



THE CORRELATION BETWEEN SLEEP QUALITY AND STRESS LEVEL IN MEDICAL STUDENT

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ABSTRACT

Medical students are one group of people who have the potential to experience poor sleep quality and stress. In Indonesia, an average of 75% of medical students experience poor sleep quality, and an average of 30% of medical students in Asia experience stress. Many of the factors that trigger poor sleep quality and stress are similar and are linked to each other, creating a chain of events that will again trigger poor sleep quality and stress. Some of the factors most often experienced by medical students are busy schedules and the academic demands they have to face everyday. This study aims to analyze the relationship between sleep quality and stress levels in medical students at University of Muhammadiyah Semarang 2023. This research was conducted with a cross-sectional design using primary data in the form of the Pittsburgh Sleep Quality Index (PSQI) questionnaire to measure sleep quality and the Kessler Psychological Distress Scale (K10) questionnaire to measure stress levels. The subjects of this research were 63 medical professional students who met the inclusion and exclusion criteria. The sample was selected using the proportionate cluster random sampling method so that the portion between professional education stages was balanced. Data analysis used the Spearman rank test, significance if the p value <0.05 Results: There were 58 students in the medical profession who had poor sleep quality (92.1%), and 41 students (65.1%) experienced stress, with the most common type of stress being mild stress, totaling 24 students (38.1%). The results of the analysis showed $r = 0.349$, and a significance value of $p = 0.005$. There is a sufficient correlation between sleep quality and stress levels in medical students at University of Muhammadiyah Semarang 2023 with a positive correlation direction, which means that the worse the sleep quality, the more stress students experience.

Keywords: medical students; sleep quality; stress levels

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INTRODUCTION

Stress is a common problem faced by people in the world, the World Health Organization (WHO) states that 450 million people in the world experience stress. Medical students are one of the groups of people who are vulnerable to stress. Research conducted in Asia 30.84% of medical students experience stress. (Pathmanathan, 2013) Stress is a condition of psychological, physical, mental and emotional tension. Stress among students is often caused by pressure demands and discomfort during learning activities, this type of stress is called stress in learning. Academic demands such as assignments, exams, dense learning activities, achievement targets so that students who are not ready for academic demands will experience stress called academic stress. (Alvin, 2007) In addition to stress, medical students also often experience poor sleep quality. Based on the results of research from three regions in Indonesia, the results obtained by medical students who experience poor sleep quality are very high, the percentage experiencing poor sleep quality is, Bali 74.8%, Riau 84% and Pontianak 73%. (Bianca et al., 2021) Sleep is a primary and basic need for every individual which is useful for restoring and restoring energy and body condition to remain optimal.

The need for adequate sleep includes factors such as sleep duration (sleep quantity), and sleep depth (sleep quality) in the form of the time needed to start the sleep phase, frequency of awakening, and subjective quality including the depth and depth of sleep. Sleep quality is considered good if it does not show symptoms of sleep deprivation and there are no sleep problems. (Benjamin J. Sadock et al., 2019; Khonsary, 2017; Sembulingam and Prema, 2013) Stress and sleep quality are major problems often encountered among medical students. This is due to the very dense learning activities of medical students and the demands of achievement that must be met. (Fasya et al., 2021; Rezita Rahma Reza et al., 2019) In previous studies, only one topic and its description were discussed, not the relationship between sleep quality and stress among medical students, so this study aims to analyze the relationship between sleep quality and stress levels of medical students at the Muhammadiyah University of Semarang in 2023.

METHOD

The study is an observational analytical study with a cross-sectional method approach with a sample of 63 medical students at the Muhammadiyah University of Semarang. Sampling used proportionate cluster random sampling to measure 9 groups of medical education stages according to their respective proportions. The inclusion criteria include medical students at the Muhammadiyah University of Semarang in the 2023/2024 academic year. The exclusion criteria include students who have or have been diagnosed with mental disorders. The data in the study are primary data taken directly using a questionnaire that includes general data, and a measuring instrument in the form of the Pittsburgh Sleep Quality Index (PSQI) questionnaire for sleep quality, and the Kessler Psychological Distress Scale (K10) for stress levels. Both instruments are well-established and widely validated; the PSQI demonstrates high internal consistency (Cronbach's alpha = 0.83) and strong diagnostic validity, while the K10 shows excellent internal reliability (Cronbach's alpha = 0.89–0.93) and strong criterion validity. The study was conducted at the Hospital. Adhyatma, MPH Semarang as the main educational hospital or hospital of Muhammadiyah University of Semarang. After the data was obtained, then processing and analysis were carried out using the Spearman rank correlation test ($p < 0.05$).

RESULT

Respondent characteristics are dominated by female gender (74.6%) and an average age of 22 years (57.1%). Most respondents live in boarding houses (84.1%), an average distance of 500m – 1km (55.6%) and most use motorbikes for transportation (65.1%).

Table 1.
Respondent characteristics (n= 63)

Respondent characteristics	f	%
Age		
21	7	11.1
22	36	57.1
23	15	23.8
24	2	3.2
25	3	4.8
Gender		
Male	16	25.4
Female	47	74.6
Marital Status		
Married	0	0.0
Unmarried	63	100.0
Station		
Dermatology	5	7.9
Radiology	5	7.9
Neurology	5	7.9
Anesthesiology	5	7.9
Obstetrics and Gynecology	9	14.3
Pediatrics	13	20.6
Internal	11	17.5

Respondent characteristics	f	%
Ophthalmology	5	7.9
Otorhinolaryngology	5	7.9
Residence		
Private house	7	11.1
Boarding house	53	84.1
Rented House	3	4.8
Etc	0	0.0
Distance form residence to Hospital		
<500 meters		
500m – 1 km	15	23.8
>1 km	35	55.6
	13	20.6
Transportation		
Walk	5	7.9
Bicycle	0	0.0
Motorcycle	41	65.1
Car	16	25.4
Public transportation	0	0.0
Etc	1	1.6
History of mental disorder		
Yes	0	0.0
No	63	100.0

Table 2.
Respondent characteristics analysis on sleep quality (n= 63)

Respondent characteristics	Sleep Quality			
	Good		Bad	
	f	%	f	%
Age				
21	1	14.3	6	85.7
22	2	5.6	34	94.4
23	1	6.7	14	93.3
24	0	0.0	2	100.0
25	1	33.3	2	66.7
Gender				
Male	1	6.3	15	93.8
Female	4	8.5	43	91.5
Marital Status				
Married	0	0.0	0	0.0
Unmarried	5	7.9	58	92.1
Station				
Dermatology	0	0.0	5	100.0
Radiology	1	20.0	4	80.0
Neurology	0	0.0	5	100.0
Anesthesiology	0	0.0	5	100.0
Obsgyn	1	11.1	8	88.9
Pediatric	1	7.7	12	92.3
Internal	0	0.0	11	100.0
Ophthalmology	1	20.0	4	80.0
Otorhinolaryngology	1	20.0	4	80.0
Residence				
Private house	0	0.0	7	100.0
Boarding house	5	9.4	48	90.6
Rented House	0	0.0	3	100.0
Etc	0	0.0	0	0.0
Distance form residence to Hospital				
<500 meters	2	13.3	13	86.7
500m – 1 km	3	8.6	32	91.4
>1 km	0	0.0	13	100.0
Transportation				

Respondent characteristics	Sleep Quality			
	Good		Bad	
	f	%	f	%
Walk	1	20.0	4	80.0
Bicycle	0	0.0	0	0.0
Motorcycle	2	4.9	39	95.1
Car	2	12.5	14	87.5
Public transportation	0	0.0	0	0.0
Etc	0	0.0	1	100.0

In table 2. it is known that men have a percentage of experiencing bad sleep quality (93.8%). The group of stations with the highest percentage of experiencing poor sleep quality are the dermatology station (100%), Neurology (100%), anesthesiology (100%), and internal (100%).

Table 3.

Respondent characteristics analysis on stress level (n= 63)

Respondent characteristics	Stres level							
	Normal		Low		Moderate		High	
	f	%	f	%	f	%	f	%
Age								
21	2	28.6	3	42.9	2	28.6	0	0.0
22	11	30.6	14	38.9	5	13.9	6	16.7
23	6	40.0	7	46.7	0	0.0	2	13.3
24	1	50.0	0	0.0	1	50.0	0	0.0
25	2	66.7	0	0.0	0	0.0	1	33.3
Gender								
Male	5	31.3	9	56.3	0	0.0	2	12.5
Female	17	36.2	15	31.9	8	17.0	7	14.9
Marital Status								
Married	0	0.0	0	0.0	0	0.0	0	0.0
Unmarried	22	34.9	24	38.1	8	12.7	9	14.3
Station								
Dermatology	2	40.0	1	20.0	0	0.0	2	40.0
Radiology	3	60.0	0	0.0	1	20.0	1	20.0
Neurology	1	20.0	2	40.0	1	20.0	1	20.0
Anesthesiology	1	20.0	2	40.0	1	20.0	1	20.0
Obsgyn	2	22.2	4	44.4	2	22.2	1	11.1
Pediatric	5	38.5	6	46.2	1	7.7	1	7.7
Internal	3	27.3	6	54.5	1	9.1	1	9.1
Ophthalmology	3	60.0	2	40.0	0	0.0	0	0.0
Otorhinolaryngology	2	40.0	1	20.0	1	20.0	1	20.0
Residence								
Private house	0	0.0	4	57.1	1	14.3	2	28.6
Boarding house	21	39.6	19	35.8	6	11.3	7	13.2
Rented House	1	33.3	1	33.3	1	33.3	0	0.0
etc	0	0.0	0	0.0	0	0.0	0	0.0
Distance form residence to Hospital								
<500 meters	7	46.7	4	26.7	1	6.7	3	20.0
500m – 1 km	12	34.3	14	40.0	5	14.3	4	11.4
>1 km	3	23.1	6	46.2	2	15.4	2	15.4
Transportation								
Walk	4	80.0	0	0.0	0	0.0	1	20.0
Bicycle	0	29.3	0	0.0	0	0.0	0	0.0
Motorcycle	12	27.5	16	39.0	8	19.5	5	12.2
Car	6	37.5	8	50.0	0	0.0	2	12.5
Public transportation	0	0.0	0	0.0	0	0.0	0	0.0
etc	0	0.0	0	0.0	0	0.0	1	100.0

Table 3 shows that men have a higher percentage of the possibility of experiencing stress than women, men who do not experience stress are only (31%). The group of stations with the highest level of stress are the neurology station (80%) and anesthesiology (80%). The distance of residence with the highest percentage of experiencing stress is students who are >1km away (77%). Tabel 4, hasil uji rank Spearman dalam penelitian ini mendapatkan nilai $p = 0,005$ yang artinya $p < 0,05$

sehingga ikualitas tidur berkorelasi denganatingkat stresapada mahasiswa profesi dokter Universitas Muhammadiyah Semarang 2023. Hasil lainnya adalah $r = 0,345$ yang menunjukkan arah korelasinya positif (semakinaburuk kualitasaitidur, maka resiko stres semakin tinggi) dan kekuatan hubunganaiantara kualitas tiduraidengan tingkatastres pada mahasiswa profesi dokter Universitas Muhammadiyah Semarang tergolong cukup.

Table 4.
Cross Tabulation and Spearman Correlation Test

Cross-Tabulation and Spearman Correlation Test										
Sleep Quality	Stres level								<i>p</i>	<i>r</i>
	Normal		Low		Moderate		High			
	f	%	f	%	f	%	f	%		
Good	5	7.9	0	0.0	0	0.0	0	0.0	0.005	0.349
Bad	17	27.0	24	38.1	8	12.7	9	14.3		

DISCUSSION

The quality of sleep of medical students in this study obtained results that were dominated by students who experienced poor sleep quality with a total of 92.1% of students. The quality of sleep of students is measured from several aspects: sleep duration, sleep latency, sleep efficiency, sleep disturbance, daytime dysfunction, and subjective sleep quality which are packaged in the form of the Pittsburgh Sleep Quality Index (PSQI) questionnaire instrument. Meanwhile, the level of stress of students is measured using the Kessler Psychological Distress Scale (K10) instrument by measuring based on the symptoms of anxiety and depression felt by a person during the last 4 weeks. In this study, the results showed that 41 out of 63 professional medical students (65.1%) experienced stress.

These results were caused by several factors that are often found in the daily lives of medical students, some of which are dense student activities that cause fatigue. If someone is tired from work, sports, or fun activities, they will generally be able to sleep peacefully, on the other hand, if the fatigue is due to work, sports, or unpleasant activities, it will cause difficulty sleeping (Aditiya Serko Aji, 2015; Rezita Rahma Reza et al., 2019; Hutagalung et al., 2022). Furthermore, intense clinical clerkship rotations and heavy academic loads during final-year medical training severely disrupt circadian rhythms and sleep architecture (Latif et al., 2024; Jiao et al., 2022). From the difficulty sleeping, the duration of sleep is reduced and will affect sleep patterns and lifestyle. Lack of sleep duration can reduce sleep quality and the body will lack energy when waking up. When individuals lack the energy to carry out their activities, these individuals tend to be less focused, get tired easily and cause their activities to be disrupted so that they can experience stress (Priyoto, 2019; Rezita Rahma Reza et al., 2022; Sulana et al., 2020). Poor sleep quality will result in inhibiting a person's performance activities which can cause stress, leading to academic burnout and mental exhaustion (Alia et al., 2025; Putri et al., 2021).

When individuals experienced stress, the body would respond to stress by increasing the hormones cortisol, epinephrine, and norepinephrine. Stress can come from a slow stress response from the HPA (Hypothalamus-Pituitary-Adrenal) axis and can come from a fast stress response from the SAM (sympathetic-Adreno Medular) axis. Both of these responses will affect the secretion of several hormones such as ACTH, Cortisol, and Catecholamine. These hormones affect the human nervous system so that the body remains awake as a response to stress. The change in the hormonal balance will affect the Non-Rapid Eye Movement (NREM) and Rapid Eye Movement (REM) sleep cycles so that a person can wake up at night and have nightmares (Barnes and Montefuscio, 2011; Ratnaningtyas and Fitriani, 2019; Wu et al., 2022). Chronic exposure to high-pressure medical environments and night shift duties further exacerbates this neuroendocrine dysregulation (Hapsari & Budianto, 2024).

The correlation between sleep quality and stress levels in this study was tested using the Spearman rank test method and the results were 0.349, which is considered to have a sufficient correlation.

This theory is in line with the results of this study which obtained a significance value of $p = 0.005$ where the value is less than 0.05 so that it can be interpreted that there is a correlation between sleep quality and stress levels of medical students at the Muhammadiyah University of Semarang 2023. The results of this study indicate the direction of the positive relationship between the variables of sleep quality and stress levels of medical students at the Muhammadiyah University of Semarang. This means that if the quality of sleep of professional students is getting worse, the greater the possibility that the students will experience stress. Similar research conducted by Ratnaningtyas & Dwi (2019) showed that there is a relationship between sleep quality and stress levels, which is consistently supported by recent findings among medical undergraduates (Muttaqin et al., 2021; Ramadhanti et al., 2023; Sari et al., 2025). These results are reinforced by Priyoto (2019) and Barnes AP et al. (2011) who stated that sleep quality and stress have a relationship and influence each other due to the causal factors of both variables are also interrelated. These hormones can affect sleep quality, creating a cycle of poor sleep quality and stress that can be experienced by medical students (Barnes and Montefuscio, 2011; Priyoto, 2019; Ratnaningtyas and Fitriani, 2019; Tanamas et al., 2023).

Research Limitation

This study has limitations only assessing in 1 time which only enough to describe the condition only during the station being carried out so it cannot describe the entire duration of the doctor's professional education period. This study also only measures sleep quality and stress levels in general without assessing the type of sleep disorders and types of mental disorders other than stress.

CONCLUSION

In this study, it can be concluded that there is a sufficient correlation between sleep quality and stress levels in medical students at the Muhammadiyah University of Semarang with a positive correlation pattern, which means that the worse the sleep quality of medical students, the higher the risk of experiencing stress.

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