

# Sleep Quality and Primary Headache in the Medical Students of Faculty of Medicine Universitas Airlangga: Does it Correlate?

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## ABSTRACT

**Introduction:** Primary headache is the most common neurological complaint found in the neurology department. In Indonesia, the prevalence of primary headaches reaches 90%. The causes or risk factors for primary headaches are quite complex. Therefore, this study examines one of the risk factors, namely sleep quality. The aim of this study is to determine the relationship between sleep quality and primary headaches in medical students of Universitas Airlangga, class of 2021-2022. **Method:** This cross-sectional study involved 107 respondents consisting of medical students from Universitas Airlangga, class of 2021-2022. The research data were collected through questionnaires, which included the Pittsburgh Sleep Quality Index (PSQI) and the Headache Intake Questionnaire (HIQ). From these questionnaires, sleep quality scores and the occurrence of primary headaches can be measured. **Results:** The study included 107 respondents, comprising 56 males and 51 females. The majority were 20 years old, with 54 respondents from the 2021 cohort and 53 from the 2022 cohort. Overall, 92 respondents had poor sleep quality, while 15 had good sleep quality. Regarding headaches, 49 respondents experienced primary headaches, including 25 with Tension-Type Headaches (TTH) and 24 with migraines; 58 respondents did not experience headaches. The main trigger factor for headaches among respondents was stress. Of the 49 respondents with headaches, 18 consumed NSAIDs. There was a significant relationship between sleep quality and primary headaches ( $P < 0.007$ ). **Conclusion:** Sleep quality correlates with how the incidence of primary headaches occurs.

**Keywords:** sleep quality; primary headache; migraine; tension-type headache; observational study.

## INTRODUCTION

In terms of neurologic complaints, headache is one of the most common symptoms that is easily discovered. WHO in the year 2021 stated that almost 40% of the people in the world, or 3.1 billion people suffer from headaches. According to the Indonesian Neurologic Association, the prevalence of headaches in Indonesia has reached around 90% [1]. Headache could be classified into two different groups based on its cause, Primary headache which is 90% of the headache incident, and Secondary headache that only responsible for 10% of it [2]. The average primary headache was more seen in children and adolescents, with teenager leads based on a study by Albers in 2015 [3].

The current knowledge has not figured how the mechanism behind the occurrence of primary headaches. However, some factors that certainly affect this disease are sex, lifestyle, stress, anxiety, smoking, and sleep quality [4]. A study conducted in Samsung Medical Center, Seoul, revealed bad sleep quality in patients associated with a higher percentage of primary headaches, therefore sleep quality was confirmed as one of the risk factors [5].

Based on the international classification of Headache Disorders (ICHD), primary headaches could be classified into migraine, tension-type headache (TTH), and trigeminal autonomic cephalgia [6,7]. Migraine, one of the well-known primary headaches is correlated with the patient's sleep routine. The lower the quality of sleep influences the occurrence of migraine [8,9]. The term sleep quality is used to describe the level of sleep and the recovery afterward, which one of the main evaluations is the capability to stay awake and sober during activity throughout the day [10]. A university student is a part of the adolescent group that is productive and active in various academic and non-academic activities. Around the age of 17-19 years old student, the primary cause of sleep deprivation was a heavy academic schedule and non-academic schedule that leads to decreased sleep quality [11]. Medical students, in particular, belong to a group with a heavily demanding academic schedule, with one study conducted in India showing that the prevalence of primary headache is 80% in medical students [12]. Therefore, the purpose of this study is to investigate the sleep quality, occurrence of primary headaches, and the correlation between

those two in medical students.

## METHODS

### Samples

An observational and quantitative study with a cross-sectional design was conducted using a questionnaire in the preclinical medical students of the faculty of medicine, Universitas Airlangga. The sample that was included in this study followed the predetermined criteria. For the inclusion criteria; 1) Medical students of Universitas Airlangga with/have a history of primary headache, 2) Agreed to the informed consent as a subject for this research. For the exclusion criteria; 1) Medical students who consume analgesics, 2) medical students that is also a part-time worker, and 3) medical students who consume caffeine routinely. The sample was taken using quota sampling methods utilizing Google Forms. The determination of the sample needed for this study was based on a thesis by Aladita in 2017 [13].

### Assessment of Sleep quality and Headache occurrence

The questionnaire used to assess sleep quality is the Pittsburgh Sleep Quality Index (PSQI) and as for the primary headache, the Headache Intake Questionnaire is used. PSQI is filled with 7 components and a total of 19 questions about the sleep habit for the last month. The quality of sleep based on PSQI interpretation is using range 0 – 21,

which the higher the score the lower the sleep quality. For the Headache Intake Questionnaire, the shortened version is used in this study with a total of 14 questions. The participants will fill out the Google form containing both the questionnaire. Firstly, the participant filled the PSQI and afterward filled the HIQ if the participant suffered from a primary headache in the past three months. If the participant did not have a history of primary headache in the past three months then HIQ is not filled. All the data will be collected in Microsoft Excel.

### Analysis Statistics

Analysis of the data involved the IBM Statistical Package for the Social Sciences (SPSS) 26. The analysis test used is the chi-square test to determine the relationship between sleep quality and headache with a 95% confidence interval and  $p < 0.05$  for the significance of the result.

## RESULTS

### Sample Characteristics

A total of 107 participants filled the questionnaire 54 of them from the 2021 batch and 53 from the 2022 batch. The Characteristics of the participants are displayed in Table 1. Based on the participant's ages, the range is from 18 to 22 years old with 43% of the samples being 20 years old. For the distribution of the sex, 56 samples were male (52,34%) and 51 samples were female (47,66%).

**TABLE 1:** OD of Positive and negative control group.

Participant characteristics (n = 107)	n	%
<b>Age</b>		
18 years old	3	2.80
19 years old	12	11.21
20 years old	47	43.93
21 years old	33	30.84
22 years old	12	11.21
<b>Sex</b>		
Male	56	52.34
Female	51	47.66
<b>Batch</b>		
2021	54	50.47
2022	53	49.53

### Distribution of sleep quality and headache in the participant

Based on the PSQI questionnaire, from 107 respondents, a total of 92 (85.98%) medical students have a bad sleep quality, and only 15 (14.02%) have a good sleep quality. For the headache, in the HIQ participants will need to fill in the intensity, location, frequency, and many more questions regarding the primary headache of the patients. Results showed that 49 of the samples had a history of headaches in

the past three months and 58 did not. TTH (51%) has a one-response lead compared to migraine (48.98%). The result is portrayed in Table 2. The HIQ also revealed the factors that affect the occurrence of primary headaches. All the factors are displayed in Table 3. Stress is the factor found within most of the respondents (87.75%). Some other factors that lead to the primary headache were, disturbed sleep quality, tired from work, period cycle, and bright light.

**TABLE 2:** Sleep quality and headache profile in the participant.

Participant characteristics (n = 107)	n	%
<b>Sleep Quality</b>		
Good sleep quality	15	14.02
Bad sleep quality	92	85.98
<b>Headache Occurrence</b>		
No primary headache	58	54.21
Primary headache	49	45.79
<b>Primary Headache (n = 49)</b>		
Tension-Type Headache	25	51.02
Migraine	24	48.98

**TABLE 3:** Factors triggering the occurrence of primary headache.

Factors triggering Headache	n	%
Stress	43	87.75
Disturbed sleep quality	36	73.47
Tiring work	35	71.43
Period cycle	16	32.65
Bright light	10	20.41
Pungent smell	3	6.12
Alcohol	1	2.04
Drugs	1	2.04
Dehydration	1	2.04
Gadget usage	1	2.04
Spontaneous	1	2.04
Starving	1	2.04

**TABLE 4:** Correlation of sleep quality and primary headache.

	Primary Headache Occurrence		Total	
	No Primary Headache	Primary Headache		
Sleep Quality	Bad sleep Quality	43	46	89
	Good Sleep Quality	15	3	18
Total		58	49	107

Sleep Quality and Primary Headache Correlation The analysis is displayed in Table 4. Of 58 participants who did not have any primary headache, 43 participants had bad sleep quality, and 15 of them had good sleep quality. As for the participants with primary headaches, 46 out of 49 participants possess a bad sleep quality. Based on the chi-square test, the occurrence of primary headache with bad sleep quality is correlated significantly ( $p = 0,007$ ).

**DISCUSSION**

**Main findings**

The main finding of this study is that sleep was correlated independently with the occurrence of primary headaches, especially TTH and migraine in medical students. A few factors that need to be considered are stress, disturbed sleep quality, and tiring work/heavy activities. Medical students have a heavy academic schedule with a non-academic schedule that leads to the factors triggering the occurrence of headaches [14].

**Sleep quality of medical students**

This study uses PSQI to help determine the sleep quality of the participants, and the result showed that 85% of the participants possess a bad sleep quality. This study aligns with research conducted in Indonesia that showed a result of bad sleep quality in 55% of the students who participated in the research [15]. One of the few reasons behind bad sleep quality in students is the activity during the day, and the result of bad sleep quality itself is decreased performance in activity [16].

The role of sleep quality could affect the student's academic stress condition, and the concern of being a medical student is the intensity of the academic schedule [17]. The demanding schedule leads to reduced sleep quality, a vicious cycle. This was also proven in a study by Stefanie and Enny on the medical students of Universitas Tarumanegara, a total of 144 students (73.1%) have bad sleep quality [18].

A study by Landa et al (19), also supports the theory that the duration and studying intensity of a medical student leads to worsening of sleep quality.

### Headache on Medical Students

The result of this study revealed that almost 50% of the participants had a history of headaches in the past 3 months. Out of 49 samples, 25 have TTH symptoms and migraine on the other 24. This is commonly known that TTH is more frequently seen compared to the other types of headache [20]. A study by Wijaya et al in 2019 [21] supports the results of this study where the occurrence of TTH in medical students is considered high (104 out of 244 participants). However, A study conducted by Farizy and Graharti in Lampung, showed that 13 out of 65 participants were university students who had migraine [15].

### The correlation between sleep quality and primary headache

This study revealed that there is a statistically significant correlation between bad sleep quality with the incidence of primary headaches in medical students. Landa et al [19] supported the theory about how worse sleep quality is one of the factors triggering a headache. Sleep is one of the most important parts of a human daily life, not only to rest our tired minds but the overall body needs to recover with the help of sleep [22]. Therefore, the lack of sleep quality could lead to primary headaches such as migraine [15]. Sleep quality leads to a major risk factor triggering migraine [23]. Nevertheless, sleep quality could not only correlate with the occurrence of primary headaches, it could even worsen the migraine severity [24]. Other than that, another study mentioned that the inability to relax and lack of sleep leads to the development of TTH [25,26].

Tension-type headache is often associated with many things such as strenuous activity, tiredness, and lack of sleep [27]. A lifestyle that leads to a bad sleep schedule and quality would lead to the individual's experience of headaches. Oh et al [28], stated that most people with headaches have a bad sleep habit that is caused by high levels of activity. However, a study conducted by Habel et al [4] on Civilians, showed a different result from this study with no correlation between sleep quality and headache. Regarding good sleep quality, the result of this study aligns with one study where the incidence of headaches is really low compared to those with bad sleep quality [19].

The condition of bad sleep quality and headache is like a vicious cycle, where sleep quality could affect headache, and headache leads to a worsened sleep quality [5]. A theory that supports poor sleep quality leads to headaches are the decreasing psychological, and cognitive functions, and even neuroendocrine stress response system in the state of bad sleep quality leads to impaired daytime function [5,29]. Furthermore, lack of sleep not only has a direct effect on headaches but also an indirect. Sleep deprivation was associated with hyperexcitability of the brain which makes the brain more prone to migraine attacks [30,31].

### CONCLUSION

There is a statistically significant correlation between the condition of sleep quality with primary headache occurrence in medical students of Universitas Airlangga. Out of 107 participants, 49 suffer from headaches with TTH responsible for 25 of the participants and migraine for 24. It is hoped that this research will provide new insights, contribute additional information, and serve as a reference regarding the relationship between sleep quality and the occurrence of primary headaches, especially among medical students.

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### ETHICAL CLEARANCE

The ethical procedure of this study has already been agreed upon by the Health Research Ethics Committee in the faculty of medicine, Universitas Airlangga, Surabaya, Indonesia, with approval number 67/EC/KEPK/FKUA/2024.

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