Indonesian Journal of Global Health Research
Volume 6 Number 5, October 2024
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

RELATIONSHIP OF SLEEP QUALITY WITH MENSTRUAL CYCLE IN TEENAGERS

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ABSTRACT

Adolescence is a very important time in the process of reproductive maturity, and adolescence has a high risk of being associated with sleep disorders. It is important for teenagers, especially schoolchildren, to have a good quality of sleep in order to be able to perform academic activities. However, students are very vulnerable to poor sleep quality, which will affect both psychological and physiological imbalances, including menstrual cycles. The aim of this study is to find out the relationship between sleep quality and the menstrual cycle in adolescents in SMAN 1 Sumedang. This research method uses a correlational analytical design with a cross-sectional approach. A large sample of 438 pupils was obtained. The research instrument used the PSQI questionnaire to measure sleep quality, consisting of categories such as objective sleep quality, sleep latency, sleep duration, sleep efficiency, daytime dysfunction, sleep disorders, sleeping pills, and menstrual cycle questionnaires over the last 3 months. The results of this study were obtained from 244 people who had good sleep quality. 48.4% had normal menstrual cycle patterns, and 7.3% had abnormal ones. And for 194 people with poor sleep quality, 25.6% had normal periods and 18.7% had unnormal periods. In the statistics, the chi-square test obtained a p-value of 0.000, so it can be concluded that there is a meaningful relationship between sleep quality and menstrual cycle in adolescents in SMAN 1 Sumedang.

Keywords: adolescence; menstrual cycle; sleep quality

First Received	Revised	Accepted
28 March 2024	28 April 2024	30 April 2024
Final Proof Received		**Published**
27 June 2024		01 October 2024

How to cite (in APA style)
Fatmaningsih, N. K., Koeryaman, M. T., & Rosidin, U. (2024). Relationship of Sleep Quality with Menstrual Cycle in Teenagers. Indonesian Journal of Global Health Research, 6(5), 2913-2920. https://doi.org/10.37287/ijghr.v6i5.3598.

INTRODUCTION

Adolescence becomes one of the stages of human development during which all adolescents will experience changes both physically and emotionally as a form of preparation for the stage of maturity. One of the major changes at this time is that adolescents will experience reproductive maturity, called puberty. In puberty, there are rapid changes in the lives of boys and girls in which the reproductive system matures and is able to reproduce. Puberty begins when secondary sexual characteristics appear. In males, puberty ends when mature sperm are formed, while in females, puberty will end when regular menstrual cycles are formed. (Yuwono & Gusto Benyamin Yakobus, 2021). The average normal menstrual cycle duration ranges from 21 to 35 days, but there are some disorders in the cycle, including oligomenorrhea, polymenorrhea, and amenorrhea. The normal menstrual cycle depends on the action and interaction of the hormones released by the hypothalamus, hypofysis, and ovaries and their effects on the endometrium. The shortening of the menstruation cycle that causes the shorter cycle (polymenorrhea) is associated with decreased fertility and miscarriage, while the

prolongation of the cycle is linked to the occurrence of anovulation, infertilization, and abortion. (Sitoayu et al., 2017).

Menstrual disorders occur most often in adolescence because they are closely related to the process of reproductive maturation. Menstrual cycle disorders severely affect day-to-day activity due to physical discomfort as well as increased anxiety in teenage girls. Studies have also suggested that these menstrual cycle disorders contribute to school absence, a lack of learning consciousness, and changes in performing normal physical activity that, if allowed, can cause problems for those experiencing them. According to data quoted from the World Health Organization (WHO), the most common problem among adolescents in the world is menstrual disorders, with a prevalence of 38.45%. Based on data, the Ministry of Health of the Republic of Indonesia (2018) states that in Indonesia, there has been an increase of 1.2% in the period of a year from 15.2 to 16.4% of people who have irregular menstrual cycles. On student scope, a study conducted by Pusparini (2017) of SMAN 1 students Sukoharjo Pringsewu Lampung showed that out of 102 students, 53.8% of respondents had menstrual disorders. Another study conducted by Kristini et al. (2014) also stated that out of 150 teenage girls at Imogiri State High School, 60% had abnormal menstrual cycles. There are a variety of causes of menstrual cycle disorders, including stress, anxiety, physical activity, and sleep quality. (Salmawati et al., 2022).

Adolescents are a high-risk group for sleep disorders. In adolescents, there are dramatic changes in sleep patterns during adolescence, including shorter sleep durations, overtime sleep, and increasing sleep pattern differences on working days and weekends. Sleep quality is a measure of a person's good and bad sleep habits. Poor sleep quality and symptoms of insomnia are associated with poor health, absence from work, and an increased risk of mental disorders, including depression. A study (Luthfi B et al., 2017) of high school students in the field showed that 69.3% of teenagers have poor sleep quality. Another study conducted by Fitriani Dkk in 2018 of adolescents in Jakarta stated that the poor quality of sleep was experienced by 62.9% of Indonesian teenagers. Another study carried out by Hamzekhani et al. (2019) at Shahroud University of Medical Sciences against student University of Medicine showed that poor sleep quality can lead to drowsiness, decreased consciousness, poor temperament, problems with concentration, reduced education, a decrease in daily performance, increased error, nervousness, behavior, and physiological changes

Changes that occur in the body due to poor quality of sleep are indicated to cause menstruation in adolescent women to worsen. Sleep deprivation conditions, either poor sleep quality or a lack of sleep hours, will cause disruption of hormonal regulation. Poor and unqualified sleep will affect a decrease in melatonin production. The hormone melatonin is a hormone that is synthesized by reproductive organs such as the ovaries, placenta, and uterus. This hormone is released at night by the pineal glands, which function to regulate sleep time, puberty development, and environmental adaptation. This hormone can also determine the amount of estrogen production. When there is a decrease in melatonin, there is an increase in the hormone estrogen, which can affect the menstrual cycle. This is reinforced by a study conducted by Supatmi et al. (2019) that obtained data showing that 42.5% had poor sleep quality, and as much as 33% of them had irregular menstrual cycles.

When a person has poor sleep quality, there is a decrease in the leptin hormone and an increase in the ghlerin hormone. When both hormones are uncontrolled, it will affect the appetite and nutritional status, which will later affect the growth and development of adolescents. Therefore, to support the optimal growth and development of adolescents, they

need quality sleep. As a student, the fulfillment of sleep needs can have a significant influence on my learning performance at school. Research carried out (Ponidjan et al., 2022) showed that teenagers who had poor sleep quality had less learning concentration compared to those who had good sleep quality. Therefore, with the various impacts that can be caused and as a form of adolescent development monitoring, it is important for health professionals to identify menstrual disorders in adolescents in order to be able to provide prompt and appropriate intervention.

This research will be carried out in SMAN 1 Sumedang because the age group of adolescents is one of those that can be found in high school. One of the schoolchildren has a risk factor for menstrual cycle problems caused by certain factors. Based on a preliminary study conducted on 10 students of SMAN 1 Sumedang with the method of interview obtained results, SMAN 1 Sumedang have 8 hours of study from 07.00 to 15.00 pm, including 2 breaks. The average student mentions that they are more frequent because they should be using normal hours to sleep but are re-functioning to work tasks. Besides, out of the ten girls, eight of them had irregular menstrual cycles. Based on the preliminary and high prevalence of menstrual cycle disorders and sleep quality in adolescents as well as the contradictions of previous research results on the relationship of sleep quality with the menstruation cycle, this study aims to find out the relationship between sleep quality and menstruational cycle in teenagers in SMAN 1 Sumedang.

METHOD

The research method used is correlation analytics with cross-sectional approaches. The variables in this study are sleep quality and menstrual cycles. The research was conducted from April to May 2024. Sampling technique using total sampling. In this study, there was a SMAN 1 Sumedang pupil population of 525 people, with 87 people not included because they did not meet the criteria. A total of 438 subjects were studied, consisting of three generations: X, XI, and XII. The instrument in this study uses a PSQI questionnaire that has been validated in the study (Destiana, 2012) by conducting a trial of 30 respondents with the result that r counts (0,410-0,831) > r table (0,361), so this questionary is worthy of being used to measure sleep quality. The data obtained will be processed and analyzed univariate, and bivariate analysis to find out if there is any relationship. This research was conducted by the research ethics committee of the nursing faculty at Padjadjaran University under the number 348/UN6.KEP/EC/2024 on March 29, 2024.

RESULTS

Table 1.
Respondent characteristics (n= 438)

Respondent characteristics		f	%
Age	15 years old	26	5.9
	16 years old	166	37.9
	17 years old	185	42.2
	18 years old	61	13.9
Class	X	182	41.6
	XI	190	43.4
	XII	66	15.1

Table 1 above shows that the majority of respondents are 17 years of age (42.2%), and most are in class XI (43.4%).

Table 2.
Frequency Distribuion of Characteristics of Student Based on Quality Sleep

Sleep quality	f	%
Good	244	55.7
Poor	194	44.3

Table 2, it can be seen that the majority of respondents have good sleep quality, as many as 244 (55.7%), and the minority of respondents have poor sleep quality, as many as 194 (44.3%).

Table 3.
Frequency Distribuion of Characteristics of Student Based on Menstrual cycle

Menstrual cycle	**f**	**%**
Normal	324	74.0
Unnormal	114	26.0

Table 4.
Relationship between Quality Sleep and Menstrual Cycle

Sleep quality	Siklus menstruasi				Total		*P value*	OR
	Normal		Un normal					
	f	%	f	%	f	%	0,000	
Good	212	48,4	32	7.3	244	55,7		4,850
Poor	112	25.6	82	18,7	194	44,3		(3,037 – 7,748)
Total	324		114		438	100		

Table 4 shows that out of 438 respondents who experienced poor sleep quality with normal menstrual cycles, 112 (25.6%) experienced poor sleep quality with abnormal menstrual periods, 82 (18.7%), experienced quality sleep both with normal menstrual cycles, 212 (48.4%), and experienced good sleep quality with abnormal menstruation cycles, 32 (7.3%). The results of the Chi-square test obtained a P value of 0.000. This indicates that $P < \alpha = 0.05$, then H0 is rejected and Ha is received, which means there is a meaningful relationship between sleep quality and menstrual cycle in adolescents in SMAN 1 Sumedang. The odd ratio value in the table above is 4,850, which indicates that girls with poor sleep quality have a risk of 4,850 times having menstrual cycle disorders.

DISCUSSION

The study used a PSQI questionnaire to measure sleep quality, with a score of 0–21, a score of ≤5 indicating good sleep quality and >5 indicating poor sleep quality, as well as a menstrual cycle questionnaire that had previously been tested for validation. Table 2 presents data on the distribution of frequency characteristics of respondents based on sleep quality. Additionally, Table 4 shows that out of 438 respondents surveyed, respondents who experienced poor sleep quality with normal menstrual cycles of 112 (25.6%) and respondents with poor quality sleep with abnormal menstrual periods of 82 (18.7%) respondents, who experienced good quality of sleep with normal cycle of 212 (48.4%), and respondants who had good sleep quality of 32 people (7.3%) from the analysis using the chi-square test obtained data that p-value 0,000 indicates less than $\alpha < 0.05$, which means that H0 was rejected and H1 was received, so that there is a relationship between sleep quality and menstruation cycle. This is in line with the previous study by H. S. N. Siregar et al. (2022), which found that 52.6% of schoolgirls have poor sleep quality and 22.9% of respondents have abnormal menstrual cycles. From the results of the study on SMAN 1 schoolgirls, it was found that 44.3% have poor quality of sleep and 26% of the respondents have abnormal menstrual cycles. This can happen because the poor quality of sleep will have a negative impact on the regularity of the menstrual cycle.

The results of this study are also supported by a study conducted by Supatmi et al. (2019) on the relationship between sleep duration and menstrual cycle in nursing students at Muhammadiyah University of Surabaya, with 59 respondents (42.5%) who have poor sleep quality and 33% having an abnormal cycle. There are many factors that can affect the quality of sleep for students at SMAN 1 Sumedang, such as stress, health, environment, and even lifestyle. The factors that can trigger the presence of stress for students in SMAN 1 Sumedang are academic stress ranging from internships, exams, and other tasks, as well as lessons both academic and non-academic. If this is left to happen continuously, then this stress will disrupt the body's system and affect the decline in the quality of sleep. Stress can stimulate the axis of the hypothalamus-pituatrium-adrenal cortex to produce the hormone cortisol, which will result in increased levels of cortisol in the blood. High levels of cortisol can reduce the levels of melatonin in the blood and stimulate sympathetic nerves, resulting in an awake state and difficulty sleeping.

Other factors that affect the quality of school sleep are food intake and lifestyle. Usually, students prefer to eat fast food because it is faster, but if eaten too often, it will lead to a disturbance of body balance because the body's nutritional needs are not met, which can also affect body functions. Besides, they also regularly consume caffeine, so they don't get sleepy at night. Caffeine intake will lead to insomnia and make it difficult to sleep because caffeine is a central adenosine receptor antagonist that can affect the function of the central nervous system, and sleep disorders can occur. As well, irregular sleep patterns can also affect the quality of sleep. Physiologically, the quality of sleep can be affected by a gland called the pineal gland, which functions to secret the hormone melatonin and can give a sense of drowsiness that will ultimately affect a person's sleep both in quality and quantity. Physiologically, increased melatonin secretion occurs when 2 hours before normal sleep time, then continues to be secreted and increases during sleep and then gradually decreases in the morning to reach the lowest amount of secretion at night. The time it takes a person to rest and sleep is different – differently this can be influenced by several factors such as health conditions, activity and age. In adolescence, the time it takes to sleep is 8-9 hours a day and have REM sleep about 20%. However, most adolescents have problems in fulfilling their needs especially the need for rest where they are often awake until late at night. (Jarmi & Rahayuningsih, 2017).

Frequently disturbed sleep, both in quality and quantity, can affect both psychological and physiological balance. Physiological disorders such as discharge of daily activities, fatigue, weakness, reduced endurance, disturbance of vital signs and hormonal disruption can occur. Melatonin hormone imbalance. Melatonin acts as an antioxidant, an antimytotic, anti-estrogenic, pro-differentiation and anti-metastatic, modulating the immune system, regulating sleep and circadian rhythms and reproductive maturity. In addition to playing a part in the sleep process, the hormone melatonin also plays a role in the menstrual cycle. Through the suprachiasmatic nucleus in the hypothalamus and the pars tuberalis, the hormone melatonin affects the GnRH of the hypothalamus in forming FSH-LH. The relationship between melatonine and GnRh is crucial because melotonin plays a role in ovarian growth, cAMP production and estrogen production. The hormone melatonin acts as an inhibitor that inhibits the production of steroids by reducing the expression of Steroidogenic Acute Regulatory (StAR), P450 side chain cleavage (P450 scc), 3β-Hydroxysteroid Dehydrogenae (3 β-HSD), and 17β- Hydroxysteroid Dehidrogenaes (17β- HSD), known as steroidogenous proteins and enzymes, and has an important role in the cyclic production of adenosis monophosphate (cAMP) and especially estrogen steroids, which are hormones that regulate the menstrual cycle. Melatonin can regulate estrogen activity in 3 ways, namely 1) down-regulating the

gonad synthesis of the steroid and lowering its levels in the blood, 2) interacting with the ER, and 3) by Down-regulation of the activity of some enzymes such as aromatase.

Melatonin also has a role in ovarian function modulation. Melatonin in large amounts is found in the follicle fluid of the ovum and spontaneously affects the menstrual cycle.The receptors for the hormone melatonin have high concentrations in the human ovaries. Melatonin also plays a role in the production of progesterone, LH receptors, GnRH, and the gene expression of GnRh receptors through the melatonin receptors in human granulosa-luteal cells, which are mediated through the MAPK pathway. The amount of melatonine in the night will stimulate the progestogen production in the granulose cells, and the stimulating effect of hCG will increase the hormone production in those cells. In addition, melatonin, as an antioxidant, also plays a role in oocyte maturation and ovulation. These things show the importance of the role of melatonin on the follicles in regulating the functions of female reproduction. The idea that daytime sleep can replace nighttime sleep is not appropriate because the two sleep times have different patterns. Nighttime sleep has a cycle of sleep that lasts 120 minutes, while daytime sleep only takes about 20 minutes. This difference can affect a person's quality of sleep. As for the observations and observations of researchers from the respondent's questionnaire results, there are some respondents who have poor sleep quality and have an impact on the abnormal menstrual cycle that can be predicted by academic busyness such as long learning time and demands in learning so that it can drain the mind and energy that affects the quality of sleep.

CONCLUSION

Based on the results of the study, it was concluded that of the 244 people who had good sleep quality, 48.4% had normal menstrual cycle patterns and 7.3% had abnormal. And of the 194 people with poor quality of sleep, 25.6% had a normal and 18.7% had irregular. In statistic chi-square test obtained p-value 0,000 so it can be concluded there is a meaningful relationship between sleep quality and menstrual cycle in adolescents in SMAN 1 Sumedang

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