


The effect of nutritional status on the menstrual cycle and duration of menstruation in active pre-clinical female students of the 2023 intake at the UMI Faculty of Medicine

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| Article Info | ABSTRACT |
|---|---|
| Keywords : Nutritional status, Menstrual Cycle, Menstrual Period. | Women with excess or deficiency nutritional status can cause decreased hypothalamic function so that it does not provide stimulation to the anterior pituitary to secrete FSH (Follicle Stimulating Hormone) and LH (Leuteinizing Hormone). In women who experience excess nutrition, there is an increase in high estrogen hormones that provide negative feedback on the production of GnRH (Gonadotropin Hormone) through the secretion of inhibitor proteins that can inhibit the work of the anterior pituitary to produce FSH. The purpose of this study was to determine the effect of nutritional status on the menstrual cycle of active pre-clinical students of Class of 2023 at the Faculty of Medicine, UMI. Using the cross-sectional method, and bivariate data analysis using the Chi Square test . The results of the study stated that nutritional status affects the menstrual cycle, and nutritional status affects the duration of menstruation. |
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INTRODUCTION

Nutrition is food that is consumed normally through the process of digestion, absorption, transportation, storage, and excretion of substances that are not used to maintain life, growth, and normal function of organs, and produce energy. Nutritional status is a condition in which there is a balance between the supply of nutrients from food and the nutritional needs required for the metabolic process. Nutritional status is a measure of success in fulfilling nutrition for a person indicated by body weight and height. Nutritional status is also defined as a health status resulting from a balance between nutrient needs and input. ^{1, 2}

Menstrual disorders are important indicators that indicate the presence of reproductive system dysfunction. Changes in the length and irregularity of the menstrual cycle reflect changes in the production of reproductive hormones. Shortening of the follicular period causes the menstrual cycle to become shorter (*polymenorrhea*) associated with decreased

The effect of nutritional status on the menstrual cycle and duration of menstruation in active pre-clinical female students of the 2023 intake at the UMI Faculty of Medicine—lis Nurafifah Putri Mas'ud et al

fertility; while lengthening of the menstrual cycle (*oligomenorrhea*) is associated with the occurrence of anovulation. The menstrual cycle is said to be normal if the distance between the first day of menstrual blood discharge and the first day of the next menstruation occurs with an interval of 21-35 days.^{3,4}

Nutritional status in women when in excess or deficiency can cause the hypothalamus function to decrease so that it does not provide stimulation to the anterior pituitary to secrete FSH (*Follicle Stimulating Hormone*) and LH (*Leuteinizing Hormone*). In a woman who experiences excess nutrition, there is an increase in high estrogen hormones which provide negative feedback on the production of GnRH (*Gonadotropin Hormone*) through the secretion of inhibitor proteins which can inhibit the work of the anterior pituitary to produce FSH. If there is a disturbance in FSH secretion, LH also does not function properly. LH that comes out too quickly causes the growth of new follicles to be continuously stimulated but does not reach the maturation and ovulation process, causing an abnormal menstrual cycle.^{5,4}

Based on the background above, this study aims to see the Effect of Nutritional Status on the Menstrual Cycle in Active Pre-Clinical Female Students of Class of 2023 at the Faculty of Medicine, UMI, where nutritional status also has an important role in the menstrual cycle.

METHODS

This study uses Observational Analytical research with a *cross-sectional method*, which aims to determine the effect of obesity on the menstrual cycle of Active Pre-Clinical Students at the Faculty of Medicine, UMI. The research time was carried out in September-October 2024, located at the Faculty of Medicine, Muslim University of Indonesia.

Population and sample

The population of the study was all Active Pre-Clinical Students of the Faculty of Medicine, UMI who had nutritional status (underweight, normal, overweight and obesity) and students who had experienced menstrual cycles. The sample of the study was Active Pre-Clinical Students of the Faculty of Medicine, UMI who had nutritional status (underweight, normal, overweight and obesity) and who had experienced menstruation.

The sample size in this study can be determined using the Slovin formula, namely as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Information :

N = Population Size

n = Sample Size

e = Precision

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{256}{1 + 256(0.05)^2}$$

$$\frac{n = 256}{1 + 256(0.0025)}$$

$$\frac{n = 256}{1.25}$$

$$n = 204.8$$

Thus, the number of samples needed in this study is 205 samples.

Data analysis

The analysis conducted in this study is bivariate data analysis using the Chi Square test to see the meaningful relationship or influence between the independent variables and the dependent variables.

RESULTS AND DISCUSSION

Univariate Analysis

Univariate analysis aims to explain or describe the influence of each research variable. The form of analysis describing the influence depends on the type of data. In general, this analysis only produces frequency distribution and percentage of each variable.

Table 1. Distribution of Nutritional Status Based on BMI, Menstrual Cycle and Menstrual Duration

| Variables | Amount | Percentage (%) |
|---|--------|----------------|
| IMT | | |
| Underweight: <18.5 Kg/m ² | 41 | 20.0 |
| Normal: 18.5 – 22.9 Kg/m ² | 96 | 46.8 |
| Overweight: 23 – 24.9 Kg/m ² | 38 | 18.5 |
| Obesity: ≥25 Kg/m ² | 30 | 14.6 |
| Menstrual Cycle | | |
| <21 days | 68 | 33.2 |
| 21 – 35 days | 82 | 40.0 |
| >35 days | 55 | 26.8 |
| Menstrual Duration | | |
| 3 – 7 days | 170 | 82.9 |
| 7 days | 35 | 17.1 |

Source: Primary Data, 2024

In table 1, it can be seen that the majority of respondents have normal nutritional status, as many as 96 people (46.8%), a menstrual cycle of 21-35 days as many as 82 people (40.0%) and a menstrual duration of 3-7 days as many as.

Bivariate Analysis

Bivariate analysis was used to determine the relationship between nutritional status and the menstrual cycle. In this analysis, the *Chi-Square correlation test* was used to test the relationship between these variables.

The Influence of Nutritional Status on the Menstrual Cycle

The results of the relationship between nutritional status and menstrual cycles in female students of Class 2023 at the Faculty of Medicine, UMI are described in Table 2. showing that the significant value is 0.00. where *the p-value is* $0.00 < 0.05$, it can be interpreted that in this study there is a significant relationship or correlation between nutritional status and menstrual cycles in active pre-clinical female students of Class 2023 at the Faculty of Medicine, UMI.

Table 2. Effect of Nutritional Status on Menstrual Cycle

| Body mass index | < 21 days | | Menstrual Cycle 21 – 35 days | | P |
|-----------------|-----------|------|---------------------------------|----------|-------|
| | n | % | N | % | |
| Underweight | 15 | 25.9 | 24 | 24.5 | 0,000 |
| Normal | 33 | 56.9 | 53 | 53.0 | |
| Overweight | 8 | 13.8 | 15 | 15.3 | |
| Obesity | 2 | 3.4 | 6 | 6.1 | |
| | | | | >35 days | |
| | | | | N % | |
| | | | | 1 | 2.0 |
| | | | | 14 | 28.6 |
| | | | | 15 | 30.6 |
| | | | | 19 | 38.8 |

The Effect of Nutritional Status on Menstrual Duration

The results of the influence of nutritional status on the duration of menstruation in female students of Class of 2023 at the Faculty of Medicine, UMI are described in Table 3. showing that the value is significant. where *the p-value is* $0.03 < 0.05$, it can be interpreted that in this study there is a significant relationship or correlation between the influence of nutritional status on the duration of menstruation in active pre-clinical female students of Class of 2023 at the Faculty of Medicine, UMI.

Table 3. Effect of Nutritional Status on Menstrual Duration

| Body mass index | 3-7 days | | Menstrual Duration > 7 days | | P |
|-----------------|----------|------|--------------------------------|------|------|
| | n | % | n | % | |
| Underweight | 29 | 17.1 | 12 | 34.3 | 0.03 |
| Normal | 81 | 47.6 | 18 | 51.4 | |
| Overweight | 36 | 21.2 | 2 | 5.7 | |
| Obesity | 24 | 14.1 | 3 | 8.6 | |

Discussion

Distribution of Nutritional Status Based on BMI

In table 1. the results of this study obtained the highest percentage of nutritional status, namely normal nutritional status of 96 people (46.8%), while underweight nutritional status was 41 people (20%), Overweight was 38 people (18.5%), Obesity I was 23 people (11.2%) and Obesity II was 7 people (3.4%), where the majority of nutritional status in this study was found to be normal nutritional status with a total of 96 people (46.8%). This study shows the same results as the studies of Kurniawan (2022) and Berty (2018) where the majority of nutritional status was normal with a total of 72 people (33.5%) and 94 people (58.8%) in their studies.^{18, 19}

The effect of nutritional status on the menstrual cycle and duration of menstruation in active pre-clinical female students of the 2023 intake at the UMI Faculty of Medicine—lis Nurafifah

Putri Mas'ud et.al

Nutritional status is a measure of success in meeting a person's nutritional needs and the use of nutrients indicated by a person's weight and height. A person needs energy/calories, protein, calcium, iron, zinc and vitamins to fulfill physical activities such as daily activities. Many teenagers do not prioritize between energy intake and energy intake, this will result in nutritional problems such as weight gain or vice versa if too much energy is released it will result in malnutrition.¹⁹

Nutritional status is a measure of success in fulfilling nutrition for a person indicated by body weight and height. Nutritional status is also defined as a health status resulting from the balance between nutrient needs and inputs. 2 Body Mass Index (BMI) is a method that uses the height and weight of adults to generally classify underweight, normal, overweight and obesity. A person's BMI is important in determining the potential for future health problems.²⁰

Food is a basic need for a person's growth and development. The body requires sufficient substances so that physical growth and development can take place perfectly, both in terms of quality and quantity, an imbalance between intake and energy expended can result in changes in body weight.²¹

Menstrual Cycle Distribution by Menstrual Cycle

In Table 2. the results of this study obtained the percentage of menstrual cycles based on the most menstrual cycles, namely 21-35 days (normal) as many as 82 people (40%), while <21 days (polymenorrhea) as many as 68 people (33.2%) and >35 days (oligomenorrhea) as many as 55 people (26.8%). Based on the table, the majority of respondents from this study have a menstrual cycle based on the normal menstrual cycle of 21 - 35 days (normal) as many as 82 people (40%). This is in line with research conducted by Kisliyanwati (2023) and Kurniawan (2022) where the majority of normal menstrual cycles, where each was 40 people (50.6%) and 66 people (30.7%) in their studies.^{18, 21}

In adolescent girls, puberty is marked by the arrival of menstruation (menarche) which is accompanied by physical, mental and social changes. The menstrual cycle sometimes fluctuates every month, so it can cause menstrual irregularities.¹⁷

Menstruation is a condition in which the uterine wall (endometrium) containing blood vessels is shed because the mature egg (ovum) is not fertilized. The menstrual cycle is the time from the first day of menstruation until the next menstruation, while the length of the menstrual cycle is the distance between the start date of the previous menstruation and the start of the next menstruation.^{22, 23}

The early days of menstruation are a period that is vulnerable to disruption of the menstrual cycle, delayed, irregular, painful and heavy bleeding, so that it is not uncommon for this to have an impact on a woman's productivity.²³

Factors that affect the menstrual cycle are hormonal factors, nutritional status, psychological and diet. A woman needs to maintain good nutritional status by consuming a balanced diet, because inadequate or limited nutrition can affect the function of body organs including reproductive function which causes hormonal imbalances such as estrogen, progesterone, LH and FSH hormones.^{24, 22}

Distribution of Menstrual Duration

In Table 4.1.1, the results of this study show that the percentage of menstrual duration based on the longest menstrual duration was 3-7 days (normal) as many as 170 (82.9%), while >7 days were 35 people (17.1). Based on the table majority Respondent from study This own long menstruation based on time menstruation that is normal 3-7 day (normal) as much as 170 person (82.9%). This is in line with research conducted by Kurniawan (2022) where the majority cycle menstruation Which normal, there is as much as 95 person (44.2%).¹

The Influence of Nutritional Status on the Menstrual Cycle

The results of table 2 show that respondents with Normal nutritional status mostly have a normal menstrual cycle, which is 53 people. Respondents with Underweight nutritional status mostly have a normal menstrual cycle, which is 24 people. Respondents with Overweight nutritional status mostly have a menstrual cycle of >35 days, which is 15 people. Respondents with Obesity nutritional status mostly have a menstrual cycle of >35 days, which is 19 people. The results were then tested using the *chi-square formula* where the value was obtained as 0.00 where $p < 0.05$, so H_0 was rejected, so there was a significant relationship between nutritional status and the menstrual cycle in active pre-clinical students of Class of 2023 at the Faculty of Medicine, UMI.

The data from this study are in line with Berty's (2018) research with a value of 0.00 that the majority of respondents with normal nutritional status experienced normal menstrual cycles, while those with obese nutritional status experienced abnormal menstrual cycles.¹⁹

Nutritional status with menstrual cycle can affect the pattern of menstrual cycle, both in women with low or high BMI. Regular or irregular menstrual cycles are related to the hormones that play a role, namely progesterone, estrogen, LH and FSH. The performance of the hormone system can be caused by nutritional status which will have an impact on the metabolism of a woman's reproductive hormones.²⁵

In a teenager who has an underweight nutritional status (less) has a common problem, namely a lack of nutritional intake which will cause anemia due to lack of iron. Lack of nutrition in a woman will have an impact on the decline in reproductive system function. In a teenager with an overweight or obese nutritional status, it can disrupt the menstrual cycle through adipose tissue actively influencing the hormones estrogen and progesterone. In obese women, there is an increase in estrogen production because adipose tissue also produces estrogen. Increased estrogen levels that increase indirectly cause an increase in androgen hormones that can interfere with the development of mature follicles.^{26,27}

The Effect of Nutritional Status on Menstrual Duration

The results of table 3 show that respondents with nutritional status underweight, normal, overweight, obesity mostly experienced menstrual duration of 3-7 days as many as 170 people and those who experienced menstrual cycles >7 days as many as 35 people where the results obtained were 0.03 $p < 0.05$, so H_0 is rejected, it can be concluded that there is a significant relationship between nutritional status and menstrual duration of pre-clinical students of class of 2023 at the Faculty of Medicine, UMI.

The results of this study are in line with the research of Kisliyanawati (2023) which showed that there was a relationship between nutritional status and the duration of menstruation in female students at the Muhammadiyah University of Kendal Batang. The results of the study from 79 respondents found that 40 people experienced menstruation for 3-7 days as many as 40 people (50.6%) and respondents who experienced menstruation for >7 days as many as 39 people (49.9%) where a value of 0.03 was obtained p -value < 0.05.²¹

Nutritional status in women when in a state of excess nutrition or malnutrition can cause the hypothalamus function to decrease so that it does not provide stimulation to the anterior pituitary to excrete FSH (*Follicle Stimulating Hormone*) and LH (*Leuteinizing Hormone*). Abnormal nutritional status is caused by the consumption of unbalanced nutritional intake by individuals, so that it can affect a person's menstrual cycle. Because in the body there is the hormone estrogen which functions on the menstrual cycle. The production of the hormone estrogen is influenced by a person's body fat. Body fat is very much needed in the menstrual process, a woman with poor nutritional status also has little body fat, body fat in the form of LDL (*Low Density Lipoprotein*) and cholesterol has a role as a precursor to the formation of gonadotropin and steroid hormones. Lack of fat also means lowering LDL and Cholesterol levels in the body so that it can cause the hormones formed to be inadequate to achieve a normal menstrual cycle.^{28, 18}

CONCLUSION

Based on the results and discussion, the author can conclude that the most nutritional status is in the 2023 batch of female students at the UMI Faculty of Medicine with normal nutritional status, although there are still 30 people who are obese. The most menstrual cycle in the 2023 batch of female students at the UMI Faculty of Medicine is a menstrual cycle of 21-35 days (normal). Based on the results of the study, it was also found that nutritional status affects the menstrual cycle, and nutritional status affects the length of menstruation.

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The effect of nutritional status on the menstrual cycle and duration of menstruation in active pre-clinical female students of the 2023 intake at the UMI Faculty of Medicine—lis Nurafifah Putri Mas'ud et.al

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