keep hemoglobin levels normal. But there are also some young women whose hemoglobin levels are low due to their unhealthy diet such as fast food consumption, poor eating habits possibly by going on a strict diet.

c) The Relationship of Menstrual Patterns and Hemoglobin Levels in Adolescent

Girls at SMA Negeri 3 Bondowoso in 2025

Based on the results of the study, it was shown that of the 25 respondents who had abnormal menstrual patterns, almost half experienced low hemoglobin levels, namely 16 (26.2%), and of the 36 respondents who had normal menstrual patterns, almost half experienced normal hemoglobin levels, which was 29 (47.5%). The results of the Chi-Square test showed that p vallue (0.001) < α (0.05) then Ha was accepted, namely there was a positive relationship, with a contingency coefficient value of 0.412 which means a moderate relationship. So it can be interpreted that there is a relationship between menstrual patterns and hemoglobin levels in adolescent girls at SMA Negeri 3 Bondowoso.

This research is in line with the research conducted (Nabila et al., 2022), showing that young women with abnormal menstrual patterns were almost half likely to have mild anemia. Meanwhile, respondents with normal menstrual patterns almost half did not experience anemia. This shows that adolescent girls with normal menstrual patterns are less likely to experience anemia compared to adolescent girls with abnormal menstrual patterns. If a teenager has an abnormal or longer menstrual cycle, it can affect hemoglobin levels. Adolescent girls with a menstrual cycle lasting more than 8 days and a short menstrual cycle, which is less than 21 days, allow for more iron loss that can result in abnormal Hb levels (Nirmala et al., 2024).

Teenagers who cycle under 28 days mean they will lose more iron than a normal cycle. Because the more often they menstruate, the more Fe is also expelled and without being balanced with iron consumption, of course, it will affect the incidence of anemia. Then adolescents who have a prolonged menstrual cycle or more than 35 days can be caused by unbalanced nutrient intake. More or less nutritional intake will result in poor nutritional adequacy, which will later affect changes in the menstrual cycle (Anemia et al., 2022). To Increase nutritional intake so that menstrual patterns and normal hemoglobin levels must consume foods that contain iron (chicken liver, red meat, beets, dark green vegetables), consume foods that contain vitamin C because it can help the absorption of iron in the body (oranges, strawberries, dragon fruit), and iron supplementation (Karimah et al., 2024).

From the results of the study and supported by several previous studies, the menstrual cycle in the respondents showed a meaningful relationship. From the data from the study

results, it can be seen that the proportion difference is that respondents who have a normal menstrual cycle tend to have normal hemoglobin levels, while respondents who have abnormal menstrual cycles are more likely to have anemia hemoglobin levels. To prevent abnormal menstrual cycles, it is necessary to adopt a healthy lifestyle, eat regularly with healthy nutrition, regular activities and rest to prevent stress in adolescent girls. A young woman who is physically and mentally healthy will not have anemia, creating a hormonal balance in her body. Healthy young women who are not anemic will not experience abnormal menstrual cycles. So that young women can do their activities well and with enthusiasm.

5. CONCLUSION AND SUGGESTIONS

The researchers concluded that:

1) The results showed that most of the respondents had normal menstrual patterns with cycles between 21-35 days, duration between 2-8 days, number of dressing changes between 2-5 times.
2) The results showed that most of the respondents had normal hemoglobin levels in the range of 12-15 gr/dL.
3) Adolescent menstrual patterns are related to changes in hemoglobin levels in adolescent girls.

The suggestions in this study are as follows:

1. For SMA Negeri 3 Bondowoso, to increase students' understanding of menstruation and the factors that affect it either through seminars at school organized by the school's UKS or participating in activities organized by the government.
2. For young women, it is expected that they are willing to consume blood supplement tablets (Fe) during menstruation, in order to avoid anemia that can interfere with their study concentration. As well as consuming foods that can prevent anemia such as beef, liver, nuts and vegetables.
3. For future researchers, with the results of this study, the next researcher can research more deeply about the sources of information related to the incidence of anemia in adolescent girls. The results of the research publication are published in the repository of dr. Soebandi University.

6. AUTHOR'S CONTRIBUTIONS

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7. CONFLICT OF INTEREST

This study does not cause a conflict of interest because it uses its own costs.

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