

The Relationship Between Nutritional Statuses and Stress Levels on The Menstrual Cycle in Adolescent Woman at SMAN 3 Sidoarjo

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ABSTRACT

Psychological factors, hormonal disorders, genetics, organic disorders and nutritional status. Nutritional status is a very influential factor in a woman's menstrual cycle. Inadequate nutritional intake causes menstrual irregularities in most adolescent girls. In addition, the stress level factor is the cause of menstrual disorders. Excessive secretion of stress hormones can damage cells, tissues, and other organs. One of the most visible effects of stress is menstrual cycle irregularities in adolescent girls. Prove the relationship between nutritional status and stress levels on the menstrual cycle in adolescent girls at SMA Negeri 3 Sidoarjo. Type of survey analytical research with a cross sectional approach using Propotional Random Sampling sampling techniques with inclusion criteria, a total of 88 respondents with a division of 28 respondents from X grade, 29 respondents in class XI and 31 respondents in class XII. The analysis used to assess variables is the chi square and logistic regression statistical test. In this study, an SPSS statistical test using chi square obtained the results of the correlation analysis of the relationship between nutritional status and the menstrual cycle obtained $\rho < \alpha$ results ($0.000 < 0.05$), while the correlation of the relationship between stress levels and menstrual cycles obtained $\rho < \alpha$ results ($0.002 < 0.05$), so it means that H1 accepted means that there is a significant relationship between nutritional status and stress levels with the menstrual cycle of adolescent girls in SMA 3 Sidoarjo.

Keywords : Menstrual Cycle, Nutritional Statuses (BMI), Stress Level

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INTRODUCTION

Adolescence begins with puberty, which is a time of physical changes (including physical appearance such as body and body proportions) and physiological function (maturity of sexual organs). In adolescent girls characterized by enlargement of the breasts and hips. In adolescence, adolescents experience changes including physical changes, concerning the growth and maturity of production organs, intellectual changes, social changes, and changes in personality maturity including emotions. In women, it begins with the arrival of the first menstruation commonly called menarche (Ministry of Health RI, 2017).

Menstruation that repeats every month will eventually form the menstrual cycle. Menstrual cycle disorders often occur in adolescents and are caused by several factors including psychological, hormonal disorders, genetics, organic disorders and nutritional

status. Nutritional status is a very influential factor in a woman's menstrual cycle. Inadequate nutritional intake causes menstrual irregularities in most adolescent girls. In excess nutritional status (overweight and obesity) usually experience chronic anovulatory or chronically irregular menstruation. Because it tends to have excess fat cells, so it produces excess estrogen. Meanwhile, in underweight nutritional status, there will be underweight and not having enough fat cells to produce estrogen needed for ovulation and menstruation, resulting in irregular menstrual cycles (Amperaningsih and Fathia, 2019).

In adolescent girls many factors can affect the menstrual cycle, among others: hormones, glands, stress levels, and nutritional status. Nutritional status and nutritional intake that greatly affect growth, organ function that causes disruption of reproductive function and will have an impact on menstrual cycle disorders. Normal growth of the body requires adequate nutrition, adequate nutritional energy, protein, fat and the availability of all essential nutrient supplies that form the basis of body growth. Nutritional deficiencies will have an impact on decreasing reproductive function, resulting in impaired hypothalamic function resulting in certain hormonal changes, including hormones that affect the ovulation cycle (gonadotropine) and diet composition both quantitatively and qualitatively affect the menstrual cycle and reproductive appearance, diet composition, especially low-fat diets will result in an increased follicle phase. A woman who is deficient or overnourished will have an impact on decreasing hypothalamic function that does not produce FSH (Folicle Stimulating Hormone). Where FSH functions to stimulate the growth of about 3-30 follicles, each of which contains one egg. But only one follicle continues to grow, the others disintegrate. While LH (Luteinizing Hormone) functions in egg maturation or ovulation (secretion phase) which later if not fertilized will decay (menstruation), so that if the production of FSH and LH is disrupted, the menstrual cycle will also be disrupted. Related to menstruation, specifically the number of anovulatory women will increase if their weight changes increase or decrease (Devillya and Selty, 2017).

Menstrual disorders often occur among adolescents. As many as 75% of adolescents in the late stages experience delayed menstrual disorders, irregularities, pain and bleeding that require them to see a doctor. Menstrual disorders must be overcome because they can affect the reproductive system and can interfere with daily activities so that it can reduce productivity levels. Differences in menstrual cycles are caused by several factors including nutritional status, age, physical activity, food intake, illness, stress and the influence of smoking. The growth period of adolescence has something to do with nutritional needs that must be met. When nutritional needs can be met, the growth will be optimal. Lack of nutritional intake results in problems such as malnutrition and anemia. The state of nutritional deficiency in a person will have an impact on decreasing reproductive function. In addition, unbalanced nutrient intake causes nutritional adequacy to be not good, it affects menstrual irregularities in adolescents (Noviyanti and Dardjito, 2018). One of the factors that influence menstrual cycle disorders is an unhealthy diet. The habit of often consuming fast food is an unhealthy diet because it is classified as high-fat, high-sodium, high-sugar foods but low fiber and vitamin content. The nutritional content of fast food is not balanced, if consumed continuously in excess will cause nutritional problems and risk factors for diseases, such as obesity, skin disorders, degenerative diseases and menstrual cycle disorders. The fatty acid content in fast food disrupts progesterone metabolism in the luteal phase of the menstrual cycle (Rahma, 2021). According to (Larasati, T. A. & Alatas, 2016) fast food is popular among teenagers because it is easy to obtain, practical and affordable. According to (Lubis, 2018) fast food in question refers to foods that can be obtained and served in a short time, such as instant noodles, fried chicken, french fries, hamburgers, and pizza. Most teenagers have irregular eating patterns and are at risk for nutritional problems. Current adolescent eating habits, such as not eating breakfast or only eating 2x a day (eating irregularly), often

consuming fast food, and rarely eating vegetables and fruit. This can result in food intake that does not meet the needs and nutritional balance which can result in undernutrition or overnutrition. This is all related to the lifestyle that leads to modernity. Whether we realize it or not, the times will change lifestyle, life term and needs. In addition, due to the busyness of parents, especially mothers who do not have time to prepare food at home, adolescents tend to eat ready-to-eat foods, therefore ready-to-eat foods become one alternative (Kristianti, Wibowo and Winarsih, 2014).

Obesity in children continues into adulthood will result in irregular menstruation. It is said to be irregular is a menstrual cycle that > 21 days or >35 days. However how fat a person will cause the anovulatory cycle is not known with certainty, which is clear diet and weight greatly affect the menstrual cycle. Adolescent girls who have a very thin nutritional status will also experience obstacles with menstruation. Massive weight loss can cause a decrease in gonadotropine hormones for LH and FSH production which results in estrogen levels will drop so that it has a negative impact on the menstrual cycle and ovulation. Impaired LH secretion due to weight loss can lead to shortening of the luteal phase. Based on several studies that examine the relationship between nutritional status and the menstrual cycle, there are several discrepancies that may occur due to differences in the selection of research samples, including female students, junior high school students and high school students where the amount of nutritional elements needed by the body differs according to a person's age. In addition, the place of research conducted has differences in the nutritional level of the population of each region and also the possibility of lack of counseling about health, especially reproductive system health obtained by adolescent girls and parents of students about the importance of nutritional status that will affect the menstrual cycle. This is what we need to make parents and their children aware of the impact that will occur if someone experiences an irregular menstrual cycle continuously (Maedy, Permatasari and Sugiatmi, 2022).

In addition to nutritional status, stress level factors are the cause of menstrual disorders. Stress is a perception of a threat or from a shadow of displeasure that moves, alerts or activates the organism (Hapsari, 2019). One of the disorders experienced by adolescents is stress. Stress is a disorder of the body and mind caused by changes and demands of life. Charles D. Speilberger, states that stress is external demands that affect a person such as an object in the environment or a stimulus that is objectively harmful. Stress can also be interpreted as pressure, tension, unpleasant disturbances that come from outside oneself (Donsu, 2019). Stress is a physiological, psychological, and behavioral response of humans who try to adapt and regulate both internal and external pressures. All forms of stress will produce reactions in the body. The body's response to stress includes 1400 physical and chemical reactions and involves more than 30 different types of hormones and neurotransmitters. Excessive secretion of stress hormones can damage cells, tissues, and other organs. One of the most visible impacts of this stress is female problems (Hawari, 2018).

In times of stress, a person's body will release adrenaline as a form of defense. Stress or emotions are part of the hormonal cycle feedback system in the human body. A theory explains that rapid stress causes an increase in the release of CRH (Corticotropin Releasing Hormone) by the hypothalamus which then causes an increase in cortisol in the blood (stress hormone). According to feedback from the hormonal system, the presence of elevated cortisol can inhibit gonadotropin-releasing factors that control ovulation in women. The amount of cortisol levels in the blood affects the magnitude of the impact it has on the individual's body. If this happens to a woman, it can affect menstruation and can even trigger menstrual disorders (Fadillah, Usman and Widowati, 2022).

According to WHO (World Health Organization) 2018 data, states that 80% of

women in the world experience irregular menstruation. According to Basic Health Research Data (Kemenkes RI, 2018) where as many as 11.7% of adolescents in Indonesia experience irregular menstruation and as many as 14.9% in urban areas in Indonesia experience menstrual irregularities, where irregular presentation reaches 15.8% in the East Java region.

Based on the results of a preliminary study conducted in January 2023 with direct interviews with 10 young women at SMAN 3 Sidoarjo, the author found that as many as 6 (60%) adolescent girls who experienced irregular menstruation such as 1 month twice or even did not menstruate for 2 months and as many as 4 people (40%) experienced regular menstruation, Every month always get menstruation. Of the 6 female students who experienced irregular menstrual cycles, 3 people (50%) experienced moderate stress and 1 (16.67%) people experienced severe stress. As many as 5 people (50%) are classified as undernourished status with a BMI value of ≤ 18.5 because their diet is only 2 times per day and often consume fast food. As many as 4 people (40%) who are classified as good / normal nutritional status category with BMI values ($>18.5-25$) because of a regular diet 3x a day with balanced nutrition, and as many as 1 person (10%) who are classified as more nutritional status categories with BMI values of >25 due to excessive consumption of food even in a day can be up to 4 times. Young women with malnutrition status who experience regular menstruation are as many as 2 people (40%) and who experience irregular menstruation as many as 3 people (60%). Young women with good nutritional status who experience regular menstruation are as many as 3 people (75%) and who experience irregular menstruation as many as 1 person (25%). Young women with more nutritional status who experience irregular menstruation are as many as 1 person (25%) and none have regular periods.

The results of previous research conducted at one of the high schools in Surabaya in 2016 showed that adolescents with more nutritional status will be at 1.5 times greater risk for dysmenorrhoea. In addition, research conducted on students majoring in Midwifery Poltekkes Kemenkes Kendari in 2016 proved a significant relationship between nutritional status and the incidence of Premenstrual Syndrome (PMS). Another study in Australia and New Zealand found that adolescents with obesity (BMI ≥ 27) had a 69.3 times greater risk of experiencing oligomenorrhoea and an 18.5 times risk of experiencing menstrual cycle disorders whose duration was more than 7 days (Novita, 2018). Meanwhile, according to Restunissa 2022 research, it shows that the level of stress with the menstrual cycle results in a p-value of 0.015. Most of the class X female students at SMAN X Depok mostly experience severe stress with abnormal menstrual cycles, meaning that there is a relationship between the level of stress and the menstrual cycle in grade X female students at SMAN X Depok (Fadillah, Usman and Widowati, 2022).

Based on the Government Regulation of the Republic of Indonesia Number 61 of 2014 concerning Reproductive Health in article 11 it is explained that the government implements Adolescent Reproductive Health Services which aims to prepare adolescents to lead a healthy and responsible reproductive life. The government in this case seeks to improve the quality of Adolescent Care Health Services (PKPR) in all health service places. The role of midwives in assisting PKPR is to provide health education and counseling on adolescent reproductive health, which includes menstrual cycle disorders (Purwati and Muslikhah, 2021).

METHODS

This research was conducted at SMA Negeri 3 Sidoarjo which was carried out in March – May 2023. The type of research used is survey analytics with a cross sectional approach. The population of this study was all adolescent girls of SMA Negeri 3 Sidoarjo. While the number of samples amounted to 88 respondents with a division of 28 respondents from X, 29 respondents from class XI and 31 respondents from class XII. The sampling

technique used is Propotional Random Sampling. Statistical Analysis using chi square and logistic regression.

RESULTS

After conducting research on the relationship between gisi status and stress levels in adolescent girls of SMAN 3 Sidoarjo, the following results were obtained

Table 1. Frequency Distribution of Respondent Characteristics based on Respondent Frequency by Class

Respondents Characteristics	Frequency	(%)
1. Class X	28	31,82%
2. Class XI	29	32,95%
3. Class XII	31	35,23%
Total	88	100%

Based on table 1 shows that of the 88 student respondents at SMAN 3 Sidoarjo most of them are class XII, as many as 31 student (35,23%) And then as many as 29 student (32,95%) came from class XI and 28 student (31,82%) came from class X.

Table 2. Correlation of the Relationship between Nutritional Statuses and Menstrual Cycle in Adolences Women of SMAN 3 Sidoarjo

IMT	Menstrual Cycle				Total	P Value	
	Orderly		Disorganized				
	Σ	%	Σ	%			
Less	3	17,7%	14	82,3%	17	19,4%	0,000
Normal	40	81,6%	9	18,4%	49	55,6%	
Over	2	9,1%	20	90,9%	22	25%	
Total	45	51,1%	43	48,9%	88	100%	

According to the results of SPSS data analysis, it shows a p value of 0.000, which means that there is a significant relationship between BMI and the menstrual cycle of young women of SMA 3 Sidoarjo.

Table 3. Correlation of Relationship Between Stress Level and Menstrual Cycle in Adolescent Women at SMA 3 Sidoarjo

Stress Level	Menstrual Cycle				Total	P Value
	Orderly		Disorganized			
	Σ	%	Σ	%		
Normal	35	77,7%	19	22,3%	45	0,002
Light	8	47%	9	53%	17	
Keep	2	15,4%	11	84,6%	13	
Heavy	0	0%	4	100%	4	
Very Heavy	0	0%	0	0%	0	
Total	45	51,1%	43	48,9%	88	

Based on the results of SPSS analysis, a p value of 0.002 was obtained, which means that there is a significant relationship between stress levels and menstrual cycles in adolescent girls of SMA 3 Sidoarjo.

Table 4. The Level of Influence of Nutritional Statuses and Stress Level on the Menstrual Cycle of Adolescent Women of SMA Negeri 3 Sidoarjo

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	103.781 ^a	.542	.389

Based on the results of logistic regression analysis with SPSS ver.23, the results of the r square value of 54.2% were obtained, which means that it shows the level of influence of 2 variables of nutritional status and stress level of 54.2%, while the remaining 45.8% is influenced by other variables that are not studied or outside the study.

DISCUSSION

According to the results of SPSS data analysis, it shows a p value of 0.000, which means that there is a significant relationship between BMI and the menstrual cycle of young women of SMA 3 Sidoarjo. This is in accordance with the theory (Armayanti, Damayanti and Damayanti, 2021), fat in the body affects insulin and leptin hormone levels. Both hormones affect the secretion of GnRH (Gonadotropin Releasing Hormone). The secretion of GnRH stimulates the production of FSH (Folicle Stimulating Hormone) and LH (Luteinizing Hormone) which play a role in stimulating the ovaries to perform folliculogenesis and steroidogenesis (producing estrogen and progesterone). Hypothalamic or pituitary abnormalities, abnormal estrogen levels, and abnormalities in the ovaries can cause menstrual disorders (Zalni, Harahap, & Desfita, 2017).

High fat levels in the body of women, especially teenagers, will affect the production of the hormone estrogen. As we know estrogen is not only produced by the ovaries, but also produced by adipose tissue. As a result, estrogen levels will increase in individuals who have high body fat levels. This unbalanced hormone production and levels can trigger menstrual disorders (Karina, Candra, & Soedarto, 2017).

On the other hand, other nutritional status indicators, namely hemoglobin levels, were found to have a strong correlation with the regularity of menstrual cycles. Abnormal menstrual cycles can be caused because a woman has anemia. Anemia and hemoglobin levels in the body greatly affect the twitching of the menstrual cycle. Lack of hemoglobin levels in the body causes oxygen supply throughout the body to decrease. As a result, the production of follicle stimulating hormone (FSH) and luteinizing hormone (LH) produced by the hypothalamus is reduced.

Body Mass Index (BMI) and can be used as an indicator of nutritional status in adolescents. Ironically, many teenagers have poor eating habits that affect their menstrual cycle. Almost 50% of teenagers do not eat breakfast every morning where breakfast is very important to meet daily nutritional needs. On the other hand, teenagers tend to prefer junk food rather than healthy foods rich in nutrients. On the other hand, ready-to-eat foods do not contain enough nutrients that can meet the needs of the body.

Deficiency or excess nutrition affects the decline in hypothalamus function. The hypothalamus cannot signal the anterior pituitary to produce FSH (Follicle Stimulating Hormone) and LH (Luteinizing Hormone). Where these two hormones have a vital role in the menstrual cycle. FSH functions to stimulate the growth of follicles in the ovaries, while LH functions in the maturation of eggs. So if the production of FSH and LH is disrupted, it will definitely interfere with the menstrual cycle.

Based on the results of SPSS analysis, a p value of 0.002 was obtained, which means that there is a significant relationship between stress levels and menstrual cycles in adolescent girls of SMA 3 Sidoarjo. This is in line with the previous theory by (Armayanti, Damayanti and Damayanti, 2021) that adolescents are prone to stress, because at the age of adolescents they have not thought heavily so they easily get stressed. One of the causes of stress is

psychological stress caused by the psychosocial environment, one of which is academic pressure originating from the teaching and learning process or other things related to learning activities. Academic pressures that tend to be faced by female students include exams, competition, time demands, classroom environment, teachers, school schedules, homework and the burden of lessons that must be studied, while students only have a little time (Nurdini & Fafi Lutfiyati, 2023).

When the body experiences pressure or load that causes the balance of body and soul to be disturbed, the body will give a nonspecific response and try to restore in the form of stress. The implications of stress can be unpleasant and pleasant stress and adjustments are needed to accept the condition. So the effort to adapt and adjust is called stress.

In this study found a very strong correlation between stress levels and menstrual cycle regularity. In stressful conditions there is an activation of the HPA axis, so that Corticotrophic Releasing Hormone (CRH) is secreted by the hypothalamus. CRH plays a role in inhibiting the secretion of GnRH so that it affects the decline in female reproductive function. CRH stimulates the release of Adenocorticotropin Hormone (ACTH) by the anterior pituitary. ACTH stimulates the adrenal glands to produce the hormone cortisol. This cortisol hormone that inhibits LH secretion plays a role in inhibiting LH secretion by inhibiting the anterior pituitary response to GnRH (Armayanti, Damayanti and Damayanti, 2021).

The LH hormone plays an important role in the menstrual cycle. LH plays a role in the process of folliculogenesis and the production of steroid hormones such as estrogen and progesterone. The hormones estrogen and progesterone have a role in regulating the menstrual cycle every month. The balance of estrogen and progesterone hormones is strongly influenced by the hormone cortisol. The high production of cortisol in the body disrupts the balance of estrogen and progesterone hormones so that the menstrual cycle becomes irregular (Pratiwi, 2017).

Based on the results of logistic regression analysis with SPSS ver.23, the results of the r square value of 54.2% were obtained, which means that it shows the level of influence of 2 variables of nutritional status and stress level of 54.2%, while the remaining 45.8% is influenced by other variables that are not studied or outside the study.

This is in line with the theory of Maedy et al 2022, nutritional status is one of the important elements to achieve optimal health. Nutritional status is influenced by the balance of the amount of nutritional intake with the amount of nutrients needed by the body. Good nutritional status will be achieved if the nutritional intake obtained is in accordance with the nutrients needed by the body. Conditions of nutritional intake that are less than the body's needs will have an impact on undernutrition status, conversely, excessive nutritional intake will cause excess nutritional status and obesity. A woman who has malnutrition or overnutrition and obesity is at risk of decreased hypothalamus function which causes the production of luteinising hormone and follicle stimulating hormone to be disrupted so that the menstrual cycle will also be disrupted. In addition to nutritional status, stressful conditions can also cause menstrual disorders. Stress is a person's reaction, in the form of physiological, psychological and behavioral reactions due to changes that require a person to adapt. Mild stress is not a problem, but severe and prolonged stress can have a bad influence on the body. As well as nutritional status less or more, stress conditions will also affect the work of the hypothalamus so that the hormones needed by the body, especially reproductive hormones cannot be produced properly, and the menstrual cycle becomes irregular (Maedy, Permatasari dan Sugiati, 2022).

CONCLUSION

After conducting research on 88 adolescent girls using data from research at SMA 3 Sidoarjo and obtaining research results through data analysis, the following conclusions can

be drawn :

1. There is a significant relationship between BMI and menstrual cycles in adolescent girls of SMA 3 Sidoarjo.
2. There is a significant relationship between stress levels and menstrual cycles in adolescent girls of SMA 3 Sidoarjo.
3. There was a significant relationship between nutritional status and stress levels with menstrual cycles in adolescent girls of SMA 3 Sidoarjo

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