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Clinical Characteristic of Headache among Medical Students Experienced Online Learning in University during the Pandemic

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ABSTRACT

Introduction: The lecture used online learning as an alternative method for minimizing the spreading covid-19 during pandemic. Headache is one of the very popular complaints during the medical education process, and it happens owing many physical or psychological stressors. It reported more common in medical students, notably during this online learning methods. This study aimed to evaluate the clinical characteristics of headaches and associated factors among medical students during online learning.
Methods: A cross-sectional study was conducted at the University of Muhammadiyah Makassar from November 2021 to May 2022. A total of 220 medical students who have experienced forms of headache and had headache attacks during the past 1 years were included in this study. Respondents filled out a structured questionnaire, which consisted of demographic data, associated factors during online learning, and headache characteristics. Chi-square test was used to test the difference in proportion. All statistical test were considered as significant if p-value <0.05. The data obtained was processed using SPSS 23.
Results: Body posture during online learning and lecture duration had a significant relationship with headaches' location, duration, and frequency (p-value < 0.05). Body posture during online learning, duration of lectures, and frequency of lectures significantly correlate with activity exacerbated headaches (p-value < 0.05). Body posture also significantly correlates with headache severity (p-value < 0.05).
Conclusions: According to the results, medical students who are experiencing online learning during the pandemic are showing a high incidence of clinical characteristics associated with headaches.

Keywords: headache; online learning; medical students

INTRODUCTION

The emergence of COVID-19 led to the implementation of online learning methods in most higher education institutions in the whole world. This method was done to diminish the spread of the virus. Online learning is a solution for face-to-face lecture activities to minimize crowds as a fundamental step in adopting health protocols[1]. The most commonly used techniques include real-time online video lectures, using Zoom, Google Meeting, or others, with interactive discussions and using various self-study applications with recorded lectures using Moodle or other platforms built for medical students[1,2].

There were a number of important considerations for the research because it has been reported following health problems experienced in online learning. Evidence from other previous study suggests that the most common health problems that students and teacher experienced during online learning were eye pain, headache, and backpain[3]. Headache was the second most common health problem. The

results of the prior study add to the evidence that excessive Personal Computer (PC) uses increased the incidence of headaches in the IT staff population in China. It is suspected that the correlation between computer use and headaches is triggered by the duration of PC use, and electromagnetic radiation produced by computers and cell phones. It was also associated with the existence of depression or anxiety that follows the incidence of headaches[4]. In our faculty, teaching, and learning were also shifted to online methods. Synchronous sessions such as lectures and tutorial discussions are conducted using the Zoom meeting application. It made our students to used computers more often for studying and increased their chance of having headache problems. It should be noted that previous studies have indicated the prevalence of headaches among medical students[5,6]. A recent study in Nepali Universities reported various health problems experienced in online learning, such as headaches, back pain, neck pain, eye pain, and anxiety[3]. We aimed to expand on the results of a previous study by describing the clinical characteristics of headaches with associated factors among medical students during online learning that have not been studied before.

METHODS

Study Design

A cross-sectional study was conducted on medical students at the Faculty of Medicine and Health Sciences, University of Muhammadiyah Makassar, Indonesia. The study was carried out from November 2021 to May 2022.

Subjects

A total of 220 students participated in this study. Systematic random sampling was applied to select the respondents from among medical students in our faculty. The eligible criteria for students to be included in the study were students registered and enrolled in the current semester, experienced online learning during courses in one semester, and experienced a history of headaches in the preceding year. We exclude students with minimum course participation of less than 80%.

Measurement and Statistical Analysis

Data about students' demographics, characteristics of headaches, and information regarding online learning were collected with a questionnaire. Headache characteristics included the following items: attack duration, pain quality, pain site, activity exacerbated, and severity of pain using a visual analog scale (VAS) score. Online learning describes by its duration per day, frequency per week, and body position during online learning. All categorical data, such as gender, age group, duration of online learning per day, frequency of online learning per week, position during online learning, and characteristic of headache, were presented in numbers and percentages. Chi-square test was used to test the difference in the proportion of duration of online learning per day, frequency of online learning per week, and position during online learning between the characteristic of headache. All statistical test were treated as significant if p-value <0.05. The data attained was processed using SPSS 23 (IBM Corporation, New York, USA) for Macbook.

Ethical Approval

This study protocol was approved by the Health Medical Research Ethics Committee of the Faculty of Medicine and Health Science, University of Muhammadiyah Makassar (Makassar, Indonesia) with registration number 058/UM.PKE/IX/43/2021 on November 3, 2021.

RESULTS

Among 220 participants who had included in the study due a history of a headache in the preceding year, consist of 60 males (27.3%) and 160 females (72.7%). Most of the participants were in < 20 years

old group (87.3%). Based on the results, we make the following observation that duration of online learning were mostly happens ≥ 8 hours per day (43.6), with frequency ≥ 5 times per week (54.5%). Most of the students were sitting up straight while following an online lecture (69.1%). Results are presented in Table 1, clearly indicates that students were experienced more times in front of their gadgets during this learning process.

Table 1. Respondent's Characteristics

Variables	Total (n=220) Frequency (%)
Gender	
Male	60 (27.3)
Female	160 (72.7)
Age groups	
< 20 years old	192 (87.3)
≥ 20 years old	28 (12/7)
Duration of online learning	
< 5 hours/day	84 (38.2)
5 – 8 hours/day	40 (18.2)
≥ 8 hours/day	96 (43.6)
Frequency of online learning	
< 2 times/week	36 (16.4)
2 – 5 times / week	64 (29.1)
≥ 5 times / week	120 (54.5)
Position during online learning (body posture)	
Sitting up straight	152 (69.1)
Leaning back	26 (11.8)
Sitting bent	42 (19.1)

According to the Chi-square test, there was statistical difference between the pain location and duration of online learning (p-value 0.00). Localized location of headache was more commonly found (32%). Our findings provide evidence that there was statistical difference between duration of headache and duration of online learning (p-value 0.04), with most headache was experienced less than 4 hours (60%). Exertional headache that occur due physical activity was found to have correlation with duration (p-value 0.00), frequency (p-value 0.00), and body position during online learning (p-value 0.00). These findings demonstrate that muscle tension from incorrect body posture for a period of time can cause headache. Body position during online learning was significantly associated with the severity of headache p-value 0.00). The majority of pain severity was found to be mild (38%) (Table 2-4).

DISCUSSION

Headache is described as an uncomfortable sensation pleasant felt from the area of the head to the neck that can be damaged by something harmful or has the potential to damage structural parts[7]. It is one of the conditions impacting the nervous system, and numerous types consist of primary or secondary headaches[8]. The prevalence of headache in our study was consist of 27.3% males dan 72.7% females (Table 1). These findings are consistent with most studies. Primary headache has been reported to be commonly found in females than in males[6,9]. The consequences of this are defined that headache is one of the very popular complaints on medical students, possibly due to many physical and psychological stressors. A large body of evidence reported that medical students have shown high prevalence of headache[5,10,11]. Our study found that most of the students were attending online class more than 8 hours per day (Table 1).

Table 2. Prevalence of different characteristic of headache according to duration of online learning

Variables	Total (n =220)	Duration of online learning (Frequency (%))			
	Frequency (%)	< 5 hours/day (n = 84)	5 – 8 hours/day (n = 40)	≥ 8 hours/day (n = 96)	p-value*
Headache location					
Bilateral	50 (23)	14 (17)	12 (30)	24 (25)	
Unilateral	53 (24)	15 (18)	14 (35)	24 (25)	0.00
Facial	46 (21)	19 (23)	7 (18)	20 (21)	
Localized	71 (32)	36 (43)	7 (18)	28 (29)	
Quality of pain					
Pulsating/throbbing	90 (41)	32 (38)	18 (45)	40 (42)	0.70
Pressing/tightening	66 (30)	24 (29)	10 (25)	32 (33)	
Stabbing/burning	64 (29)	28 (33)	12 (30)	24 (25)	
Duration of headache					
< 4 hours	133 (60)	58 (69)	28 (70)	47 (49)	0.04
4 – 24 hours	55 (25)	18 (21)	7 (18)	30 (31)	
> 24 hours	32 (15)	8 (10)	5 (13)	19 (20)	
Activity exacerbated					
Yes	113 (51)	30 (36)	23 (58)	60 (63)	0.00
No	107 (49)	49 (58)	17 (43)	43 (45)	
Severity of pain					
Mild (Scale 1-3)	94 (43)	38 (45)	13 (33)	43 (45)	
Moderate (Scale 4-6)	77 (35)	23 (27)	16 (40)	38 (40)	0.62
Severe (Scale> 6)	49 (22)	23 (27)	11 (28)	15 (16)	

Table 3. Prevalence of different characteristic of headache according to frequency of online learning per weeks

Variables	Total (n =220)	Frequency of online learning per weeks (Frequency (%))			p-value*
	Frequency (%)	< 3 times/week (n = 36)	3 – 5 times/week (n = 64)	≥ 5 times/week (n = 120)	
Headache location					
Bilateral	50 (23)	8 (22)	12 (19)	30 (25)	
Unilateral	53 (24)	6 (17)	21 (33)	26 (22)	0.13
Facial	53 (24)	14 (3)	15 (23)	24 (20)	
Localized	64 (29)	8 (22)	16 (25)	40 (33)	
Quality of pain					
Pulsating/throbbing	90 (41)	12 (33)	22 (34)	56 (47)	0.31
Pressing/tightening	66 (30)	11 (31)	24 (38)	31 (26)	
Stabbing/burning	64 29)	13 (36)	18 (28)	33 (28)	
Duration of headache					
< 4 hours	133 (60)	21 (58)	40 (63)	72 (60)	0.20
4 – 24 hours	55 (25)	11 (31)	19 (30)	25 (21)	
> 24 hours	32 (15)	4 (11)	5 (8)	23 (19)	
Activity exacerbated					
Yes	113 (51)	13 (36)	37 (58)	63 (53)	0.00
No	107(49)	23 (64)	27 (42)	57 (48)	
Severity of pain					
Mild (Scale 1-3)	84 (38)	19 (53)	21 (33)	44 (37)	
Moderate (Scale 4-6)	77 (35)	8 (22)	24 (38)	45 (38)	0.21
Severe (Scale> 6)	59 (27)	9 (25)	19 (30)	31 (26)	

Table 4. Prevalence of different characteristic of headache according to body position while doing online learning

Variables	Total (n =220) Frequency (%)	Body position (Frequency (%))			p-value*
		Sitting up straight (n = 152)	Lying down (n = 26)	Sitting bent (n = 42)	
Headache location					
Bilateral	53 (24)	41 (27)	3 (12)	9 (21)	
Unilateral	53 (24)	38 (25)	3 (12)	12 (29)	0.00
Facial	53 (24)	37 (24)	7 (27)	9 (21)	
Localized	61 (28)	36 (24)	13 (50)	12 (29)	
Quality of pain					
Pulsating/throbbing	90 (41)	65 (43)	10 (38)	15 (36)	0.93
Pressing/tightening	66 (30)	45 (30)	8 (31)	13 (31)	
Stabbing/burning	64 (29)	42(28)	8 (31)	14 (33)	
Duration of headache					
< 4 hours	133 (60)	102 (67)	9 (35)	22 (52)	0.00
4 – 24 hours	55 (25)	36 (24)	8 (30)	11 (26)	
> 24 hours	32 (15)	14 (9)	9 (35)	9 (21)	
Activity exacerbated					
Yes	104 (47)	82 (54)	9 (35)	13 (31)	0.00
No	116 (53)	70 (46)	17 (65)	29 (69)	
Severity of pain					
Mild (Scale 1-3)	84 (38)	53 (35)	19 (73)	12 (29)	0.00
Moderate (Scale 4-6)	77 (35)	53 (35)	4 (15)	20 (48)	
Severe (Scale> 6)	59 (27)	46 (30)	3 (12)	10 (24)	

Most of our learning methods used scheduled real-time video lectures with Zoom, allowing interactive discussions among students and lecturers. Demonstrated videos were another method that we used in response to teaching clinical skills. A recent study concluded that there was an increasing duration of digital device use during the Covid-19 pandemic than pre-Covid era[12]. Other prior studies have shown that screen time in front PC or laptop may interact with the mechanism of headaches and migraine. A migraine attack can be triggered by screen band light frequency and brightness[13].

Our findings indicated that duration, frequency, and body position during online learning was significancy associated with headache (Table 2-4). This relationship was further supported in a recent study, which showed that electromagnetic radiation from computers has become a problem and creating concern for health. There is much evidence regarding the association between computer use and headache[14-16]. According to the Fadel Communication Commission (FCC), the value of the Specific Absorption (SAR) of the Smartphone is still categorized as safe because it is still below < 2.0 watts/kg. According to the World Health Organization (WHO), the impact of high-voltage electromagnetic waves from smartphones is not harmful as long as the light is small. Furthermore, other factors can affect this, namely the distance when using a Smartphone. It was also explained that a safe distance when using smartphones is approximately 20 cm[17].

The most common position during online learning was sitting up straight (69.1%) (Table 1), and body position had a significant association with the severity of headaches (Table 4). Participants in this study experienced headaches due to the duration and poor posture. The straight position of the head that remained too long while studying online might cause headaches. Neck muscles have an essential role in the pathogenesis of headaches. Excessive contraction or tension of the neck and head muscles causes nociceptive input resulting in central sensitization that affects peripheral regulation and mechanisms. This causes an increase in pericranial muscle activity, which then triggers the release of neurotransmitters that cause headaches[18]. Prolonged contraction of cranial muscles causes vasoconstriction of blood vessels so that blood flow is reduced, resulting in obstruction of oxygen

distribution and accumulation of metabolic products, which ultimately causes pain[19]. The more time we spend in front of the screen, it can affect our eyes. It was previously reported in the prior study that the constant accommodation of the eye and extraocular muscles must endure over a long period strains muscles and tires the eyes, leading to headaches[20].

CONCLUSION

Our study concluded that many medical students who are participating in online learning during the pandemic are experiencing frequent headaches. This suggests that headaches are a common clinical characteristic among this group. Characteristics of headaches were associated with many factors during online learning, including duration, frequency, and body position during online learning. Students who sit for long periods staring at computer screens are at high risk of developing headaches.

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CONFLICT OF INTEREST

The authors reported no potential competing interests

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