



# Prevalence and Trigger Factors of Primary Headache Among Medical Students in Jenderal Achmad Yani University Batch 2018 During Online Learning

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**Abstract.** Primary headache is the most common complaint in general population. Several epidemiological studies show the high prevalence of primary headache in medical students due to the large number of stressors both psychologically and physically. This study aims to determine the prevalence of primary headaches in medical students at Jenderal Achmad Yani University batch 2018, and to determine the relationship between the use of electronic media, psychological factors, and sleep patterns with the incidence of primary headaches. Observational analytic study of primary headache based on questionnaire adapted to the PERDOSSI 2018 headache diagnostic criteria. The assessment of the factors that influence headache was obtained from DASS 21 questionnaire, PSQI, and several parameters related to the use of electronic media such as duration of computer usage, position of the monitor, and the presence of refractive errors. Bivariate data analysis was done using Chi-square test. Multivariate analysis was done using Binary Logistics Regression test. There were 100 respondents consisting of 37 male respondents and 63 female. Migraine headache percentage is 23%, Tension-type headache 27%, Cluster headache 2%, and unspecified headache 20%. There is no significant correlation between psychological factors and sleep quality with headaches. Significant correlation was found between refractive errors on electronic media users with the incidence of primary headaches. It can be concluded that there is significant correlation between refractory error on electronic media users with the incidence of primary headaches, but not with psychological factor and sleep disorders.

**Keywords:** Medical students · Electronic media user · Primary headache

## 1 Introduction

Headache is a pain in the region above the orbitomeatal line [1]. The International Headache Society classified headaches into three categories: (1) The primary headaches,

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(2) Secondary headaches, and (3) Neuropathies & Facial pains and other headaches. About 90% people who come to primary healthcare with headache complaints have a primary headache disorder and the remaining 10% are secondary headaches [2, 3].

Headache is the most common complaints among medical students [4–6]. Several epidemiological studies from various countries have shown a high prevalence of primary headache in the medical student population (53–86%). Tension-type headache (41–76%) and migraine (7–48%) were the most common types of headache experienced by medical students [4, 6–8].

Psychological factors include depression, stress, and anxiety that may precipitate the primary headaches [9]. Due to a decrease in several hormones, including serotonin and norepinephrine, which also have a role in pain mechanisms [10]. Lack of sleep was the second most common precipitating factors of headache among medical students. The abundance of subjects needed to be mastered ahead of exams and the demands to do homework that have tight deadlines is the main cause of lack of sleep in medical students, especially during this online learning method, due to the Covid-19 pandemic, students are required to be active independently to achieve the expected learning goals. This causes the study time required to be more than when academic activities are carried out offline [9].

Computers and laptops have become an important tools for the support of university students to carry out academic activities during this online learning method due to pandemic Covid-19. Academic activities last about 400 min a day in medical faculty of Jenderal Achmad Yani University. This means students stare at their computer or laptop screens for about six hours per day. Several studies have shown that using a computer for more than three hours is at risk of causing Computer Vision Syndrome (CVS) where one of the symptoms is a headache [11–14]. A study of medical students in China showed a significant relationship between online learning during the lockdown and the incidence of CVS [15].

Students are a very important population to study in these cases because the prevalence of headaches that occur in students will continue to increase along with academic improvement and stress levels [16]. Students who suffer from headaches are frequently mistreated. Usually only consume over-the-counter medicines, and do not try to seek treatment from health services [8]. The onset of headaches has become a common reason for people to immediately take analgesic drugs that can be obtained without the need for a doctor's prescription. It should be noted that frequent and excessive use of analgesics will cause hepatotoxicity (toxic to the liver), dependence, withdrawal syndrome, headaches due to excessive drug consumption, and so on [17].

Considering this background, we would like to determine the prevalence of headaches among medical students of Jenderal Achmad Yani University and determine the relationship between the use of electronic media, psychological factors, and sleep patterns with the incidence of primary headaches. In Indonesia, the research that identifies the incidence and risk factors of primary headaches in college students, especially medical students still limited.

## 2 Methods

### 2.1 Participants and Procedure

Our study was an observational analytic study involving medical students of Jenderal Achmad Yani University batch 2018. We aim to determine the prevalence of primary headaches in medical students at Jenderal Achmad Yani University batch 2018, and to determine the relationship between the use of electronic media, psychological factors, and sleep patterns with the incidence of primary headaches. The determination of the sample size was carried out using the sample size formula for multiple logistic regression, namely the researcher's rule of thumb with corrections, so that  $n = 100$  was obtained. Participants filled out the informed consent and questionnaire via the google form link. Our study received permission from the Padjadjaran University Research Ethics Committee on 9<sup>th</sup> November 2021, with letter number 951/UN6.KEP/EC/2021. The ethical submission is carried out in order to maintain the ethics and confidentiality of the respondents. Primary data was collected in September 2021. The data taken as inclusion criteria was medical students of Jenderal Achmad Yani University batch 2018 who are willing to participate in this research by agreeing to the informed consent and filling out the questionnaire. Researcher excluded participants with experiencing headaches related to a history of head and/or neck trauma or injury, cranial or cervical vascular disorder, non-vascular intracranial disorder, drug use or withdrawal, infections, homeostatic disorders, disorders of the eyes, ears, nose, sinuses, teeth, facial or cervical structures, and psychiatric disorders (somatization and psychotic).

### 2.2 Measures

The assessment of primary headache was obtained with the questionnaire adapted to the PERDOSSI 2018 headache diagnostic criteria. For the measurement of depression, anxiety, and stress disorder the Depression Anxiety Stress Scale (DASS 21) questionnaire were used. Sleep quality was evaluated with *Pittsburgh Sleep Quality Index* (PSQI) questionnaire. To assess the relationship between the use of electronic media and the incidence of primary headaches, several parameters related to the use of electronic media such as duration of computer usage, position of the monitor, and the presence of refractive errors were assessed. Those who answered "yes" to the question: "Do you wear glasses or contact lenses when you're using a computer or other electronic device?" will be characterized with a refractive error.

### 2.3 Statistics

To determine the prevalence of primary headaches in medical students at Jenderal Achmad Yani University batch 2018, the data were run through univariate analysis, and continue to bivariate analysis using Chi-square test to determine the relationship between the duration of computer usage, glasses and contact lenses usage, monitor position, sleep quality, depression anxiety stress scale (independent variables) with the incidence of primary headaches (dependent variable). Independent variables with *p-value*  $< 0,25$  in bivariate analysis result, continue to multivariate analysis with *Regression*

*Binary Logistic* test to find out which factors most influence the occurrence of primary headaches.

### 3 Results and Discussion

Our study consists 37 (37%) male student subjects and 63 (63%) female student subjects. The average age of the respondents was 21 years. The detailed characteristics of the sample are shown in Tables 1 and 2.

From 100 respondent which are included on inclusion data, there are 52 respondent (52%) that experience primary headache with TTH being the most prevalent. This study was in accordance with a study conducted among medical students in Saudi Arabia. The most prevalent primary headache in their studies was TTH (41.66%). Detailed distribution of primary headaches among medical student of Jenderal Achmad Yani University batch 2018 are shown in Table 3.

Bivariate analysis results between the use of electronic media, psychological factors, and sleep patterns with the incidence of primary headaches was done using Chi-square test. To assess the relationship between the use of electronic media and the incidence of primary headaches, three parameters were assessed: (1) physical factors that might have an effect such as refractive errors seen from the history of using glasses and contact

**Table 1.** Ages range of the sample

	Mean	Median	SD	Min-Max	95% CI
Age of the sample	21.14	21.00	0.69	19–23	21.00–21.28

**Table 2.** Sex distribution of the sample

Gender	Total	Percentage
Male	37	37%
Female	63	63%

**Table 3.** Primary headache prevalence

Types of headache	Total	Percentage
TTH	27	27%
Migraine	23	23%
Cluster headache	2	2%
Unspecified headache	20	20%
Not experienced the primary headache	28	28%

**Table 4.** Chi-square test result

Variables	Primary headache		p-value
	Yes N = 72	No N = 28	
Glasses and contact lens usage			<b>0.014*</b>
Yes	44(61.1%)	9(32.1%)	
No	28(38.9%)	19(67.9%)	
Duration of computer usage			1.000
>3 h/day	70(97.2%)	27(96.4%)	
<3 h/day	2(2.8%)	1(3.6%)	
Position of the monitor is at eye lever			0.084
No	56(77.8%)	17(60.7%)	
Yes	16(22.2%)	11(39.3%)	
Psychological factors			0.095
With psychological factors	31(43.1%)	7(25.0%)	
Without psychological factors	41(56.9%)	21(75.0%)	
Sleep Quality			0.427
Poor	32(44.4%)	10(35.7%)	
Good	40(55.6%)	18(64.3%)	

lenses, (2) duration of electronic media use, and (3) monitor position. Detailed of the results of bivariate analysis are shown in Table 4.

Table 4 shows a relationship between refractive errors on electronic media users with the incidence of primary headaches ( $p = 0.014$ ). One of the eye problems that can be addressed with glasses or contact lenses is refractive error. Myopia is the most prevalent refractive defect, especially among adolescents. People with myopia do not have the mechanism to focus the images from far away object on the retina clearly. When the item is kept close to the eye, the parasympathetic nervous system regulates an accommodation process that causes the ciliary muscle to contract, allowing the picture to be focused. People with refractive problems who are not appropriately corrected are more likely to experience eyestrain on their eyes. A headache and pain behind the eyes are caused by the continuous tightening of tiny muscles. The use of contact lenses also can increase the risk of CVS, as the thickness of the tear film layer in the eyes of contact lens wearers changes, making the eyes dry more quickly [18].

This result was in accordance Vikanaswari *et al.* studies who's stated that there was a relationship between glasses wearers who had refractive errors and the incidence of CVS [19]. Individuals who have refractive errors and are not properly corrected can increase the risk of fatigue or eye strain, this can also trigger headaches. Sihombing *et al.* reported there were 30 students in Sumatera Utara (35.7%) who experienced a decrease in vision due to refractive errors during online lectures during the Covid-19 Pandemic [20].

In our result, there is no significant correlation between duration of computer usage with the incidence of primary headaches ( $p = 1.000$ ). Different from Li *et al.* study who's stated that there was a relationship between duration of computer usage with the incidence of primary headaches especially TTH. There are differences in the groups of subjects studied wherein the study of Li *et al.* identified IT employees where the majority of them were in front of a laptop or computer monitor for more than 8 h [21]. American Optometric Association recommends following the 20–20–20 rules to alleviate digital eyestrain, which is every 20 min staring at the monitor screen, we should rest our eyes for 20 s by looking at something 20 feet away [22]. When the online lecture was in progress, several lecturers gave us a break for about 5–10 min in the middle of giving the material, and there was a time lag when changing lectures. This study did not identify the respondent's time off from using electronic media. There is a possibility that this causes some respondents to answer no headaches even though the duration of using electronic media is more than 3 h and obtained a comparison that is not statistically significant.

There is no significant correlation between position of the monitor with the incidence of primary headaches ( $p = 0.084$ ). The difference may be due to the monitor's position being more related to TTH, not to other primary headaches types. The presence of prolonged neck muscle contractions causes central sensitization that affects peripheral regulation and mechanisms, which then causes an increase in pericranial muscle activity and triggers the release of neurotransmitters that cause tension-type headaches or TTH [23].

In this result, there is no significant correlation between psychological factors with the incidence of primary headaches ( $p = 0.095$ ). Fauziyyah *et al.* stated that stress, anxiety, and depression levels during a pandemic depend on their ability to adapt [24]. The average students in college are live far from their families. In addition, there are unfamiliar environmental conditions. The differences food, people around, and live accommodations may create a stressful environment [25]. During this Covid-19 pandemic, students can return to their families and live together so that stress, depression, and anxiety levels are possible decreased.

This studies also shows no significant correlation between sleep quality with the incidence of primary headaches ( $p = 0.427$ ). In research results by Wright *et al.* about student sleep during the COVID-19 pandemic, it was found that there was an increase in sleep time for students during the COVID-19 pandemic because students tended to be less assertive about the time when they stay at home [26]. It is possible to make the results of the questionnaire assessment that some of the participants have good sleep quality.

## 4 Conclusion

It can be concluded that TTH is the most prevalent primary headache (27%) among medical students in Jenderal Achmad Yani University batch 2018 and there is significant correlation between refractory error on electronic media users with the incidence of primary headaches, but not with psychological factor and sleep disorders.

The main strength of our study, no previous research on the prevalence and triggering factors for primary headaches among medical students during online learning

methods due to the Covid-19 pandemic has ever been conducted. Our study also has several limitations. First, the primary headache was not examined and diagnosed by Neurologist, so it could be overdiagnosed or underdiagnosed. Second, the questions in the questionnaire may not be specific enough to make a diagnosis of primary headache therefore some subjects are classified as having unspecified headaches. Third, due to Covid-19 pandemic, this research was only conducted using a questionnaire instrument distributed via google form, while to make a diagnosis we have to do anamnesis and physical examination first. Fourth, Research respondents may not be honest in answering questions from researchers. Fifth, there are other factors not studied that can trigger headaches such as cigarette smoke, skipping meals, weather changes, etc. Studies on larger sample are suggested.

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