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THE RELATIONSHIP BETWEEN CENTRAL OBESITY AND SLEEP QUALITY WITH MENSTRUAL CYCLE AMONG ADOLESCENT GIRLS AT MUHAMMADIYAH 3 SENIOR HIGH SCHOOL TULANGAN SIDOARJO

Hubungan Obesitas Sentral dan Kualitas Tidur dengan Siklus Menstruasi pada Remaja Putri di SMA Muhammadiyah 3 Tulangan Sidoarjo

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ABSTRACT

Menstrual cycle disorders are common reproductive health issues among adolescent girls and are often associated with hormonal imbalances. Central obesity, characterized by abdominal fat accumulation, can disrupt hormonal regulation, while poor sleep quality may decrease melatonin production, both of which can affect the menstrual cycle. This study aimed to examine the relationship between central obesity and sleep quality with the menstrual cycle. A cross-sectional design was used involving 82 female students selected through stratified random sampling from a population of 240 students at SMA Muhammadiyah 3 Tulangan Sidoarjo. Waist circumference was measured using the midline method, sleep quality was assessed through a questionnaire, and menstrual cycle data were collected for the last three months. Data were analyzed using Spearman's rank tests. The results showed that 34.1% of respondents experienced central obesity, 35.4% had poor sleep quality, and 45.1% had oligomenorrhea. There was a significant relationship between central obesity and sleep quality with the menstrual cycle. It is recommended that adolescent girls adopt healthy lifestyles and regulate sleep patterns to maintain reproductive health and prevent menstrual disorders.

Keyword : *adolescent girls; central obesity; menstrual cycle; sleep quality*

ABSTRAK

Gangguan siklus menstruasi merupakan salah satu masalah reproduksi yang dialami oleh remaja putri. Gangguan tersebut terjadi karena ketidaknormalan sistem hormon akibat dari penumpukan lemak di daerah perut yang disebut dengan obesitas sentral. Selain itu, kualitas tidur yang buruk dapat menurunkan produksi hormon melatonin sehingga berkaitan juga dengan siklus menstruasi. Tujuan penelitian ini untuk menganalisis hubungan obesitas sentral dan kualitas tidur dengan siklus menstruasi. Penelitian ini menggunakan desain Cross-Sectional dengan total populasi dalam penelitian ini sebanyak 240 siswi dan sampel sebanyak 82 siswi di SMA Muhammadiyah 3 Tulangan Sidoarjo dengan teknik penarikan sampel menggunakan stratified random sampling. Pengambilan data lingkar pinggang menggunakan midline, data kualitas tidur menggunakan kuesioner kualitas tidur, dan data siklus menstruasi menggunakan kuesioner siklus menstruasi dalam 3 bulan terakhir. Analisis data yang digunakan yaitu uji Chi-Square dan uji Rank Spearman. Hasil penelitian ini menunjukkan bahwa terdapat sebagian responden mengalami obesitas sentral (34.1%), kualitas tidur yang buruk (35.4%) dan memiliki siklus menstruasi oligomenorrhea (45.1%).

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Kesimpulan penelitian ini terdapat hubungan yang signifikan antara obesitas sentral dan kualitas tidur dengan siklus menstruasi pada remaja putri di SMA Muhammadiyah 3 Tulangan Sidoarjo. Disarankan untuk remaja putri dapat menerapkan pola hidup sehat dan mengatur waktu tidur untuk mencegah masalah kesehatan terutama masalah reproduksi.

Kata Kunci : kualitas tidur; obesitas sentral; remaja putri; siklus menstruasi

INTRODUCTION

Adolescence is a complex period of human development in which individuals experience not only physical growth, such as increases in height and body weight, but also significant changes in physical, biological, cognitive, socio-emotional, and psychological aspects. The World Health Organization defines adolescence as the age range of 12–24 years (Maedy et al., 2022). During this phase, adolescent girls generally experience menarche, or their first menstruation, which commonly occurs between the ages of 11 and 15 years (Jha et al., 2018).

Adolescence is also considered a vulnerable period for various sexual and reproductive health problems. Reproductive health refers to a state of complete physical, mental, and social well-being related to the reproductive system, including its functions and processes. Among adolescent girls, reproductive health problems may include endometriosis, polycystic ovary syndrome (PCOS), menarche-related disorders, ovarian cysts, fibroids, cervical cancer, interstitial cystitis, HIV/AIDS, sexually transmitted infections, menstrual cycle disorders, dysmenorrhea, and other related conditions (Azagew et al., 2020).

A report by the World Health Organization (2020) stated that approximately 45% of women worldwide experience menstrual cycle disorders. In Indonesia, according to the 2018 Basic Health Research (Riskesdas), 11.7% of adolescent girls experienced menstrual cycle disorders, with a higher prevalence among those living in urban areas (14.9%). Previous studies have also reported relatively high prevalence rates. A study conducted by Moulinda et al. (2023) among adolescent girls aged 10–19 years at YPPS Bandung found that 93.13% experienced menstrual cycle disorders, while Juliana et al. (2019) reported a prevalence of 75% among students at SMAN 1 Manado. Several factors influencing menstrual cycle disorders among

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adolescents include nutritional status, stress, physical activity, macronutrient intake and adequacy, dietary patterns, hormonal factors, and sleep quality (Fitria, 2021).

One of the nutritional problems among adolescents is excessive body mass index (BMI), which includes overweight and obesity categories. Obesity has become a global issue and has been declared an epidemic by the World Health Organization. Based on the 2018 Riskesdas data, the prevalence of central obesity among individuals aged ≥15 years increased from 18.8% in 2007 to 26.6% in 2013 and reached 31% in 2018 (Ministry of Health of the Republic of Indonesia, 2018). In Indonesia, central obesity in this age group is more prevalent among women (46.7%) than men (15.7%) (Ministry of Health of the Republic of Indonesia, 2018). Central obesity is characterized by the accumulation of fat, particularly in the intra-abdominal area (abdominal fat) (Wulandari, 2020). This fat accumulation may stimulate adipose tissue to produce hormonal imbalances, thereby disrupting the normal secretion of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), which consequently contributes to menstrual disorders (Ajijah, 2021).

In addition to central obesity, sleep quality is also considered a factor influencing the menstrual cycle among adolescent girls. Previous studies have demonstrated an association between sleep quality and menstrual cycle patterns, in which adolescents with poor sleep quality are at a higher risk of experiencing menstrual cycle disorders (Mardiana et al., 2022; Fitriani et al., 2018). Sleep quality is defined as a condition in which an individual feels refreshed and physically fit upon awakening. Poor sleep quality may reduce the production of melatonin, a hormone that functions to inhibit estrogen production. Melatonin deficiency may increase estrogen levels, and this hormonal imbalance can subsequently disrupt the menstrual cycle (Siregar et al., 2022).

METHODS

Study Design, Setting, and Period

This study employed an analytic observational research design using a cross-sectional approach to determine the

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association between central obesity, sleep quality, and menstrual cycle patterns among adolescent girls at SMA Muhammadiyah 3 Tulangan Sidoarjo. Data collection was conducted in November 2024 using questionnaires on menstrual cycles over the previous three months, sleep quality questionnaires, and waist circumference measurements using the midline method.

Population and Sampling Technique

The target population of this study consisted of all female students at SMA Muhammadiyah 3 Tulangan Sidoarjo, totaling 240 students. The inclusion criteria were female students enrolled at SMA Muhammadiyah 3 Tulangan Sidoarjo, having experienced menstruation, aged 15–18 years, physically and mentally healthy, willing to participate as respondents, and able to complete the study from beginning to end. The exclusion criteria included the use of hormonal medications such as clomiphene, progestin, and other related drugs, active smoking and alcohol consumption, as well as having reproductive or hormonal disorders such as polycystic ovary syndrome (PCOS).

Samples were selected using a stratified random sampling method, resulting in a total of 82 respondents. The procedures for stratified random sampling were as follows (Fauziah, 2019): (1) the population was divided into smaller subgroups called strata; (2) the strata were formed in such a way that each stratum was homogeneous or relatively homogeneous; and (3) samples from each stratum were then selected randomly to represent the respective strata, and overall estimation was obtained by combining all strata estimates.

The study began with the development of research instruments, including menstrual cycle and sleep quality questionnaires. This study received ethical approval from the Health Research Ethics Committee (KEPK) of Universitas Nahdlatul Ulama Surabaya on October 17, 2024, under Ethical Clearance Number 0415/EC/KEPK/UNUSA/2024.

Types and Methods of Data Collection

The study was conducted through the distribution of research questionnaires and waist circumference measurements using the midline method. Respondent characteristics

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included age, age at menarche, and sleep duration. The independent variables in this study were central obesity and sleep quality, while the dependent variable was the menstrual cycle.

Data Analysis

Data regarding menstrual cycles were obtained from menstrual calendar applications or personal records. Data from the sleep quality questionnaires and waist circumference measurements were processed using Microsoft Excel. Subsequently, the data were analyzed using SPSS for Windows software through univariate and bivariate analyses. Univariate analysis was performed to describe the general characteristics of the respondents. Bivariate analysis was conducted using the Spearman Rank test, with statistical significance determined at $p < 0.05$.

RESULTS AND DISCUSSION

Respondent Characteristics

Based on Table 1, the age characteristics of the respondents showed that most respondents were aged 17 years (36.6%) and 16 years (26.8%). The remaining respondents were aged 15 years (20.7%) and 18 years (13%).

Table 1. Characteristics of Respondents Based on Age

Age (years) n = 82	Total	Percentage (%)
15 years	17	20.7
16 years	22	26.8
17 years	30	36.6
18 years	13	15.9

The characteristics of respondents based on age at menarche are presented in Table 2. The majority of respondents experienced normal age at menarche (12–15 years) (47%), while 42.7% experienced early menarche (<12 years).

Table 2. Characteristics of Respondents Based on Age at Menarche

Age at Menarche n = 82	Total	Percentage (%)
Normal (12–15 years)	47	57.3
Early (<12 years)	35	42.7

The characteristics of respondents based on sleep duration are presented in Table 3. The majority of respondents had a sleep duration of 5–6 hours (43.9%).

Table 3. Characteristics of Respondents Based on Sleep Duration

Sleep Duration n = 82	Total	Percentage (%)
>7 hours	7	8.5
6-7 hours	31	37.8
5-6 hours	36	43.9
< 5 hours	8	9.8

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The characteristics of respondents based on sleep quality are presented in Table 4. The majority of adolescent girls had poor sleep quality, with a score of <18.

Table 4. Characteristics of Respondents Based on Sleep Quality

Variables	Category	Total		Mean (Score)
		n	%	
Sleep Quality	Poor	29	35.4	19.8
	Good	53	64.6	
Total		82	100	

Research Variable Data

Table 5 shows that the proportion of respondents with central obesity was 34.1%, those with poor sleep quality was 35.4%, and those experiencing oligomenorrhea was 45.1%. Menstrual cycle criteria: a cycle length of 21–35 days is considered normal, <21 days is classified as polymenorrhea, and >35 days is classified as oligomenorrhea.

Table 5. Research Variable Data

Variables	Category	Percentage (%)
Central Obesity	Yes	34.1
	No	65.9
Sleep Quality	Poor	35.4
	Good	64.6
Menstrual Cycle	*Polymenorrhea*	12.2
	Normal	42.7
	Oligomenorrhea	45.1

Table 6 shows that all study variables had a p-value < 0.05, and the correlation coefficient (r-value) indicated a positive correlation direction. Central obesity classification was divided into two categories, namely central obesity (>80 cm) and non-central obesity (≤80 cm).

Table 6. Bivariate Analysis Results Between Research Variables

Variables	Menstrual Cycle	
	p-value	*r-value*
Central Obesity	0.000	0.401
Sleep Quality	0.000	0.511

Association Between Central Obesity and Menstrual Cycle Among Adolescent Girls at SMA Muhammadiyah 3 Tulangan Sidoarjo

Based on Table 6, there was a significant association between central obesity and menstrual cycle patterns. The correlation coefficient (r = 0.401) indicated a positive correlation with a moderate strength of association. A positive correlation implies that the greater the waist circumference (>80 cm), the higher the likelihood of menstrual cycle disorders among adolescent girls.

His finding is consistent with Ajijah (2021), who reported that excessive fat accumulation may lead to central obesity, particularly visceral fat deposition, which triggers hormonal dysfunction by disrupting

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the secretion of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), thereby contributing to menstrual irregularities. Similarly, Putri et al. (2022) stated that central obesity is characterized by an increased body fat percentage, which promotes the aromatization process in adipose tissue, converting androgens into estrogen. Increased estrogen levels disrupt the feedback mechanism of FSH, preventing an optimal FSH peak, which in turn impairs follicular development and prolongs the menstrual cycle (Saroh et al., 2021).

Central obesity is an important health issue due to its significant impact on female reproductive health. Abdominal fat accumulation not only increases the risk of metabolic diseases but is also directly associated with reproductive disorders such as polycystic ovary syndrome (PCOS), fibroids, heavy menstrual bleeding, pre-eclampsia, and infertility. Therefore, prevention of central obesity is a priority in maintaining reproductive health (Venkatesh et al., 2022).

Association Between Sleep Quality and Menstrual Cycle Among Adolescent Girls at SMA Muhammadiyah 3 Tulangan Sidoarjo

Based on Table 5, there was a significant association between sleep quality and menstrual cycle patterns. The correlation coefficient (r = 0.511) indicated a positive correlation with a strong relationship. A positive correlation means that poorer sleep quality is associated with a higher risk of menstrual cycle disturbances.

This finding is in line with Sholihah (2022), who reported that poor sleep quality can reduce melatonin production, which plays an important role in inhibiting estrogen production and regulating gonadotropin release for the formation of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH). This melatonin imbalance may affect estrogen synthesis, leading to hormonal dysregulation and subsequently causing menstrual cycle disturbances.

The consistency of these findings is supported by Luthfi (2020), who reported a significant relationship between sleep quality and menstrual cycle (p = 0.002), as well as Siregar et al. (2022), who found a statistically

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significant correlation (p = 0.005) with an odds ratio of 4.773, indicating that poor sleep quality increases the risk of menstrual cycle disorders.

CONCLUSION

There is a significant association between central obesity and sleep quality with menstrual cycle patterns among adolescent girls at SMA Muhammadiyah 3 Tulangan Sidoarjo. Most respondents with central obesity had a waist circumference of >80 cm. Therefore, adolescent girls are recommended to adopt a healthy lifestyle to prevent central obesity. In addition, most respondents had poor sleep quality with a score of <18. It is recommended that adolescents regulate their sleep duration properly, ideally 7–8 hours per day. The school is also expected to conduct regular health education activities, particularly adolescent girls' programs, focusing on reproductive health education, including menstrual cycle management and the importance of maintaining physical fitness and good sleep quality.

BIBLIOGRAPHY

Ajijah, M. A. (2021). *Hubungan obesitas sentral, usia menarche, dan faktor stres dengan siklus menstruasi pada remaja di Desa Jemundo, Sidoarjo, Jawa Timur*. Undergraduate thesis. Faculty of Health Sciences, Universitas Nahdlatul Ulama Surabaya.

Azagew, A. W., Kassie, D. G., & Walle, T. A. (2020). Prevalence of primary dysmenorrhea, its intensity, impact and associated factors among female students at Gondar town preparatory school, Northwest Ethiopia. *BMC Women's Health, 20*, 1–7.

Fitria, R. (2021). Pengaruh obesitas terhadap siklus menstruasi pada remaja di Desa Rambah Tengah Hilir Kecamatan Rambah Kabupaten Rokan Hulu. *Al Insyirah Kebidanan: Jurnal Ilmu Kebidanan, 10*(2), 70–74.

Fitriani, R. J., Probandari, A., & Wiboworini, B. (2018). Body mass index, sleep quality, stress conditions determine menstrual cycles among female adolescents. *International Journal of Public Health Science, 8*(1), 101.

Jha, N., Bhadoria, A. S., Bahurupi, Y., Gawande, K., Jain, B., Chaturvedi, J., & Kishore, S. (2020). Psychosocial and stress-related risk factors for abnormal menstrual cycle pattern among adolescent girls: A case-control study. *Journal of Education and Health Promotion, 9*(1), 313.

Juliana, I., Rompas, S., & Onibala, F. (2019). Hubungan dismenore dengan gangguan siklus haid pada remaja di SMAN 1 Manado. *Jurnal Keperawatan, 7*(1), 6.

DOI 10.20884/1.jgipas.2026.10.1.18601

Kementerian Kesehatan Republik Indonesia. (2018). *Laporan nasional Riset Kesehatan Dasar (Riskesdas) 2018*. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.

Luthfi, M. Z. (2020). *Hubungan kualitas tidur dan siklus menstruasi pada mahasiswi tingkat akhir Fakultas Kedokteran Universitas Sriwijaya*. Undergraduate thesis, Universitas Sriwijaya, Palembang.

Maedy, F. S., Permatasari, T. A. E., & Sugiatmi, S. (2022). Hubungan status gizi dan stres terhadap siklus menstruasi remaja putri di Indonesia. *Muhammadiyah Journal of Nutrition and Food Science, 3*(1), 1–10.

Mardiana, M., Mawarni, I., & Rahman, F. F. (2022). The impact of sleep quality on the menstrual cycle of teenage girls at SMAN 1 Tenggarong, East Kalimantan. *Journal of Health Management Research, 1*(1), 32–37.

Moulinda, A. A., Imrar, I. F., Puspita, I. D., & Amar, I. (2023). Relationship of nutritional status, sleep quality and physical activity with the menstrual cycle in adolescent girls at SMAN 98 Jakarta. *Jurnal Gizi dan Kesehatan, 15*(1), 1–12.

Putri, R. N., Nugraheni, S. A., & Pradigdo, S. F. (2022). Faktor-faktor yang berhubungan dengan kejadian obesitas sentral pada remaja usia 15–18 tahun di Provinsi DKI Jakarta (Analisis Riskesdas 2018). *Media Kesehatan Masyarakat Indonesia, 21*(3), 169–177.

Saroh, N. Y. M. (2021). *Hubungan stres dengan siklus menstruasi pada mahasiswa kelas reguler Jurusan Kebidanan Poltekkes Kemenkes Yogyakarta* (Doctoral dissertation, Poltekkes Kemenkes Yogyakarta).

Siregar, H. S. N., Mustika, S. E., & Wardhani, K. (2022). Hubungan kualitas tidur dengan siklus menstruasi pada mahasiswi FK UISU tahun 2021. *Jurnal Kedokteran STM (Sains dan Teknologi Medik), 5*(2), 101–108.

Sholihah, Z. (2022). Hubungan kualitas tidur dengan pola siklus menstruasi pada mahasiswi Program Studi Kedokteran Fakultas Kedokteran Universitas Tanjungpura. *Jurnal Cerebellum, 8*(3), 1–5.

Venkatesh, S. S., Ferreira, T., Benonisdottir, S., Rahmioglu, N., Becker, C. M., Granne, I., & Wittemans, L. B. (2022). Obesity and risk of female reproductive conditions: A Mendelian randomisation study. *PLOS Medicine, 19*(2), e1003679.

World Health Organization. (2012). *The prevalence of menstrual cycle disorders*. World Federation of Public Health Associations.

Wulandari, M. A. D. (2020). Hubungan obesitas sentral terhadap menarche dini pada remaja putri di SMP Negeri 3 Abiansemal. *Bali Medika Jurnal, 7*(2), 165–173.

DOI 10.20884/1.jgipas.2026.10.1.18601