

Analysis of Factors Related to Menstrual Cycle Disorders among Female Students

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Abstract:

Menstrual irregularities are typical in adolescent groups; in the world, the prevalence of menstrual cycle disorders in women in early adolescence is about 45%, and menstrual disorders can be severe. It may be a harbinger of the absence of ovulation; the amount of bleeding that is large and occurs over a long period can cause anaemia in adolescents. Factors associated with menstrual cycle disorders include stress, nutritional status, haemoglobin levels, physical activity, and sleep duration. This study aims to determine the relationship between stress, nutritional status, haemoglobin level, physical activity, and sleep duration with menstrual cycle disorders in female SMK Plus Trimitsa Cibinong in 2023. This research is quantitative correlational research; the method used is non-experiment with cross-sectional. The sample in this study amounted to 72 respondents, teen schoolgirls Class X-XII—sampling techniques using techniques purposive sampling, using the test Chi-square. There is a relationship between stress (p-value=0.002<0.05), nutritional status (p-value=0.006<0.05), haemoglobin levels (p-value=0.000<0.05), physical activity (p-value=0.015<0.05), and sleep duration (p-value=0.018<0.05), with menstrual cycle disorders in female SMK Plus Trimitsa Cibinong. The school can provide education and preventive, promotional efforts to prevent menstrual disorders on the side, and students can record the date of menstruation every month using a calendar or menstrual calendar application to find out how the menstrual cycle is going.

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INTRODUCTION

Menstrual disorders often occur in groups of teenagers, such as menstrual pain and menstrual cycle disorders, which include polymenorrhagia (<20 days), oligomenorrhoea (>35 days), primary amenorrhoea (not menstruating until the age of 16 years), and secondary amenorrhoea (>3 months) (Sitoyu et al., 2019). WHO reported in 2020 that the prevalence of menstrual cycle disorders in early adolescent women is around 45% (WHO, 2020). According to data in Indonesia, 13.7% of women aged 10-59 years experience irregular menstrual problems in 1 year. Irregular menstrual cycle disorders in Indonesian women aged 17-29 years and 30-34 years are pretty high, namely 16.4% (RISKESDAS, 2019)

According to the Indonesian Ministry of Health in 2019, in Suparji's (2019) research, in West Java, it is estimated that 70% experience menstrual problems, and this is experienced by those aged 17-29 years. Meanwhile, in Bogor Regency, in the research of Tazkyatunnisa (2022), 178 teenagers in Bogor Regency showed that 71.9% experienced menstrual disorders. According to the profile data from Puskesmas Cibinong in 2022, during the health screening examination at

SMA/SMK in the working area of the Cibinong Health Center, it was discovered that at SMK Plus Trimitsa Cibinong, from grade 10 to grade 12, there were 84 female students, and 61.3% of the female students experienced menstrual disorders.

According to Kusmiran (2018), in his book on reproductive health, factors related to menstrual cycle disorders include stress, nutritional status, hemoglobin levels, physical activity, and sleep duration.

Stress is a physically or psychologically disturbing situation that threatens well-being (Kurniyawan et al., 2023). When stressed, a person's body releases adrenaline as a defense. Stress or emotions are part of the hormonal cycle feedback system in the human body. Increased levels of cortisol in the blood can affect menstruation and can even trigger menstrual disorders in women (Ulum, 2019). Research conducted by Eni (2018) at SMK Bakti Indonesia Medika Jombang showed that stress levels were associated with menstrual cycle disorders, as indicated by 51.8% experiencing abnormal menstrual cycles.

Nutritional status is the condition of a person's body due to food intake and utilization of nutrients (Kurniyawan et al., 2023). Nutritional status also plays a role in the menstrual cycle; research conducted at SMAK St. Stanislaus Surabaya in 2018 showed that teenagers with higher nutritional status were 1.5 times more likely to experience dysmenorrhoea (Nurlaily, 2018).

Menstrual disorders can be caused by hemoglobin levels, in line with research by Patonah and Azizah (2018), which states that there is a 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.

Physical activity also has an important role in the menstrual cycle, as supported by research by Lim et al. (2019) shows that physical activity (exercise) influences menstrual cycle irregularities. This is supported by research by Yu et al. (2019), which states that physical activity has a positive influence on menstrual cycle irregularities.

Sleep duration also has a vital role in the menstrual cycle, according to research by Nam et al. (2018), which has proven a relationship between sleep time and irregularities. Sleeping 5 hours a day significantly increases the risk of menstrual cycle irregularities compared to respondents who sleep 8 hours daily.

Menstrual disorders can be serious. Irregular menstruation can indicate the absence of ovulation (anovulatory) in the menstrual cycle. This means a woman is infertile (tends to have difficulty having children). Menstruation with a large amount of bleeding occurring over a long period can cause anemia in teenagers (Suparji, 2019). According to Rohan (2019), the impact of menstrual cycle irregularities that are not treated immediately and correctly is fertility problems; the body loses too much blood, which triggers anemia, characterized by fatigue, paleness, lack of concentration, and signs of anemia. According to Sukarni (2018), menstrual cycle irregularities are also an important indicator of reproductive system disorders, which can later be associated with an increased risk of various diseases in the reproductive system, including uterine cancer and infertility. Changes in the menstrual cycle must be given more attention because they can affect the quality of life of teenagers in the future (Sharma, 2019). Because of that, based on the above background, looking at the impact and causal factors, the researcher was interested in conducting research with the title Analysis of Factors Associated with Menstrual Cycle Disorders in Female SMK Plus Trimitsa Cibinong.

METHOD

This quantitative correlational research was conducted to develop relationships between variables and explain the relationships found. The method used is non-experimental with cross-sectional (Nursalam, 2018). In this study, researchers took the population of all female students at SMK Plus Trimitsa Cibinong in 2023 with 72 female students. To determine the sample in this research using the total sampling method, or the number of samples was the same as the total population, namely 72 respondents, female students of SMK Plus Trimitsa, consisting of 17 students in class 10, class 11 with 24 respondents and class 12 with 31 respondents. This research was conducted from November 2023 to January 2024.

The independent variables were stress, nutritional status, hemoglobin levels, physical activity, and sleep duration, while the dependent variables were menstrual cycle disorders. The instrument in this study used a questionnaire related to menstrual cycle disorders in the form of polymenorrhoea, oligomenorrhoea, amenorrhoea, hypermenorrhoea, and dysmenorrhoea. The stress level questionnaire was measured using the Perceived Stress Scale (PSS-10) questionnaire, a questionnaire about nutritional status that refers to the body mass index, which consists of 2 questions about anthropometry, weight, and height, and then analysis was carried out. Calculations by researchers to determine the nutritional status category of respondents. The hemoglobin level variable was checked for hemoglobin levels using a digital hemoglobin tool. For the physical activity variable, the Physical Activity Level (PAL) questionnaire was used, and for the sleep duration questionnaire, questions were asked about the length of time the respondent slept according to the normal sleep needs of teenagers, namely 8.5 hours. The analysis used is a univariate analysis of each proportion of variables studied using frequency and percentage data analysis. Bivariate analysis using Chi-Square analysis to prove whether there is a relationship between the independent and dependent variables.

RESULT

Table 1. Univariate Analysis

Variable	Frequency (f)	Percentage (%)
Menstrual cycle disorders		
Experience	28	38.9
Not Experienced	44	61.1
Stress		
Severe	18	25.0
Moderate	23	31.9
Mild	31	43.1
Nutritional status		
Obese	17	23.6
Thin	22	30.6
Normal	33	45.8
Hemoglobin levels		
Low	14	19.4
Moderate	27	37.5
Normal	31	43.1
Physical Activity		
Strenuous Activity	29	40.3
Medium Activity	23	31.9
Light Activity	20	27.8

Variable	Frequency (f)	Percentage (%)
Sleep Duration		
Not good	30	41.7
Good	42	58.3
Total	72	100.0

Of the 72 female respondents at SMK Plus Trimitsa, it was found that 28 respondents (38.9%) experienced menstrual cycle disorders, 18 respondents (25.0%) had severe stress, 17 respondents (23.6%) had obese nutritional status, 14 respondents (19, 4%) low haemoglobin levels, 29 respondents (40.3%) had heavy physical activity, and 30 respondents (41.7%) not good sleep duration.

Table 2. Bivariate Analysis

Variable	Menstrual Cycle Disorders				Total		p-value
	Experience		Not Experienced		n	%	
	n	%	n	%			
Stress							
Severe	13	72.2	5	27.8	18	100	0.002
Moderate	8	34.8	15	65.2	23	100	
Mild	7	22.6	24	77.4	31	100	
Nutritional status							
Obese	12	70.6	5	29.4	17	100	0.006
Thin	8	36.4	14	63.6	22	100	
Normal	8	24.2	25	75.8	33	100	
Hemoglobin levels							
Low	12	85.7	2	14.3	14	100	0.000
Moderate	7	25.9	20	74.1	27	100	
Normal	9	29.0	22	71.0	31	100	
Physical Activity							
Strenuous Activity	17	58.6	12	41.4	29	100	0.015
Medium Activity	7	30.4	16	69.6	23	100	
Light Activity	4	20.0	16	80.0	20	100	
Sleep Duration							
Not good	17	56.7	13	43.3	30	100	0.018
Good	11	26.2	31	73.8	42	100	

Of the 72 respondents studied, 18 respondents had severe stress, there were 13 respondents (72.2%) had menstrual cycle disorders, 17 respondents had obese nutritional status, 12 respondents (70.6%) had menstrual cycle disorders, 14 respondents had low hemoglobin levels, 12 respondents (85.7%) had menstrual cycle disorders, 29 respondents had heavy physical activity, 17 respondents (56.6%) had menstrual cycle disorders, and 17 respondents had not good sleep duration. Respondents (56.7%) experienced menstrual cycle disorders.

Based on statistical tests using the Chi-Square test, it is known that there is a relationship between stress ($p\text{-value}=0.002<0.05$), nutritional status ($p\text{-value}=0.006<0.05$), haemoglobin levels ($p\text{-value}=0.000<0.05$), physical activity ($p\text{-value}=0.015<0.05$), and sleep duration ($p\text{-value}=0.018<0.05$), with menstrual cycle disorders in female students at SMK Plus Trimitsa Cibinong in 2023.

DISCUSSION

The Relationship between Stress and Menstrual Cycle Disorders

From the results of the analysis statistical test using the Chi-Square test obtained p-value = 0.002, which is smaller than 0.05 (p-value < 0.05), which means there is a significant relationship between stress and menstrual cycle disorders in female students at SMK Plus Trimitsa in 2023.

According to Segars (2019), stress often causes irregular menstrual cycles, and disturbances in menstrual patterns involve integrative regulatory mechanisms that affect biochemical and cellular processes throughout the body, including the brain and psychology. The influence of the brain in hormonal reactions occurs through the hypothalamic-pituitary-ovary pathway, which includes multiple effects and feedback control mechanisms. In stressful situations, the amygdala is activated in the limbic system, which stimulates the release of hormones from the hypothalamus, namely corticotrophic releasing hormone (CRH). This hormone will directly inhibit hypothalamic GnRH secretion at its production site in the arcuate nucleus. This process likely occurs through the augmentation of endogenous opioid secretion.

Likewise, according to Prawirohardjo (2020), stress often causes irregular menstrual cycles. This happens because stress as a stimulus to the nervous system is transmitted to the central nervous system, namely the limbic system, through nerve transmission through the autonomic nerves. It will be passed on to the hormonal (endocrine) glands until it releases neurohormonal secretions (fluid) to the pituitary through the frontal system to release gonadotropins. In the form of FSH and LH, the production of these two hormones is influenced by Gonadotropin Releasing Hormone (GnRH), which is channeled from the hypothalamus to the pituitary. GnRH release is strongly influenced by the estrogen feedback mechanism on the hypothalamus, which influences the menstrual process.

This research is in line with the research of Kurniasari (2018), who said that 75.3% of female students suffer from irregular menstrual cycles, and 65.2% experience mild stress and irregular menstrual cycles. Statistically, a p-value of 0.004 (p < 0.05) was obtained for stress levels. There is a relationship between stress and menstrual cycle irregularities. This is supported by research conducted by Hidayatul and Supriyadi (2020), which stated that 89.7% of female students with severe stress experienced menstrual cycle irregularities, so there was a relationship between stress and menstrual cycle irregularities. Likewise, according to research by Roswendi (2019), there is a significant relationship between stress and menstrual disorders; female students with high stress have a significant risk (1.91 times) of experiencing a menstrual duration of more than seven days.

Authors assume that female students who experience stress are at risk of experiencing menstrual cycle disorders. Female students experience stress because, in the last month, many female students have been unable to complete the things they have to do and are less able to control feelings of irritability in life as a result of this. Causes stress, which can trigger menstrual cycle disorders because excessive stress can affect the production of the GnRH hormone, where the release of GnRH is greatly influenced by the estrogen feedback mechanism on the hypothalamus so that it can affect the menstrual process.

The Relationship between Nutritional Status and Menstrual Cycle Disorders

From the results of the analysis statistical test using the Chi-Square test obtained p-value = 0.006, which is smaller than 0.05 (p-value < 0.05), which means there is a significant relationship between nutritional status and menstrual cycle disorders in female students at SMK Plus Trimitsa in 2023.

According to Hanifah (2019), nutritional status has an important role in the menstrual cycle; good nutritional status is very necessary to maintain the ovulation cycle normally; good or poor nutritional status can affect the decline in hypothalamus function, which will then not provide stimulation to the pituitary anterior to produce FSH and LH, the results of this study are not in line with the theory above. The data produced shows that there is no relationship between nutritional status and the menstrual cycle. Likewise, according to Goldman et al. (2018), nutritional status is related to the menstrual cycle because body fat influences the role of the hormone estrogen. When the body's fat increases, estrogen in the blood increases, and the menstrual cycle becomes longer. Adolescents with abnormal nutritional status will experience a decrease in hypothalamus function and cause no stimulation of the anterior pituitary, which is responsible for producing FSH (Follicle Stimulating Hormone) and LH (Luteinizing Hormone) with a role as a stimulant for follicle growth and ovum maturation.

This research is in line with research conducted by Krishna et al. (2019), which shows that based on the analysis results, the p-value of 0.003, it can be concluded that a relationship exists between BMI and the menstrual cycle. Likewise, research by Noviyanti (2018) on young women in the sub-district Kedungbanteng, Banyumas Regency, shows a relationship between nutritional status and the menstrual cycle ($p = 0.025$). This is also in line with research conducted by Puspitaningtyas (2020), based on the analysis carried out using Fisher's test, the result was a value of $p = 0.001$ (with a value of $\alpha = 0.05$). It can be concluded that there is a significant relationship between nutritional status and the menstrual cycle of female students at the Nurul Huda Islamic Boarding School.

Authors assume that although the nutritional status of most female students is normal, there are also quite a few female students who have fat nutritional status. Female students with fat nutritional status can experience increased levels of estrogen in the blood due to high levels of fat in the body; high levels of estrogen can increase the production of the FSH hormone, which can inhibit follicle proliferation so that follicles cannot form maturely. There is a lengthening of the menstrual cycle. Therefore, normal nutritional status is needed to make the hypothalamus work well to produce the required reproductive hormones.

The Relationship between Hemoglobin Levels and Menstrual Cycle Disorders

From the results of the analysis statistical test using the Chi-Square test obtained p-value = 0.000, which is smaller than 0.05 ($p\text{-value} < 0.05$), which means there is a significant relationship between haemoglobin levels and menstrual cycle disorders in female students at SMK Plus Trimitsa in 2023.

According to Prawirohardjo (2020), Normal human reproduction involves interactions between various hormones and organs regulated by the hypothalamus. The hypothalamus produces hormones called releasing factors (RH). RH travels to the pituitary (a gland under the hypothalamus) and stimulates the pituitary to release other hormones. For example, gonadotropin-releasing hormone (produced by the hypothalamus) stimulates the pituitary to produce luteinizing hormone (LH) and follicle-stimulating hormone (FSH). LH and FSH stimulate the maturation of the reproductive glands and the release of sexual hormones. The menstrual cycle is controlled by the hormonal system and assisted by the pituitary gland. Apart from being influenced by the hormone estrogen, the menstrual cycle is also influenced by the hormone progesterone. If brain performance is reduced because the amount of oxygen it receives is not optimal, it will affect the work of the hypothalamus. A disturbed hypothalamus will also impact the work of hormones, which can stimulate the maturation of the reproductive glands, and the release of sexual hormones will be hampered or take longer to work. So, usually, the menstrual cycle is irregular and long.

This research is in line with the results of this study in line with the results of research conducted by Patonah & Azizah (2018), which states that there is a relationship between the menstrual cycle and haemoglobin levels in young women at SMA Negeri 3 Surabaya. Moreover, in line with Elok's (2019) research, the scatter diagram above shows that the p -value = 0.010 ($p < 0.05$), there is a relationship between haemoglobin levels and the menstrual cycle. According to Noviandari (2019), Low haemoglobin levels (< 12 g/dl) can cause disruption in the transport of oxygen in the blood to the brain, so the blood supply to the brain is not optimal. If brain performance decreases due to the lack of oxygen it receives, this will affect the work of the hypothalamus. Disorders of the hypothalamus can also affect hormonal work, inhibiting the maturation of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) so that the menstrual cycle will become irregular and tend to last longer. Women who menstruate will experience bleeding every month. Low haemoglobin levels can affect the menstrual cycle because haemoglobin is a protein that carries oxygen throughout the body, including the reproductive organs.

Authors assume that Female students' haemoglobin levels are related to the menstrual cycle because the entire body, including the brain, needs oxygen carried by haemoglobin. In contrast, if the body lacks haemoglobin, it will disrupt the hormones Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), so the menstrual cycle will become irregular and tend to last longer.

The Relationship between Physical Activity and Menstrual Cycle Disorders

From the results of the analysis statistical test using the Chi-Square test obtained p -value = 0.015, which is smaller than 0.05 (p -value < 0.05), which means there is a significant relationship between physical activity and menstrual cycle disorders in female students at SMK Plus Trimitsa in 2023.

According to Kurniawan (2020), doing high-intensity physical activity stimulates the hypothalamus, which later results in impaired secretion of the GnRH hormone. This situation will cause menstrual cycle irregularities and late menarche in women. One of the main factors that causes suppression of a woman's GnRH secretion is caused by excessive energy use, exceeding energy intake. Likewise, according to Mahitala (2018), physical activity with heavy intensity can stimulate the inhibition of GnRH (Gonadotropin Releasing Hormone) in the hypothalamus and then affect the activity of gonadotropins, namely Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), thus reducing the level of serum estrogen which should regulate menstrual cycle.

This research is in line with Hidayatul & Supriyadi (2020), which states that the majority of physical activity in the physical activity category is sometimes, namely 41 female students (51.3%), the Chi-Square test obtained a p result of 0.000, which is smaller than $\alpha = 0, 05$ means H_0 is rejected, and H_a is accepted, so it can be concluded that there is a relationship between physical activity and menstrual cycle irregularities. This research is in line with research by Lim et al. (2019), which states that physical activity is related to menstrual cycle irregularities. Moreover, it is supported by research by Yu et al. (2019), which states that there is a positive relationship between physical activity and menstrual cycle irregularities.

Authors assume that physical activity is related to the menstrual cycle. At the same time, female students have heavy physical activity so that when the body does too much activity, the body becomes tired, which affects the function of the hypothalamus in secreting the hormones FSH and LH, resulting in hormonal instability in the body, which can affect the menstrual cycle.

The Relationship between Sleep Duration and Menstrual Cycle Disorders

From the results of the analysis, statistical test using the Chi-Square test obtained a p-value = 0.018, which is smaller than 0.05 (p-value < 0.05), which means there is a significant relationship between sleep duration and menstrual cycle disorders in female students at SMK Plus Trimitsa in 2023.

According to Lovani (2019), short sleep duration can cause serotonin synthesis or damage to the ramus nucleus, affecting the REM cycle and making it difficult for humans to sleep. Serotonin levels decrease during the luteal phase, so hormonal disorders will occur, namely inhibiting the secretion of luteinizing hormone (LH) and decreasing estrogen levels, which can cause menstrual cycle disorders. Likewise, according to Luthfi (2020), shorter sleep duration in teenagers can disrupt circadian rhythms, which can affect women's menstrual cycles, and disturbed sleep can also inhibit the secretion of luteinizing hormones, which can change menstrual cycles in women.

This research is in line with Nam et al. (2018), which has proven an important relationship between sleep time and menstrual cycle irregularities. Sleeping 5 hours a day significantly increases the risk of menstrual cycle irregularities compared to respondents who sleep 8 hours daily. This research aligns with Lim et al. (2019); among all Korean adolescents examined, 19.4% reported menstrual cycle irregularities, which were influenced by the length of sleep. The average sleep duration of Korean teenagers has decreased to 6 hours, which is insufficient, and 2 hours less than that of teenagers in other countries. This is supported by research by Supatmi & Yumni (2020), which found that most women lack sleep (42.4%) and most experienced menstrual cycles in the literature (54,5%). This study shows a relationship between sleep duration and menstrual cycle with a value of $0.000 < 0.05$, which indicates that H_0 is rejected. Short sleep duration can be caused by serotonin synthesis or damage to the ramus mucus.

Authors assume that sleep duration is related to menstrual cycle disorders. Female students sleep less because they don't get enough 8.5 hours per day, so poor sleep duration can inhibit the synthesis of the hormone melatonin, affecting the production and synthesis of the hormone estrogen.

CONCLUSION

Most respondents did not experience menstrual cycle disorders. Most had mild stress, normal nutritional status, normal haemoglobin levels, heavy physical activity, and good sleep duration. There is a relationship between stress, nutritional status, haemoglobin levels, physical activity, and sleep duration with menstrual cycle disorders at SMK Plus Trimitsa Cibinong Students in 2023.

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CONFLICT OF INTEREST

The research process has no conflicts of interest until the article is reviewed.

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