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Analysis of Menstrual Periods, Menstrual Cycle, Menstrual Pain and Body Mass Index with the Incidence of Anemia in Adolescent Girls

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ABSTRACT

Introduction. Periodic blood loss due to menstruation makes adolescent girls more susceptible to anemia. Menstrual periods such as prolonged menstruation, irregular monthly cycles, volume of blood loss, and health problems that accompany menstruation such as menstrual pain coupled with nutritional status can affect the occurrence of anemia in adolescents. The purpose of the study was to determine the relationship between menstrual periods, menstrual cycle, menstrual pain, and BMI with the incidence of anemia. **Methods.** This study was a cross-sectional study with a sample size of 53 respondents of adolescent girls of the Mambaul Ulum Islamic Boarding School in Banjarmasin City using an accidental sampling technique and analyzed using chi-square. The study was conducted in July 2024. The respondent's height was measured using a microtoise and weight using a scale. Furthermore, they filled out a questionnaire about the menstrual periods, menstrual cycle, and menstrual pain, and the hemoglobin levels were checked using the Easytouch tool. **Results.** There was a relationship between BMI and anemia with a p-value of 0.026. **Conclusion.** It is important to provide education about understanding good and sufficient eating patterns and nutrition, as well as education about the importance of taking iron tablets and education about the side effects of iron tablets in an effort to prevent anemia.

1. Introduction

Anemia is a deficiency of iron in the blood due to various causative factors. Globally, according to the World Health Organization (WHO), more than 30% of women aged 15-49 years suffer from anemia.[1] Anemia can cause fatigue, decreased learning concentration, decreased immune system therefore it is prone to infection. Adolescent girls are more susceptible to anemia than adolescent boys because adolescent girls who menstruate every month will release blood that can trigger anemia. Menstruation is the periodic and cyclic discharge of blood from the uterus accompanied by the release of the endometrium wall. Each woman has a different menstrual cycle and duration. Normally, one cycle ranges from 21-35 days (average 28 days), and the duration of menstruation is around 2-8 days. The volume of blood lost due to menstruation is 20-60 ml/day with an average of 30 ml/day.[2] That is why adolescent girls need more nutrients and iron to restore the body's condition to its original state.

There are several aspects in the menstrual cycle every month, such as the duration (period), the amount of blood lost, and whether there are disorders, such as dysmenorrhea. The menstrual cycle is calculated from the beginning of menstruation until the next menstruation. The normal menstrual cycle ranges from 21-35 days, and only 10-15% have a cycle of around 28 days with a duration of 3-5 days. In some women, the menstrual period even lasts 7-8 days by changing pads 2-5 times a day.[3]

Loss of blood for a long time is one of the many causes of nutritional anemia. Every month women will naturally lose blood, but if the loss is too much it can cause iron deficiency anemia. One study found that there was a relationship between the menstrual cycle and the length of menstruation with the incidence of anemia in adolescent girls, but the amount of menstrual blood that comes out each month had no relationship with the incidence of anemia.[4]

An irregular menstrual cycle is one of the triggers for anemia, especially if a lot of blood is lost. Suhariyati (2020) stated that there is a relationship between menstrual periods and the incidence of

anemia in adolescents.[5] In addition, adolescent girls tend to pay close attention to their body shape to keep them looking beautiful, so they limit their food intake and impose many prohibitions on eating foods, such as going on a vegetarian diet. In contrast, some adolescent girls pay attention to their weight while also paying attention to their nutritional status properly, so that they can avoid anemia. Some adolescent girls are also overweight due to poor diet and a culture of lack of exercise. From the results of Sandy's research (2020), it was obtained that overweight teenage girls have a higher risk of experiencing anemia compared to girls with normal weight.[6]

In addition, the nutritional status of adolescents is very important, especially as prospective mothers, and considering nutritional needs increases for the growth process. If at this time the consumption of nutrition is inadequate, it can lead to malnutrition. Calculating body mass index (BMI) is a simple way to assess a person's nutritional status. BMI provides an overview of whether a person's weight is in accordance with their height, but BMI cannot take into account body composition such as muscle mass, fat, so additional examinations are needed to achieve accurate results. Various research results highlight the relationship between BMI and the incidence of anemia. A study shows that there is an association between BMI and anemia in adolescent girls.[7] However, in contrast to other studies, high BMI (fat and obese) can also increase the occurrence of anemia.[8]

The government has distributed iron supplement tablets as an iron supplement to prevent anemia in target groups. In 2023, the Indonesian Health Survey Report stated that the proportion of female adolescents with high school education who had received/purchased iron supplement tablets was only 45.2%, while in South Kalimantan it was only 45.8%. Most students received iron supplement tablets at school (90.1%) more than getting it from health facilities or taking the initiative to buy it themselves. Various reasons for not taking it were thinking it was unnecessary or not useful (11.3%), taken during menstruation (3.2%), forgot (25.4%), smelly and unpleasant taste (27.4%), side effects of nausea and constipation (12.7%), and boredom (5.3%).[9] Based on these data, schools have actually been facilitated with free provision, but many students still do not take advantage of the program.

The purpose of this study was to determine the relationship between menstrual periods, menstrual cycle, menstrual pain and BMI with the incidence of anemia in adolescents at the Mambaul Ulum Islamic Boarding School in Banjarmasin City.

2. Methods

This study was a cross-sectional study with a sample size of 53 respondents, comprising of adolescent girls of the Mambaul Ulum Islamic Boarding School in Banjarmasin City. Ethical approval was obtained for this study (certificate number 269/UMB/KE/VII/2024). This study used an accidental sampling technique and analyzed using chi-square. This analysis was chosen considering the sample used was >40 and the category used was ordinal. The study was conducted in July 2024.

Respondents were gathered in one room, then their height was measured using a microtoise and their weight using a scale, then their BMI was calculated using a mathematical formula. Furthermore, the respondents then filled out a questionnaire about menstrual periods, menstrual cycle, and menstrual pain. After filling out the questionnaire, the hemoglobin levels were checked using the Easytouch tool.

Although this study has been well prepared, there is still a possibility of bias in the results of the study, one of which is if at the time the hemoglobin level examination was carried out the respondent was menstruating, this would certainly affect the hemoglobin level. In addition, another possible bias in this study is the possibility that the respondent was experiencing an illness that affected the hemoglobin level at the time the research activity was carried out.

3. Results

Based on Table 1, the majority of adolescent girls at Mambaul Ulum Islamic Boarding School had abnormal menstrual periods (56.6%), with normal menstrual cycles (54.7%), not accompanied by menstrual pain (69.8%), and also had normal BMI (52.8%) and have normal hemoglobin levels or are not anemic (64.2%).

Based on Table 2, it can be explained that anemia did not occur in adolescent girls whose menstrual periods were abnormal (37,7%), normal menstrual cycles (39,6%), did not experience menstrual pain (49%) and with normal BMI (40%). Meanwhile, the anemia was more often found in adolescent girls who have irregular menstrual periods (18.9%), whose menstrual cycles are disrupted (20.8%), who do not experience menstrual pain (21%), and with underweight BMI (23%). After cross-testing was conducted, the chi-square test obtained a p-value of 0.026 for the nutritional status level variable, which means there is a relationship between the incidence of anemia and BMI in female adolescent girls at the Mambaul Ulum Islamic Boarding School.

Table 1. Frequency distribution of menstrual periods, menstrual cycle, menstrual pain, BMI, and anemia incidence in adolescent girls

Variable	Frequency	%
Menstrual periods		
Normal (3-7 days)	23	43.4
Abnormal (< 3 days or > 7 days)	30	56.6
Menstrual cycle		
Normal (21-35 days)	29	54.7
Disturbed (<21 days or > 35 days)	24	45.3
Menstrual pain		
No	37	69.8
Yes	16	30.2
Body Mass Index (BMI)		
Underweight	20	37.7
Overweight	3	5.7
Obesity	2	3.8
Normal	28	52.8
Anemia		
Non-anemia	34	64.2
Anemia	19	35.8

Table 2. Relationship between menstrual periods, menstrual cycle, menstrual pain, and BMI with anemia incidence in adolescent girls

Variable	Anemia				Total		P-value
	No		Yes				
	n	%	n	%	n	%	
Menstrual periods							
Normal (3-7 days)	14	26.4	9	17	23	43.4	0.775
Abnormal (< 3 days or > 7 days)	20	37.7	10	18.9	30	56.6	
Menstrual cycle							
Normal (21-35 days)	21	39.6	8	15,1	29	54.7	0.250
Disturbed (<21 days or > 35 days)	13	24.5	11	20.8	24	45.3	
Menstrual pain							
No	26	49	11	21	37	69.8	0.138
Yes	8	15	8	15	16	30.2	
Body Mass Index (BMI)							
Underweight	8	15	12	23	20	37.7	
Overweight	3	6	0	0	3	5.7	0.026
Obesity	2	2	0	0	2	3.8	
Normal	21	40	7	13	28	52.8	

n = frequency, % = percentage

4. Discussion

The adolescent girl is a group that is susceptible to anemia due to the increased need for iron during growth and menstruation. The results of the study showed that the incidence of anemia in adolescent girls of the Mambaul Ulum Islamic boarding school was 35.8%, meaning that 1 in 3 adolescent girls had anemia. Anemia has long-term impacts on a woman of childbearing age who is likely to be at high risk in pregnancy, such as giving birth to a baby with low birth weight and stunting.[8]

In this study, most respondents' menstrual periods were abnormal (56.6%), which is either less than 3 days or more than 7 days, and bivariate analysis showed menstrual period and the incidence of anemia were not associated (p = 0.775). This study is in accordance with Yunita's research (2023) with a p-value of 0.112.[10] However, it is different from Sari's research (2023), which showed a partially significant relationship (p = 0.005) and adolescent girls who have abnormal menstrual duration had a 5.9 times greater chance of experiencing anemia.[11]

The results of the current study showed that most adolescents experienced a normal cycle (54.7%) of 21-35 days, and the results of the bivariate analysis showed no relationship with a p-value of 0.250. This finding is in line with Himawan's research (2020) with a p-value of 0.749.[7] However, it is different from Sari's research (2023) that there was a partially significant relationship (p-value 0.009), and adolescent girls whose menstrual cycles were abnormal were 5.1 times more likely to experience anemia. Anemia does not occur in adolescents because their menstruation may only be short <3

days, or in adolescents who menstruate >7 days, the blood released is not much. Anemia also does not occur in adolescents with normal cycles because iron nutrition has been met, for example, the adolescent routinely takes iron supplement tablets.[11]

This study found that the majority of adolescent girls did not experience menstrual pain (69.8%), and the bivariate results showed menstrual pain and the incidence of anemia research had no association (p = 0.138). This is in line with Hamdiyah's research (2020) which stated that dysmenorrhea has no relationship with anemia with a p-value of 0,005.[12] However, it is different from the research of Masnilawati & Thamrin (2021) which stated that low hemoglobin levels will worsen dysmenorrhea or menstrual pain with a p-value of 0,00.[13]

This study also found that the majority of adolescent girls had a normal BMI (52.8%) and the bivariate analysis results showed that there was an association between BMI and the incidence of anemia (p = 0.026), which is in line with Sari's research (2023) with p-value 0.001. In this study, it is possible that the adolescent girls had an unbalanced diet and the quality of their iron intake was low. Anemia is more common in low BMI.[14-17] However, this finding is different from other studies, which have a negative correlation between BMI and anemia. This is caused by various other factors that influence the occurrence of anemia, such as the health status of adolescents, unbalanced food consumption, and the environment.[18] Iron deficiency is more likely in obese women,[19] and research findings show that anemia occurs more often in underweight and overweight compared to normal BMI.[20] It is necessary for one to monitor hemoglobin levels at least once every 6 months to detect anemia, always remember to take iron tablets, and manage diet by increasing intake of foods high in iron.

The limitation of this study is that it could not reach all students, but is only represented by students who were present on the day the research activity is carried out. Also, this study was only conducting hemoglobin level checks, and not yet conducting further blood tests to ensure the occurrence of other types of anemia.

5. Conclusion

BMI is associated with anemia incidence in adolescent girls at Mambaul Ulum Islamic Boarding School. Meanwhile, menstrual periods, menstrual cycles, and menstrual pain have no association with the occurrence of anemia in adolescents. This study provides education about understanding good and sufficient eating patterns and nutrition, as well as education about the importance of taking iron tablets and education about the side effects of iron tablets in an effort to prevent anemia. Education about nutrition is important to provide practical knowledge to students about the importance of early detection of anemia and its prevention through proper nutritional intake. Anemia can be prevented if we pay attention to food intake, especially foods rich in iron.

For further research, the variables that cause anemia (eg. diet and physical activity), or external factors related to the environment (eg. family knowledge and family socioeconomic status) should be considered with a better approach. In addition, the research currently being conducted has limitations with only limited respondents, so future studies should include a larger number of respondents.

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7. References

1. WHO. Accelerating anemia reduction: a comprehensive framework for action. 2023.
2. Afriani D. Kesehatan Reproduksi Dismenorea (nyeri haid). PT. Nasya Expanding Management; 2024.
3. Pratiwi L, Harjanti AI, Oktiningrum M, Maharani K. Mengenal Menstruasi dan Gangguannya. CV. Jejak; 2024.
4. Ansari, M H, Farida Heriyani DMSN. Hubungan Pola Menstruasi dengan Kejadian Anemia pada Remaja Putri di SMPN 18 Banjarmasin. Homeostasis 2020;3(2):209–16.
5. Suhariyati S, Rahmawati A, Realita F. Hubungan antara Pola Menstruasi dengan Kejadian Anemia pada Mahasiswi Prodi Sarjana Kebidanan Unissula Semarang. J Akad Baiturrahim Jambi 2020;9:195. doi: 10.36565/jab.v9i2.214
6. Sandy YD, Tamtomo DG, Indarto D. Hubungan Berat Badan Dengan Kejadian Anemia Remaja Putri di Kabupaten Boyolali. J Dunia Gizi 2020;3:94–8. doi: 10.33085/jdg.v3i2.4744
7. Himawan R, Cholifah N, Rusnoto R, Trisnawati T. Hubungan Siklus Menstruasi Dan Indek Massa Tubuh (IMT) Dengan Kejadian Anemia Pada Remaja Di SMK Islam Jepara. J Ilmu Keperawatan dan Kebidanan 2020;11:302–7. doi: 10.26751/JIKK.V11I2.865
8. Turnip DAF, Alexander, Lisnwati, Melyani. Hubungan Indeks Massa Tubuh Dengan Kadar Hemoglobin Remaja Putri Di Asrama Sekolah Tinggi Kesehatan Panca Bhakti Pontianak Kubu Raya Tahun 2023. J Kebidanan 2024;14:96–102.
9. BKPK. Survei Kesehatan Indonesia (SKI). 2023.
10. Yunita IR, Hidayati RW, Noviani NE. Hubungan status gizi, konsumsi tablet Fe, dan lama menstruasi terhadap kejadian anemia pada remaja putri. Pros Semin Nas Penelit dan Pengabdi Kpd Masy LPPM Univ 'Aisyiyah Yogyakarta, vol. 1, 2023, hal. 425–37.
11. Sari IP, Arif A, Anggraini H. Hubungan Status Gizi, Siklus Menstruasi, dan Lama Menstruasi Dengan

Kejadian Anemia pada Remaja Putri Usia 15-16 Tahun di SMA Pembina Palembang Tahun 2022. J Ilm Univ Batanghari Jambi 2023;23:2118–22. doi: 10.33087/JIUBJ.V23I2.3149
12. Hamdiyah H. Hubungan Anemia Terhadap Dysmenorrhea (Nyeri Haid) Pada Remaja Putri di Panti Asuhan Sejahtera Aisyiyah Sidrap. Madu J Kesehat 2020;9:8. doi: 10.31314/mjk.9.1.8-16.2020
13. Masnilawati A, Thamrin H. Hubungan antara Kadar Hemoglobin dengan Siklus Menstruasi dan Derajat Dismenorhe pada Remaja Putri di Prodi DIII Kebidanan Universitas Muslim Indonesia. J Penelit Kesehat Suara Forikes 2021;12:120–3.
14. Khan UH, Asif E, Hassan SA, Zohra RR, Hanif E. Prevalence of Nutritional Anaemia with Association of Body Mass Index among Karachi University students, Pakistan. J Pak Med Assoc 2021;71:55–8. doi: 10.47391/JPMA.470
15. Paramudita PU, Dwi Mahayati NM, Somoyani NK. Hubungan Indeks Massa Tubuh Dengan Status Anemia Pada Remaja Putri. J Ilm Kebidanan (The J Midwifery) 2021;9:98–102. doi: 10.33992/jik.v9i1.1486
16. Jho YL, Ping MF, Natalia E. Indeks Massa Tubuh Remaja Putri Pada Kejadian Anemia Di Asrama Melanie Samarinda. MNJ (Mahakam Nurs Journal) 2020;2:305-310. doi: 10.35963/MNJ.V2I7.170
17. Pasalina PE, Jurnalis YD, Ariadi A. Hubungan Indeks Massa Tubuh Dengan Kejadian Anemia Pada Wanita Usia Subur Pranikah. J Ilmu Keperawatan dan Kebidanan 2019;10:12–20.
18. Mehdad S, Benaich S, El Hamdouchi A, Bouhaddou N, Azlaf M, El Menshawy I, et al. Association between overweight and anemia in Moroccan adolescents: a cross-sectional study. Pan Afr Med J 2022;41. doi: 10.11604/pamj.2022.41.156.20927
19. Kadhim EJ. Iron-deficiency anemia in relation to body mass index among Iraqi primigravida women. J Med Life 2023;16:868–72. doi: 10.25122/jml-2023-0066
20. Yunita S, Adnani QES, Zuhairini Y, Dhamayanti M, Rahmatika NS, Anwar R, et al. Anthropometry Indices and Body Composition in Adolescent Girls with Anemia: A Scoping Review. J Multidiscip Healthc 2024;17:4131–41. doi: 10.2147/JMDH.S481134