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The Relationship Between Stress Levels and Sleep Quality Among Pre-Clinical Students of the Faculty of Medicine, University of Alkhairaat Palu

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ABSTRACT

Stress is a condition that can affect an individual's physiological and psychological balance, including sleep quality. Pre-clinical medical students face high academic pressure, which may increase stress levels and negatively impact their sleep quality. This study aims to determine the relationship between stress levels and sleep quality among pre-clinical students of the Faculty of Medicine at Universitas Alkhairaat Palu. This analytical observational study used a cross-sectional design. The sample was selected using a total sampling technique, with a total of 165 pre-clinical students. Stress levels were measured using the Depression Anxiety Stress Scales (DASS-42) questionnaire, while sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Data were analyzed using the Spearman correlation test with a significance level of p<0.05. The results showed that most students had normal stress levels (59.4%), while 40.6% experienced mild to severe stress. Additionally, 92.1% of students had poor sleep quality. Bivariate analysis indicated a significant relationship between stress levels and sleep quality 1(p<0.001) with a Spearman's rho correlation coefficient of 0.535, indicating a moderate positive correlation. There is a significant relationship between stress levels and sleep quality among pre-clinical students of the Faculty of Medicine at Universitas Alkhairaat Palu, where higher stress levels are associated with poorer sleep quality.

INTRODUCTION

Stress is a condition that can be caused by social situations, environmental factors, and uncontrolled physical demands[1]. Stress increases the release of hormones such as epinephrine, cortisol, and norepinephrine, which enhance sympathetic nervous system activity and may lead to sleep disturbances and poor sleep quality[2]. Some individuals respond to stress with sleep disorders such as insomnia, characterized by difficulty initiating or maintaining sleep, both in terms of quantity and quality[3].

A study by Hediaty found that medical students are among the groups with high stress levels. The majority of students (52.6%) experienced moderate stress, 35.1% experienced severe stress, and 2.4% experienced very high stress levels. Only 9.9% experienced mild stress[4].

Approximately 264 million people worldwide suffer from stress and depression, as reported by the World Health Organization (WHO) in 2019. Data from the 2018 Basic Health Research (Riskesdas) showed that 37,728 individuals (9.8%) of Indonesians aged over 15 years experienced emotional mental disorders or stress. The province with the highest stress level was Central Sulawesi (11.6%), while the lowest was Lampung (1.2%)[5].

Physiologically, stress is known to be associated with sleep patterns. Sleep is a

physiological process characterized by a state of unconsciousness for a certain duration. It is a fundamental human need essential for maintaining health[6]. Sleep quality is a term used to describe how satisfied a person is with their sleep. It can be measured through several aspects, including sleep duration, difficulty waking up, frequency of awakening, sleep efficiency, and disturbances during sleep[1]. One common sleep disorder is insomnia. Individuals with insomnia often complain of inability to sleep, insufficient sleep, or experiencing disturbing dreams, which can affect their daily functioning[7].

Studies conducted in the United States and Lithuania reported that most medical students have poor sleep patterns and sleep hygiene[2]. Poor sleep quality can negatively affect daily life, including fatigue, difficulty maintaining concentration and decision-making, irritability, and long-term consequences such as heart disease and diabetes[8].

Research on the relationship between stress and sleep quality among pre-clinical medical students is important because they face different challenges compared to clinical students. The pre-clinical phase is characterized by high academic pressure and demands to understand fundamental medical sciences, with a dense curriculum and a large volume of material to be learned within a relatively short time. During this phase, students must deal with tight study schedules, difficult examinations, and the need to adapt to the medical academic environment[1].

Unlike clinical students who interact directly with patients and apply their knowledge in practice, pre-clinical students focus more on theoretical learning and examinations. Since they lack clinical experience, their stress is more influenced by academic pressure rather than clinical practice demands.

Previous studies have shown that high academic stress is associated with poor sleep quality[9]. Based on these considerations, the researcher is interested in conducting a study entitled *"The Relationship Between Stress Levels and Sleep Quality Among Pre-Clinical Students of the Faculty of Medicine, Universitas Alkhairaat Palu."* This study is motivated by the high level of stress among pre-clinical medical students, its impact on health and sleep quality, and the limited number of similar studies conducted in the local context, particularly in Central Sulawesi. Therefore, this study is expected to contribute to identifying and addressing this issue.

MATERIAL AND METHOD

Research Design

This study is an analytical observational study using a cross-sectional design. The research utilized primary data collected directly from respondents through standardized questionnaires

Time and Place of Research

The study was conducted at the Faculty of Medicine, University of Alkhairaat Palu

Population and Sample

The Population of this study consisted of pre-clinical students of the Faculty of Medicine, University of Alkhairaat Palu. The sample included 165 respondents selected using a total sampling technique.

The independent variable in this study was stress level, while the dependent variable was sleep quality. Stress levels were measured using the Depression Anxiety Stress Scales (DASS-42) questionnaire, and sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI)

Data Presentation

Data were analyzed using univariate and bivariate analysis. Univariate analysis was used to describe the characteristics of respondents, while bivariate analysis was performed to examine the relationship between stress levels and sleep quality. The statistical test used was the Spearman correlation test with a significance level of $p < 0.05$.

RESULTS AND DISCUSSIONS

In the univariate analysis, the characteristics of the respondents are presented in the following tables.

Table 1. Frequency Distribution of Respondents by Cohort.

Batch	n	%
2021	41	24.8
2022	68	41.2
2023	56	33.9
Total	**165**	**100**

Based on Table 1, the frequency distribution of respondent characteristics shows that students of the Faculty of Medicine, University of Alkhairaat Palu who participated in this study consisted of 41 respondents (24.8%) from the 2021 cohort, 68 respondents (41.2%) from the 2022 cohort, and 56 respondents (33.9%) from the 2023 cohort.

Table 2. Frequency Distribution of Respondents by Gender

Gender	n	%
Male	37	22.4
Female	128	77.6
Total	**165**	**100**

Based on Table 2, the frequency distribution by gender shows that there were 37 male respondents (22.4%) and 128 female respondents (77.6%).

Table 3. Frequency Distribution of Respondents by Stress Level.

Stress Level	n	%
Normal	98	59.4
Mild Stress	26	15.8
Moderate Stress	28	17.0
Severe Stress	9	5.5
Very Severe Stress	4	2.4
Total	**165**	**100**

Based on Table 3, the frequency distribution of respondent characteristics shows that 98 respondents (59.4%) had normal stress levels, 26 respondents (15.8%) had mild stress, 28 respondents (17.0%) had moderate stress, 9 respondents (5.5%) had severe stress, and 4 respondents (2.4%) had very severe stress.

Table 4. Frequency Distribution of Respondents by Sleep Quality

Sleep Quality	N	%
Good	13	7.9
Bad	152	92.1
Total	**165**	**100**

Based on Table 4, the frequency distribution of respondent characteristics shows that 13 respondents (7.9%) had good sleep quality, while 152 respondents (92.1%) had poor sleep quality.

Table 5. Distribution of Sleep Quality by Cohort

Category	Good		Bad		Total	
	n	%	n	%	n	%
2021	3	1.8	38	23.0	41	24.8
2022	7	4.2	61	37.0	68	41.2
2023	3	1.8	53	32.1	56	33.9
Total	**13**	**7.9**	**152**	**92.1**	**165**	**100**

Based on Table 5, the majority of students from all cohorts had poor sleep quality. Among the three cohorts, the 2022 cohort had the highest number of students with good sleep quality, totaling 7 respondents (4.2%). Meanwhile, the 2021 and 2023 cohorts had the same number, with 3 respondents each (1.8%).

Table 6. Distribution of Sleep Quaiity by Gender

Category	Male		Female		Total	
	n	%	n	%	n	%
Good	7	4.2	6	3.6	13	7.8
Bad	30	18.2	122	73.9	152	92.1
Total	**37**	**22.4**	**128**	**77.6**	**165**	**100**

Based on Table 6, male students with good sleep quality were slightly more numerous than female students, with 7 respondents (4.2%) compared to 6 respondents (3.6%). However, poor sleep quality was predominantly found among female students, with 122 respondents (73.9%), while 30 male students (18.2%) experienced poor sleep quality.

In the bivariate analysis, the characteristics of respondents are presented in the following tables.

Table 7. Differences in Sleep Quality Based on Stress Levels.

Statistic Test		Value	df	p-value
Kruskal-Wallis		47.7	4	<.001
Stres Levels	**n**	**Mean PSQI**	**SD**	**SE**
Normal	98	12.0	5.47	0.553
Mild	26	14.4	4.38	0.860
Moderate	28	20.8	6.43	1.215
Severe	9	22.1	7.67	2.557
Very Severe	4	23.3	11.0	5.498

Based on Table 7, the Kruskal–Wallis test was conducted to determine whether there were differences in sleep quality (PSQI) based on stress levels (DASS-42). The analysis showed a significant difference ($p < 0.001$). The table indicates that the higher the students' stress levels, the higher the PSQI scores, which means poorer sleep quality.

Table 8. Relationship Between Stress Levels and Sleep Quality

Variable	n	p-value	Spearman's Rho
Stress Level	165	<0.001	0.535
Sleep Quality			

Based on Table 8, the results of the Spearman correlation test showed a p-value < 0.001 ($p < 0.05$), indicating a statistically significant relationship between stress levels and students' sleep quality. Furthermore, the rho value of 0.535 indicates a moderate positive correlation between stress levels (DASS) and sleep quality (PSQI).

DISCUSSION

Based on the results of this study, most students experienced normal stress levels, while the rest had mild to severe stress levels. This indicates that many students are able to cope well with academic pressure. In addition, social support from peers, lecturers, and family plays an important role in helping students face academic challenges.

These findings are consistent with a study conducted by Permatasari (2020) at Universitas Islam Negeri Syarif Hidayatullah Jakarta, which found that most pre-clinical students were also in the normal stress category, totaling 150 students (68.5%), followed by mild stress in 22 students (10%), moderate stress in 26 students (11.9%), severe stress in 10 students (4.6%), and very severe stress in 11 students (5%). The study explained that normal stress levels were associated with good coping mechanisms, strong social support, and the ability to adapt to the academic environment.

However, there were still students experiencing mild to very severe stress (31.5%), which was attributed to academic pressure, organizational demands, and suboptimal adaptation processes.[9]

Kartini (2018) found that the majority of students experienced stress in the normal (43.1%) and mild (33.3%) categories, while 15.7% experienced moderate stress and only 7.8% experienced severe stress. The study explained that most students experienced normal stress levels due to several factors, one of which was the implementation of the Problem-Based Learning (PBL) system, which promotes independent learning and is supported by a conducive academic environment.

In this system, students have a similar academic workload and receive equal treatment, allowing them to adapt more effectively to academic pressure. In addition, students with good time management skills and strong social support from family, peers, and lecturers are better able to control their stress levels. External factors such as a supportive environment and access to learning resources also help students cope with academic pressure without experiencing excessive stress.[10]

This finding is also consistent with studies conducted by Sibarani et al[11] (2023), which reported that out of 192 samples, the majority of respondents had normal stress levels (81 students; 42.2%). A similar result was found by Hutahaean et al[12] (2022), where among 97

respondents, most did not experience stress (80.4%).

Both studies explained that the predominance of normal stress levels is associated with students' ability to adapt to academic demands and the presence of better coping mechanisms, such as effective time management and social support. Additionally, students who are accustomed to the academic routine tend to have better control over their stress levels.[11,12]

Different findings were reported by Hediaty and Natasha Ayu Shafira (2022) at the Faculty of Medicine and Health Sciences, Universitas Jambi, where the majority of students experienced moderate stress levels (52.6%). Academic stress was identified as the main contributing factor, particularly due to exam pressure and a heavy study workload. In addition, stress arising from family expectations, personal ambitions, and group activities also influenced individuals' stress levels.[4]

According to the stress theory of General Adaptation Syndrome (GAS) proposed by Selye (1936), there are three phases of the body's physiological response to stress: the alarm phase, resistance phase, and exhaustion phase. [13]

In this study, it is assumed that many students had reached the resistance phase. They were able to cope with individual stressors and manage academic pressure, particularly in the second year, resulting in reduced stress symptoms. Additionally, a relatively lighter academic schedule and the absence of examinations during the data collection period may have contributed to the lower number of respondents experiencing stress.

Based on the results of this study, the majority of pre-clinical students at the Faculty of Medicine, Universitas Alkhairaat Palu had poor sleep quality. This poor sleep quality may be caused by various factors, such as high academic workload, the habit of staying up late to complete assignments or study, and the use of gadgets before bedtime, which can disrupt sleep patterns. In addition, poor time management and the habit of consuming caffeine at night also contribute to reduced sleep quality among students.

These findings are consistent with a study conducted by Permatasari (2020), which found that the majority of students experienced poor sleep quality (93.1%). This was attributed to stressors such as heavy academic workload, accumulating assignments, and exam pressure, which made many students have difficulty sleeping or frequently stay up late. Furthermore, adaptation to the academic environment and the use of gadgets before bedtime also contributed to sleep disturbances.[9]

Similar findings were also reported in a study conducted by Paceli et al (2022) at the Faculty of Medicine, Universitas Nusa Cendana, where the majority of students (58%) had poor sleep quality, while only 42% had good sleep quality. This poor sleep quality was associated with high academic workload, accumulated assignments, and examinations. These findings are supported by a study conducted by Febriyanti et al[14] (2023), which also found that the majority of medical students experienced poor sleep quality (70.5%), primarily influenced by high stressors due to academic pressure, such as block examinations and heavy study workload.[14]

These findings are consistent with studies conducted by Sibarani et al (2022), which found that almost all respondents had poor sleep quality, totaling 176 respondents (91.7%), while only 16 respondents (8.3%) had good sleep quality. Similarly, Hutahaean et al (2022) reported that the majority of their respondents experienced poor sleep quality (84.5%). Both studies explained that this was due to many students engaging in nighttime activities such as working on their thesis, completing assignments, playing games, watching media, consuming caffeine before sleep, frequent nighttime awakenings, and insomnia.[11,12]

Based on the results of this study, sleep quality across cohorts showed no significant differences, as the majority of students in each cohort experienced poor sleep quality. This may be attributed to the similarly high academic workload across all academic years, resulting in comparable academic pressure among cohorts. In addition, although students tend to adapt to academic demands, lifestyle factors such as staying up late and using gadgets before bedtime continue to contribute to poor sleep quality.

These findings are consistent with a study conducted by Hendika (2019) at Universitas Andalas, which showed that year of entry (cohort) had no significant relationship with sleep quality. In this study, the cohort variable had a p-value of 0.404, indicating no significant association between cohort year and students' sleep quality.[15]

However, several studies have reported different findings, where sleep quality among medical students tends to vary based on year of entry. A study conducted by Permatasari (2020) at the Faculty of Medicine, Universitas Islam Negeri Syarif Hidayatullah Jakarta found that first-year students had poorer sleep quality compared to second-year students, with 72% of first-year students experiencing sleep disturbances compared to 58% of second-year students. This was attributed to the transition period from high school to university, which leads to changes in sleep patterns and increased academic stress.[9]

Similar findings were also reported in a study conducted by Hutahaean (2022) at Universitas HKBP Nommensen, where students from the 2019 and 2020 cohorts experienced the poorest sleep quality compared to the 2018 cohort. Among 97 respondents, 94.1% of students from the 2019 and 2020 cohorts had poor sleep quality, while only 75.8% of the 2018 cohort experienced poor sleep quality. The high academic workload due to the competency-based curriculum (KBK) required students to study late into the night, which negatively affected their sleep quality.[12]

In addition, a study conducted by Clariska (2020) at Universitas Jambi among final-year students found that 91.3% had poor sleep quality, while only 8.7% had good sleep quality. The main factors influencing this condition were high academic pressure, thesis completion, and anxiety about the future.[1]

Meanwhile, a study conducted by Paceli (2022) at Universitas Nusa Cendana also found that 58% of students experienced poor sleep quality, particularly among first- and second-year students. Compared to final-year students, of whom 42% experienced poor sleep quality, this indicates that early-year students are more vulnerable to sleep disturbances. This was associated with the implementation of Problem-Based Learning (PBL) and block system curricula, which require students to maintain intensive study schedules.[14]

Based on various studies, there are differing findings regarding the relationship between stress levels and sleep quality among medical students based on year of entry. Some studies have found that first- and second-year students more frequently experience poor sleep quality compared to final-year students. However, other studies have shown that final-year students actually experience poorer sleep quality.

This indicates that year of entry is not the primary factor determining students' sleep quality. Instead, sleep quality is more strongly influenced by lifestyle, sleep habits, and how students manage academic stress. Therefore, although there are differences in stress levels across cohorts, these do not always directly affect sleep quality. These findings suggest that medical students' sleep quality is more influenced by daily habits rather than their year of entry.

Based on the results of this study, sleep quality by gender shows that both male and female students experience poor sleep quality; however, it is more prevalent among female students.

This may occur due to several factors, one of which is the higher number of female students compared to male students, resulting in a statistically greater number of females with poor sleep quality. In addition, stress levels in females tend to be higher than in males, as females are more likely to use emotions when dealing with problems and have greater sensitivity to stress. Males, on the other hand, tend to be more rational in problem-solving, making them less likely to experience stress that affects sleep quality.

Beyond psychological factors, fluctuations in estrogen and progesterone levels during the menstrual cycle also play a role in influencing sleep quality. Menstruation causes significant hormonal changes in females, particularly decreases in progesterone and estrogen levels. These hormonal changes have been associated with sleep disturbances, making females more prone to insomnia and poor sleep quality compared to males, who do not experience such hormonal fluctuations.[16]

A decline in progesterone before menstruation can lead to difficulty falling asleep and more frequent awakenings during the night. Additionally, reduced estrogen levels negatively affect the production of serotonin and melatonin, hormones that play important roles in regulating the sleep cycle.[17]

These findings are consistent with a study conducted by Permatasari[9] (2020), which showed that female students were more likely to experience poor sleep quality compared to males. A total of 126 female students (57.6%) had poor sleep quality, while only 8 female students (3.7%) had good sleep quality. The study explained that the main cause was the higher prevalence of stress among female students, which contributes to sleep disturbances. In addition, the study also revealed that female students were more likely to experience poor sleep quality due to the habit of staying up late, such as watching Korean dramas.[9]

In a study by Kartini[10] (2018), it was also found that poor sleep quality was more common among females than males. The results showed that 23 females (23.9%) experienced poor sleep quality, while only 6 males (5.1%) experienced poor sleep quality. The study explained that the higher prevalence of poor sleep quality among females was due to higher stress levels compared to males. Psychological factors such as greater sensitivity to problems, a tendency to rely more on emotions than rational thinking, and a higher susceptibility to anxiety and sleep disturbances are the main reasons why females are more vulnerable to poor sleep quality.[10]

In a study by Sibarani (2023), it was found that poor sleep quality was more prevalent among females than males. The results showed that 120 females (62.5%) experienced poor sleep quality, compared to 56 males (29.1%). The study explained that the higher prevalence of poor sleep quality among females may be attributed to decreased levels of estrogen and progesterone during the menstrual cycle. A decline in progesterone during the premenstrual phase is associated with difficulty sleeping and increased nighttime awakenings. Meanwhile, estrogen can reduce sleep latency and increase total sleep duration; however, fluctuations in these hormones may disrupt sleep patterns.[11]

In a study by Hutahaean (2022), it was found that 84.5% of students experienced poor sleep quality, with 64 females (84.2%) and 18 males (85.7%) affected. The findings indicated no significant difference in poor sleep quality between males and females. The researchers explained that factors influencing sleep quality may affect both genders equally.[12]

Based on the results of the correlation test between stress levels and sleep quality, stress is one of the factors contributing to sleep disturbances, but it is not the sole primary cause. The bivariate analysis showed a significant relationship with a moderate correlation between stress levels and sleep quality (p-value < 0.001, Spearman's rho = 0.535), indicating that higher stress levels are associated with poorer sleep quality among students.

However, since the correlation found was only moderate, this suggests that, in addition to stress, other factors also play a role in influencing students' sleep quality. Potential contributing factors include high academic workload, the habit of staying up late, the use of gadgets before bedtime, and caffeine consumption. Therefore, although stress contributes to sleep disturbances, lifestyle factors and daily habits likely also influence the poor sleep quality of pre-clinical students at the Faculty of Medicine, Universitas Alkhairaat Palu.

Physiologically, stress can increase the release of hormones such as epinephrine, cortisol, and norepinephrine, which enhance sympathetic nervous system activity and may lead to sleep disturbances and poor sleep quality. These findings are consistent with a study conducted by Permatasari (2020), which reported a p-value of 0.001 ($p < 0.05$), indicating a significant relationship between stress levels and sleep quality. The study explained that poor sleep quality among students was influenced by stressors related to complex academic activities, including numerous assignments, module examinations, differences in curriculum among first- and second-year students, extracurricular and organizational activities, as well as the use of electronic devices.[9]

These findings are also consistent with a study conducted by Sibarani et al (2023), which

showed a significant relationship between stress levels and sleep quality among pre-clinical students at the Faculty of Medicine, Universitas Palangka Raya, with a p-value of 0.000 and a correlation coefficient of 0.293, indicating a weak correlation. The study explained that high academic pressure, competency demands, and a dense academic schedule are the main factors contributing to stress among medical students, which subsequently affects their sleep quality. In addition, students' lifestyles, such as reducing rest time for studying, as well as habits like caffeine consumption and late-night activities, also contribute to poor sleep quality.[11]

Similar findings were also reported in a study conducted by Hutahaean et al (2022), which demonstrated a significant relationship between stress levels and sleep quality among students at the Faculty of Medicine, Universitas HKBP Nommensen, with a p-value of 0.037, indicating a meaningful association. The study explained that stressors such as academic pressure and a dense lecture schedule affect students' sleep quality. Furthermore, medical students tend to study late into the night due to high academic demands, which further worsens their sleep quality.[12]

Different findings were reported in a study conducted by Kartini (2018), which showed no significant relationship between stress levels and sleep quality among 2016 cohort students at the Faculty of Medicine, Universitas Muhammadiyah Makassar, with a p-value of 0.958 ($\alpha < 0.05$). The study involved 51 respondents and used the DASS-42 questionnaire to assess stress levels and the PSQI to measure sleep quality.

Although many students experienced mild stress and poor sleep quality, no strong correlation was found between the two variables. The study explained that other factors, such as irregular sleep patterns, lifestyle, and the learning environment, may play a more significant role in influencing students' sleep quality than stress levels themselves. In addition, most students may have adapted to academic pressure, so stress does not directly affect their sleep quality.[10]

CONCLUSION

Based on stress levels, the majority of students were in the normal stress category, indicating that most of them are able to cope well with academic pressure. However, there were still some students who experienced mild to very severe stress, suggesting variability in individuals' ability to manage academic demands.

In terms of sleep quality, most students experienced sleep disturbances, while only a small proportion had good sleep quality. This reflects that students' sleep patterns tend to be disrupted.

Analysis of the relationship between stress levels and sleep quality showed a significant association. Students with higher stress levels tended to have poorer sleep quality, whereas those with lower stress levels tended to have better sleep. This indicates that stress contributes to students' sleep quality, although other factors may also influence their sleep patterns.

RECOMMENDATION

For students It is important to implement effective stress management strategies to maintain good sleep quality. One approach is proper time management to avoid staying up late. Students are also advised to avoid using electronic devices before bedtime. In addition, light physical exercise can help relax the mind and prepare the body for sleep. Avoiding caffeine consumption at night is also important to prevent sleep disturbances.

For the faculty It is recommended to provide flexibility in the learning system to reduce excessive academic pressure, for example by allowing sufficient intervals between examinations and assignments.

For future researcher It is recommended to investigate other factors that may influence students' sleep quality, such as dietary patterns, physical activity levels, and living environment conditions. Future studies may also be expanded using in-depth interview methods to explore more deeply the causes of stress and sleep disturbances among medical students.

AUTHOR CONTRIBUTIONS

Conceptualization, R.F., M.M.D.R, R.R.R; Methodology, R.F.; Validation, M.M.D.R, R.R.R.; Formal Analysis, R.F..; Investigation, R.F., Resources, R.F..; Data Curation, R.F..; Writing-Original Draft Preparation, R.F., M.M.D.R and R.R.R.; Visualization, R.F. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declares that there is no conflict of interest.

REFERENCES

1. Clariska W, Yuliana Y, Kamariyah K. Relationship between stress levels and sleep quality among final-year students at the Faculty of Medicine and Health Sciences, Universitas Jambi. *J Ilm Ners Indones.* 2020;1(2):94-102. doi:10.22437/jini.v1i2.13516
2. Kartika AA. Relationship between stress levels and sleep quality among medical students of Universitas Prima Indonesia during the COVID-19 pandemic. *Skripsi.* 2021;44(6):378-389.
3. Ahmad M, Budiana DM. Effectiveness of infant massage on sleep quality in infants aged 2–12 months at Sabrina Care Bogor in 2022. *J Kesehat Karya Husada.* 2023;11(1):27-32.
4. Hediaty S, Shafira NA. Description of stress levels among medical students based on the Medical Student Stressor Questionnaire at the Faculty of Medicine and Health Sciences, Universitas Jambi. *J Med Stud.* 2022;2(2):61-71.
5. Singal EM, Manampiring AE, Nelwan JE. Analysis of factors associated with work stress among employees at the Eye Hospital of North Sulawesi Province. *Sam Ratulangi J Public Heal.* 2021;1(2):40. doi:10.35801/srjoph.v1i2.31988
6. Sahri RP, Hasibuan MTD. Relationship between sleep quality and academic achievement among students. *J Penelit Perawat Prof.* 2023;5(2):473-480. doi:10.37287/jppp.v5i2.1459
7. Ahmad SR, Anissa M, Triana R. Relationship between stress levels and insomnia incidence among 2017 cohort medical students at Universitas Baiturrahmah. *Indones J Heal Sci.* 2022;6(1):1-7. doi:10.24269/ijhs.v6i1.3936
8. Veronica E, Primayanti IDAID, Adiatmika IPG. [Incomplete title]. 2021;10(4):1-4.
9. Permatasari AN. Relationship between stress levels and sleep quality among first- and second-year medical students at Universitas Islam Negeri Syarif Hidayatullah Jakarta. 2020.
10. Kartini. Relationship between stress levels and sleep quality among 2016 cohort medical students at Universitas Muhammadiyah Makassar. 2018;3(2):91-102.
11. Sibarani JV, Widayati R, Mutiasari D. Relationship between stress levels and sleep quality among preclinical medical students at Universitas Palangka Raya. *Barigas J Ris Mhs.* 2023;1(1):13-23.

doi:10.37304/barigas.v1i1.8033

12. Hutahaean RG, Sitepu JN, Hendra. Relationship between stress and sleep quality among medical students at UniversitasHKBP Nommensen. *Nommensen J Med.* 2022;8(1):5-9.
13. Sherwood L. *Human Physiology: From Cells to Systems.* 2018.
14. Paceli V, Setianingrum ELS, Telussa AS. Relationship between sleep quality and concentration among students at Universitas Nusa Cendana. *Cendana Med J.* 2022;24(2):301-308.
15. Hendika IP. Relationship between student characteristics and sleep quality among academic phase medical students at Universitas Andalas. 2019.
16. Fauziah F, Putra Y, Muazinah B. Relationship between premenstrual syndrome (PMS) and sleep quality among adolescent girls at SMPN 3 Unggul Ingin Jaya, Aceh Besar. *J Anestesi.* 2023;1(2):200-222. doi:10.59680/anestesi.v1i2.578
17. Siregar HSN, Pane AH, Mustika SE, Wardhani K. Relationship between sleep quality and menstrual cycle among female medical students at UISU in 2021. *J Kedokt STM.* 2022;5(2):101-108. doi:10.30743/stm.v5i2.319