The Correlation Between Menstrual Cycle with Anemia Among Female Adolescents at SMA Negeri 1 Meukek, South Aceh

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Abstract

Anemia is a condition characterized by a reduction in the number or size of red blood cells or a decrease in hemoglobin (Hb) concentration below normal levels. The menstrual cycle is measured by the interval between the first day of one menstruation and the first day of the next. Body Mass Index (BMI) is an anthropometric indicator used to assess nutritional status, particularly in individuals over the age of 18.This study aimed to examine the correlation between menstrual cycle patterns and Body Mass Index (BMI) with the incidence of anemia among female adolescents at SMA Negeri 1 Meukek, South Aceh. This was an analytical survey study with a cross-sectional design. A total of 113 students from SMA Negeri 1 Meukek served as the population, and 53 students were selected as the sample using the Slovin formula and random sampling. Data were collected using a questionnaire, a microtoise for height measurement, a digital scale for weight, and the Easy Touch GCHb 3-in-1 device to measure hemoglobin levels. Bivariate analysis was conducted to assess associations. The analysis showed no significant correlation between BMI and the incidence of anemia ($p = 0.213 > \alpha = 0.05$), indicating that BMI is not associated with anemia in this population. However, a significant correlation was found between menstrual cycle irregularities and anemia ($p = 0.004 < \alpha = 0.05$). Based on these findings, it is recommended that schools and health authorities increase awareness and education on menstrual health and anemia prevention among adolescent girls.
Keywords: anemia, body mass index, female adolescents, menstrual cycle

Introduction

Anemia is one of the most common nutritional problems affecting women, particularly female adolescents. According to the World Health Organization (WHO, 2015), adolescent girls are at higher risk of developing anemia compared to boys, with iron requirements peaking at ages 14–15 in girls and slightly later in boys (Silalahi, Aritonang, & Ashar, 2016). Briawan, cited in Yunarsih (2014), reported that the global prevalence of anemia is estimated at 46%, while in Indonesia, the Ministry of Health recorded anemia rates of 30% in adolescent girls and 21% in boys. Similarly, Permaesih found that 25.5% of adolescents were anemic, including 30% of girls and 21% of boys. Anemia prevalence is higher in rural areas (27.1%) than urban (2.6%). Iron deficiency remains the leading cause of anemia worldwide.

The 2018 Basic Health Research (Riskesdas) data showed that anemia prevalence among adolescents in Indonesia was 32%, with Aceh reporting an even higher rate of 36.93%. In the 15–24 age group, the proportion of anemia was particularly significant (Kemenkes RI, 2018).

Riskesdas (2013) reported a prevalence of 22.7% in adolescents, indicating that 1 in 4 adolescent girls and 1 in 10 adolescent boys suffer from anemia. This increasing trend may be linked to poor nutritional knowledge and inadequate dietary intake (Masyudi, 2018).

Riskesdas (2018) also reported that 76.2% of adolescent girls had received iron supplementation (IFA tablets), mostly from schools (80.9%), while 19.1% received them elsewhere. However, only 1.4% consumed the recommended ≥52 tablets, while 98.6% took fewer. Menstruation, a normal physiological process in women from menarche to menopause, contributes to monthly iron loss. A normal menstrual cycle lasts 21–35 days with an average of 28 days and a duration of 3–5 days (Wiknjosastro, 2012).

Data from Riskesdas (2010) indicated that 68% of women aged 10–59 years experienced irregular menstrual cycles. The iron loss due to menstruation increases daily iron requirements by approximately 1.4 mg/day. Low Body Mass Index (BMI) may also influence menstrual patterns. Istiany (2014) stated that frequent consumption of junk food can make adolescents vulnerable to nutritional deficiencies and menstrual disorders. Inadequate nutrient intake contributes to menstrual irregularities (Chomaria, 2008), which can also be linked to poor nutritional status, assessable via BMI (Adisty, 2012).

Adolescent girls require more iron than boys due to menstruation (Adriani, 2012). Despite adequate calorie and protein intake, micronutrient deficiencies such as iron, calcium, and certain vitamins remain prevalent among adolescents (Arisman, 2010). Rati and Jawadagi (2012) observed that anemia is more common among girls over 14 years of age, with global prevalence ranging between 40–88%. Anemia impairs immune function and contributes to mortality. WHO's global strategy to combat adolescent anemia includes iron supplementation programs (WHO, 2013), which classify anemia as hemoglobin levels below 12 g/dL.

According to Riskesdas (2013), anemia prevalence in women was 23.9%, higher than in men (18.4%). In 2018, it rose to 27.2% for women and 20.3% for men, with the 15–24 age group showing 32% prevalence. Menstruation is a key factor contributing to this condition. Lifestyle factors such as fast food consumption, lack of physical activity, and skipping breakfast can further disrupt menstrual cycles and reproductive health. Nationally, 9.4% of adolescents aged 16–18 years were classified as underweight (1.9% severely underweight; 7.5% underweight), while 7.3% were overweight or obese (5.7% overweight; 1.6% obese).

Several studies indicate that low BMI is associated with longer or irregular menstrual cycles (Lee et al.), although findings on the relationship between BMI and menstrual disorders remain inconsistent. BMI is a widely used anthropometric measure for assessing nutritional status, calculated by dividing weight in kilograms by the square of height in meters. BMI helps identify undernutrition or overnutrition, both of which may influence menstruation and anemia in adolescents.

Methods
Research Design and Setting
This study employed a **cross-sectional survey design**, in which measurements of both independent and dependent variables were conducted simultaneously at a single point in time. The purpose of this design is to examine the relationship between specific health conditions (such as anemia) and associated risk factors (Siswanto, 2015). The research aimed to analyze the correlation

between the menstrual cycle and with the incidence of anemia among female adolescents at SMA Negeri 1 Meukek, South Aceh District.

The study was conducted at SMA Negeri 1 Meukek, South Aceh Regency, the population consisted of all Grade XI students, totaling 113 individuals. The sampling technique used in this study was random sampling, allowing each member of the population an equal opportunity to be selected as a respondent, totaling 53 female.

Result

The results of the study showed that the majority of the respondents were 17 years old, with a total of 41 individuals (77.4%). Based on class distribution, the highest proportion of students was found in class XI-MIPA 3, accounting for 26.4% of the sample.

Table 1. Characteristics of Respondents Based on Age and Class

Characteristics	n	%
Age		
16 years	12	22.6
17 years	41	77.4
Total	53	100
Class		
XI-MIPA 1	7	13.2
XI-MIPA 2	11	20.8
XI-MIPA 3	14	26.4
XI-MIPA 4	11	20.8
XI-MIPA 5	10	18.9
Total	53	100

The Body Mass Index (BMI) distribution showed that most respondents had a normal BMI, totaling 45 students (84.9%). A total of 5 students (9.4%) were categorized as overweight, 2 students (3.8%) were underweight, and 1 student (1.9%) was obese.

Table 2. Distribution of Respondents Based on Body Mass Index (BMI)

BMI Category	n	%
Underweight	2	3.8
Normal	45	84.9
Overweight	5	9.4
Obese	1	1.9
Total	53	100.0

Regarding the menstrual cycle, the majority of respondents had regular cycles (48 students or 90.6%), while only 5 students (9.4%) had irregular cycles.

Table 3. Distribution of Respondents Based on Menstrual Cycle

Menstrual Cycle	n	%
Irregular	5	9.4
Regular	48	90.6
Total	53	100.0

The majority of respondents (48 students or 90.6%) did not experience anemia, while only 5 students (9.4%) were found to be anemic.

Table 4. Distribution of Respondents Based on Anemia Status

Anemia Status	n	%
Anemia	5	9.4
Not Anemic	48	90.6
Total	53	100.0

The cross-tabulation results showed that of those with irregular menstrual cycles, 3 respondents (60%) had anemia, while 2 (40%) did not. Among those with regular cycles, 2 students (4.2%) had anemia and 46 (95.8%) did not. A significant association was found between menstrual cycle and anemia (p = 0.004).

Table 5. Relationship Between Menstrual Cycle and Anemia Status

Menstrual Cycle	Anemia		p-value
	Anemia	**Not Anemic**	
Irregular	3	2	
Regular	2	46	0.004
Total	5	48	

Discussion

Based on the statistical analysis using the Chi-Square test (Table 3.1), the study found a p-value of 0.004 (< α = 0.05), indicating a significant relationship between the menstrual cycle and the incidence of anemia among female adolescents at SMA Negeri 1 Meukek, South Aceh. Thus, the null hypothesis is rejected, and the alternative hypothesis is accepted.This finding suggests that irregular menstrual cycles may contribute to the development of anemia in adolescent girls. Abnormal menstrual patterns—such as prolonged menstruation or excessive bleeding—can increase iron loss and, consequently, the risk of iron deficiency anemia (Kumalasari et al., 2019).

According to Gibney et al. (2009), women lose iron during menstruation, increasing their average daily iron requirement to approximately 1.4 mg per day to maintain iron balance.

This study is consistent with research by Saranani (2018), which found a significant relationship between menstrual patterns and the incidence of anemia among female students at SMAN 2 Unaha. Similarly, Kumalasari et al. (2019) reported a significant association between menstrual patterns and anemia among junior high school students in East Lampung, with a p-value of 0.001. Respondents with prolonged or irregular menstrual cycles tend to experience greater blood loss, which can lead to depleted iron stores and increase the risk of anemia. Although BMI is often used as an indicator of nutritional status, this result suggests that BMI alone may not be a reliable predictor of anemia among adolescents. Several respondents with normal BMI were found to be anemic, possibly due to inadequate iron intake or other contributing factors such as menstrual blood loss, irregular dietary habits, or underlying health conditions. This highlights the multifactorial nature of anemia, where factors beyond body weight, such as micronutrient intake and menstrual health, play a crucial role.

Conclusion

The majority of female adolescents at SMA Negeri 1 Meukek, South Aceh, were found to have regular menstrual cycles and a normal Body Mass Index (BMI), indicating generally good nutritional status. Most of the respondents were not anemic. However, the statistical analysis revealed a significant relationship between menstrual cycle patterns and the incidence of anemia ($p = 0.004$), suggesting that irregular menstrual cycles may increase the risk of anemia in this population. Based on these findings, it is recommended that schools and health authorities increase awareness and education on menstrual health and anemia prevention among adolescent girls. Routine screening for anemia and counseling on proper iron intake—especially for those with irregular menstruation—should be promoted. Nutritional education that emphasizes the importance of a balanced diet rich in iron and other micronutrients is also essential to support overall health and reduce the risk of anemia in adolescent girls.

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