THE RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND HEMOGLOBIN LEVELS WITH THE MENSTRUAL CYCLE STUDENTS AT MAN 2 SITUBONDO

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ABSTRAK
Menstruasi adalah proses pengeluaran darah, lendir, dan sel-sel dari mukosa uterus yang disertai dengan deskuamasi endometrium yang terjadi secara teratur sekitar 14 hari setelah ovulasi (WHO, 2018). Tujuan penelitian ini adalah untuk mengetahui hubungan antara status gizi dan kadar hemoglobin dengan siklus menstruasi. Jenis penelitian analitik observasional dengan desain cross sectional. Populasi penelitian adalah siswi kelas XII MAN 2 Situbondo yang berjumlah 69 siswi dengan sampel sebanyak 60 siswi menggunakan teknik simple random sampling. Instrumen penelitian menggunakan kuesioner dan analisis data dengan Rank Spearman. Hasil analisis hubungan antara status gizi dengan siklus menstruasi diperoleh nilai p-value $0,010 < α 0,05$ yang berarti ada hubungan antara status gizi dengan siklus menstruasi pada siswi MAN 2 Situbondo. Dan hasil antara kadar hemoglobin dengan siklus menstruasi diperoleh nilai p-value $0,165 > α 0,05$, yang berarti tidak ada hubungan antara kadar hemoglobin dengan siklus menstruasi pada siswi MAN 2 Situbondo. Siklus menstruasi dipengaruhi oleh usia menarche, status gizi, anemia, aktivitas fisik dan tingkat stres.

ABSTARCT
Menstruation is a process of removing blood, mucus, and cells from the uterine mucosa accompanied by desquamation of the endometrium that occurs regularly around 14 days after ovulation (WHO, 2018). The research objective was to determine the relationship between nutritional status and hemoglobin levels with the menstrual cycle. This type of observational analytic research with cross sectional design. The research population was students of class XII MAN 2 Situbondo, totaling 69 students with 60 sample using simple random sampling technique. The research instrument used a questionnaire and data analysis with Spearman's Rank. Analysis of the relationship between nutritional status and the menstrual cycle obtained a p-value of $0.010 < α 0.05$, which means there is a relationship between nutritional status and the menstrual cycle in female students of MAN 2 Situbondo. And the results between hemoglobin levels and the menstrual cycle were p-value $0.165 > α 0.05$, that mean there was no relationship between hemoglobin levels and the menstrual cycle in female students of MAN 2 Situbondo. The menstrual cycle is influenced by the age of menarche, nutritional status, anemia, physical activity and stress levels.

Introduction

Insufficient or excessive nutrient intake during adolescence can lead to health issues such as iron deficiency and obesity. One current concern is the impact of nutritional status and low hemoglobin levels on adolescents, particularly on the menstrual cycle. Anemia, caused by a lack of nutrients, can interfere with the production of hormones necessary for ovulation and pregnancy maintenance, thereby affecting the menstrual cycle. The classification of a healthy menstrual cycle for adolescents typically consists of a cycle length between 21 and 35 days, a period length of 3-7 days, and a blood volume not exceeding 80 ml. The menstrual cycle is an important aspect of reproductive health for adolescents and should be monitored to ensure proper functioning (Yuniyanti *et al.*, 2022)

According to (WHO, 2018), 75% of adolescent girls experience menstrual disorders, and 80% of adolescents experience irregular menstrual cycles. In Indonesia, 1.4% of women aged 20-25 years have irregular menstrual cycles. The prevalence of anemia worldwide ranges from 40-80%.

The prevalence of anemia in adolescents in Indonesia was 32%, now increasing to 48.9% (Riskesdas, 2018). Meanwhile, the prevalence of anemia in adolescent girls in East Java was 42% in 2018. Based on the survey results of the Situbondo Health Office in 2020, there were 11% cases of anemia in adolescent girls. The preliminary study conducted at MAN 2 Situbondo showed that many female students consume less nutritious food, instant food, and often drink tea drinks. In 10 MAN 2 Situbondo students who became samples after measuring nutritional status, filling out questionnaires and checking Hb levels, 50% of students had normal nutritional status with Hb levels of 12 g/dl and normal menstrual cycles, 20% were overweight with Hb levels of 12 g/dl, 20% were underweight with Hb levels of 11 g/dl and 10% were obese with Hb levels of 11 g/dl with menstrual cycles < 21 days (abnormal).

Based on the research results, it was found that nutrition in teenagers affects their menstrual cycle(Dya and Adiningsih, 2019). Taking into account the very worrying eating patterns of today's teenagers, many of them have not

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formed healthy eating patterns, such as irregular eating schedules and fixed types of food, skipping breakfast, and often consuming tea drinks containing tannin, which contains Tannins in tea can interfere with the absorption of iron in the body. This can cause nutritional problems in teenagers. Nutritional problems among teenagers are a serious problem, but are still a neglected group. Most nutrition research in developing countries focuses on childhood or during pregnancy, and it is clear that adolescent health programs are still limited, especially those that address adolescent nutrition(Islamy and Farida, 2019).

Women who are undernourished, overnourished and overweight are at risk of reducing hypothalamic function which causes the production of luteinising hormone and follicle stimulating hormone to be inhibited so that the menstrual cycle will be delayed. Nutritional status is also one aspect that can affect hemoglobin levels in the body. Hemoglobin is responsible for carrying oxygen from the lungs to all organs of the body. Low hemoglobin levels indicate anemia. Hemoglobin content in women affects the menstrual cycle due to the turnover of steroid hormones which are the main factor in regulating the cycle. A normal hemoglobin level will support the regularity of the menstrual cycle. Conversely, if haemoglobin levels are low, it can cause many complications in women. This happens because low hemoglobin levels result in a lack of oxygen supply to the hypothalamus, so the lower the hemoglobin level, the longer the menstrual cycle (Barus, 2022)

Women as prospective mothers if their nutritional status is disturbed will not be able to meet the nutrients for themselves and also the fetus in the womb, causing complications in pregnancy and childbirth, the risk of maternal mortality, increasing prematurity, LBW and perinatal mortality. Untreated menstrual disorders can also affect women's quality of life and daily activities. The impact of short menstrual cycles, if not managed properly, can lead to more blood loss and possibly anemia. The long-term effect felt by adolescents with abnormal menstrual cycles is infertility, which means that someone is difficult to have offspring (Novita, 2018)

Method

This type of research is observational analytical research with a cross-sectional design. The population in this study were 69 class XII female students at MAN 2 Situbondo for the 2022-2023 academic year. The sample for this research was 60 respondents with a sampling technique using simple random sampling. The independent variables in this study are nutritional status and hemoglobin levels, while the dependent variable is the menstrual cycle. The data measuring tool for this research uses a questionnaire about the menstrual cycle which the respondent fills out and an observation sheet containing data on body weight, height, nutritional status assessment, and hemoglobin levels. The research data were obtained after obtaining a proper ethical statement and then being given to respondents who had signed an informed consent. Data processing and data analysis techniques were univariate and bivariate analyses using Spearman's Rank Correlation Coefficient Test.

Results

Data were collected through questionnaires distributed and answered by respondents to obtain menstrual cycle data and observations of nutritional status measurements by researchers by calculating the respondents' BMI and checking the respondents' hemoglobin levels. The results of data collection and analysis are presented in the form of general data and specific data as follows.

A. Univariate Analysis

Table 1. Frequency Distribution of Nutritional Status in Female Students of MAN 2 Situbondo in 2023

No	Nutritional Status	N	(%)
1	Underweight	20	33,3
2	Normal	22	36,7
3	Overweight	7	11,7
4	Obesity I	9	15
5	Obesity II	2	3,3
	Total	60	100

Source: Primary data 2023

Shows that the nutritional status of most respondents is normal as many as (36.7%) respondents and the least with obesity II nutritional status is (3.3%).

Table 2. Frequency Distribution of hemoglobin levels in Female Students of MAN 2 Situbondo in 2023

No	Hemoglobin Levels	N	(%)
1	Normal	15	25
2	Mild Anemia	42	70
3	Moderate Anemia	3	5
	Total	60	100

Source: Primary data 2023

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*S*hows that students' hemoglobin levels are mostly in the mild anemia as many as (70%) of respondents and respondents who have normal hemoglobin levels as many as (25%), and the rest are in the moderate anemia category as many as (5%).

Table 3. Frequency Distribution of Menstrual Cycle in Female Students of MAN 2 Situbondo in 2023

No	Menstrual Cycle	N	(%)
1	Normal	25	41, 7
2	Oligomenorea	17	28,3
3	Polimenorea	18	30
	Total	60	100

Source: Primary data 2023

It shows that the normal menstrual cycle of students is mostly (41.7%) respondents and respondents who have a *oligoamnenorhea* (28.3%).

B. Bivariate Analysis

Table 4. Analysis of the Relationship between Nutritional Status and Menstrual Cycle in MAN 2 Situbondo female students in 2023

Nutritional Status	Menstrual Cycle						*p*	*Correlati-on coeffisien*
	Normal		Oligomenorea		Polimenorea			
	n	%	N	%	N	%		
Underweight	4	6,7	3	5,0	13	21,7	0,010	-0,329
Normal	14	23,3	4	6,7	4	6,7		
Overweight	5	8,3	2	3,3	-	-		
Obesity I	2	3,3	6	10,0	1	1,7		
Obesity II	-	-	2	3,3	-	-		
Total	25	41,7	17	28,3	18	30,0		

Source: Primary data 2023

Table 5. Analysis of the Relationship between Hemoglobin Levels and Menstrual Cycle in MAN 2 Situbondo female students in 2023

Hemoglobin Levels	Menstrual Cycle						*p-Value*
	Normal		Oligomenorea		Polimenorea		
	n	%	n	%	n	%	
Normal	8	13,3	5	8,3	2	3,3	0,165
Mild Anemia	16	26,7	11	18,3	15	25,0	
Moderete Anemia	1	1,7	1	1,7	1	1,7	
Total	25	41,7	17	28,3	18	30,0	

Source: Primary data 2023

Based on the results of the analysis with Spearman Rank between Nutritional Status and the Menstrual Cycle, the *p-value* is 0.010 < α (0.05), therefore, H0 is rejected, which means that there is a relationship between nutritional status and the menstrual cycle, while between Hemoglobin Levels and

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the Menstrual Cycle, the p-value is 0.165 > α (0.05), therefore, H0 is accepted, which means that there is no relationship between hemoglobin levels and the menstrual cycle in MAN 2 Situbondo students.

Discussion

1. The Relationship Between Nutritional Status and Menstrual Cycle in MAN 2 Situbondo Students

Based on the results of the study, it showed that the nutritional status of the normal category with normal menstrual cycles was (23.3%), the nutritional status of thin with short menstrual cycles was (21.7%), the nutritional status of obesity with normal menstrual cycles was (8.3%) , and nutritional status obesity I with a long menstrual cycle of (10.0%). Based on the results of the *Spearman Rank* analysis between Nutritional Status and Menstrual Cycles, the results obtained were a *p-value of* 0.010 <α (0.05) so H_0 was rejected and Ha was accepted which means that there is a relationship between nutritional status and menstrual cycle in female students of MAN 2 Situbondo . From the research results, very few respondents had normal nutritional status with a normal menstrual cycle, namely 14 people (23.3%).

The results of this study are in line with research by Dya (2019) that there is a significant relationship between nutritional status and the menstrual cycle. In this study, someone with normal nutritional status tended to experience a normal menstrual cycle and respondents with obese nutritional status tended to experience an abnormal menstrual cycle(Dya and Adiningsih, 2019). These results are also in line with the results of research by Zahra (2023) which analyzed factors that influence the menstrual cycle, one of which is nutritional status(Zahra *et al.*, 2023).

Nutritional status affects the growth and function of body organs, including the function of the reproductive organs. Proper nutritional intake can improve reproductive function and influence the menstrual cycle. Good nutritional intake will improve nutritional status so that the hypothalamus can produce reproductive hormones needed to regulate the menstrual cycle. Excessive or deficient nutritional conditions in women can affect the function of the hypothalamus and anterior pituitary in releasing FSH and LH hormones. In adolescents with excess nutrition, they have fat which

increases the hormone estrogen thereby inhibiting FSH production and causing disturbances in follicular proliferation, as well as increasing LH levels rapidly. Disturbances in FSH and LH secretion can cause abnormal menstrual cycles. Therefore, maintaining nutritional balance is very important to maintain reproductive health and a normal menstrual cycle.

Malnutrition can interfere with reproductive function. Weight loss can cause a decrease in GnRH production to release LH and FSH hormones which results in decreased levels of the hormone estrogen, thus negatively impacting the menstrual cycle and inhibiting the ovulation process. This can cause the menstrual cycle to be disrupted. The results showed that respondents with less nutritional status and half of respondents with more nutritional status tended to have normal menstrual cycles. This result may be caused by factors other than nutritional status, because women's menstrual cycles are very easily influenced by other conditions. However, there were also respondents who were undernourished or obese but had abnormal menstrual cycles due to stress, physical activity, hormonal diseases and other factors .

2. **Relationship Between Hemoglobin Levels and Menstrual Cycles in Students of MAN 2 Situbondo**

The results of this study showed that the hemoglobin level in the normal category with a normal menstrual cycle was (13.3%), the hemoglobin level in the normal category with an abnormal menstrual cycle was (11.6%), the hemoglobin level in the anemia category with a normal menstrual cycle was (28.4%). and hemoglobin levels in the anemia category with abnormal menstrual cycles were (46.7%). After conducting an analysis with *Spearman Rank* between Hemoglobin Levels and Menstrual Cycles, the results obtained were a *p-value of* $0.165 > \alpha$ (0.05) then, H_0 was accepted and Ha was rejected, which meant that there was no relationship between hemoglobin levels and the menstrual cycle in female students of MAN 2 Situbondo . From the results of the study it was found that almost half of the respondents experienced mild anemia with normal menstrual cycles, namely 16 respondents (26.7%).

The results in this study are in line

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with the results of research conducted by Kimas Novrica which stated that there was no significant relationship between hemoglobin levels and the menstrual cycle(NOVRICA, 2019).but were not in line with the results of research by Patonah,2018 which stated that there was The relationship between the menstrual cycle and hemoglobin levels in adolescent girls. Hemoglobin levels in young women are normal if their menstrual cycle is also normal, namely between 21-35 days. If the cycle is prolonged (> 35 days) or shortened (< 21 days), the hemoglobin level will tend to be abnormal(Patonah and Azizah, 2018). The results of other studies show that the longer or longer the menstrual duration of female adolescents results in lower hemoglobin levels or a higher probability of anemia. The main factor that causes anemia is blood loss over a long time. If iron deficiency continues, iron reserves will increasingly run out. Lack of iron supply causes disruption in the formation of erythrocytes, so that hemoglobin levels begin to decrease (Permatasari, 2016).

According to researchers, hemoglobin levels are not related to the menstrual cycle. Hemoglobin is a protein that carries oxygen throughout the body and is linked to blood health. Meanwhile, the menstrual cycle is a natural process in women that occurs every month and is related to reproduction. Even though there is an increase in blood volume during the menstrual cycle, this does not mean that the hemoglobin level will increase significantly. However, long and prolonged menstrual cycles can cause hemoglobin levels to fall, causing anemia. Low hemoglobin levels can cause anemia, which can cause disturbances in the menstrual cycle, such as irregular or even stopping menstruation. Women who experience anemia can have normal menstrual cycles because anemia does not affect the production of hormones that regulate the menstrual cycle. However, anemia can cause heavier and longer menstrual bleeding, which can worsen the anemia condition.

The results of this study provide an illustration that adolescent girls who experience both normal and abnormal menstrual cycles have the potential to experience anemia based on the length of menstruation and also the amount of bleeding. Apart from that, other factors such as diet, lifestyle and health

conditions can also affect hemoglobin levels. However, it is important for women to pay attention to their hemoglobin levels, especially during menstruation. Adequate and balanced nutritional intake , such as iron and vitamin B12, can help keep hemoglobin levels stable and prevent anemia.

Conclusion

The nutritional status of female students at MAN 2 Situbondo is almost half of the respondents in the normal category, namely 22 respondents. Very few respondents with normal nutritional status had normal menstrual cycles, as many as 14 respondents. The hemoglobin level of the students of MAN 2 Situbondo, most of the respondents were in the category of mild anemia, namely 42 respondents. Almost half of the respondents in the mild anemia category had a normal menstrual cycle, namely 16 respondents. MAN 2 female students' menstrual cycle, almost half of the respondents have normal menstrual cycles and most of the respondents have abnormal menstrual cycles. There is a relationship between nutritional status and the menstrual cycle in MAN 2 Situbondo female students with a fairly

strong level of coefficient correlation and the direction of the relationship is negative, namely, if nutritional status is less then the menstrual cycle will be shorter, conversely if nutritional status is higher then the menstrual cycle will be long. And there is no relationship between hemoglobin levels and the menstrual cycle in MAN 2 Situbondo students. Suggestions for respondents to MAN 2 Situbondo are maintain a balanced nutritional intake and consume Fe tablets regularly to prevent anemia and maintain normal nutritional status. The suggestion for schools is to coordinate with health workers at local health centers to carry out routine hemoglobin level checks.

Abbreviation

Hb   : Hemoglobin

WHO   : *World Health Organization*

BMI   : *Body Mass Index*

FSH   : *Folikel Stimulating Hormon*

LH   : *Luteinizing Hormone*
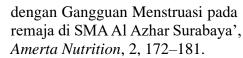
GnRH   : *Gonadotropin-Releasing Hormone*

RH   : *Releasing Factors*

HPA   : *Hypothalamus Pituitary Adrenal Cortex*

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