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Stress Levels Determine Migraine Incidence in Medical Students of Duta Wacana Christian University

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ABSTRACT

Introduction: Migraine is the second most common primary headache after tension-type headache. Stress is one of the factors that can contribute to migraine occurrence. Medical students are subjected to a high-stress level due to their educational program, which increases their risk of migraine. **Objective:** To measure the relationship between stress levels and migraine occurrence in medical students of Duta Wacana Christian University, batch 2020. **Methods:** This study used an observational analytical design with a *cross-sectional* method and involved 61 respondents from the medical students of Duta Wacana Christian University, batch 2020, who met the inclusion and exclusion criteria. Respondents were required to approve informed consent and complete the *Perceived Stress Scale* and *Migraine Screen Questionnaire* before conducting the research. **Results:** The *Chi-Square for Trend* statistical analysis for trends showed that stress levels were related to migraine ($p < 0.05$), age variables revealed no association with migraine ($p > 0.05$), and gender revealed that the sexes had a relationship with migraine ($p < 0.05$). Using Fisher's statistical technique, this study found that menstrual status has no association with migraine ($p > 0.05$). **Conclusion:** Stress levels and migraine frequency were significantly correlated, meaning that high-stress levels can trigger migraines.

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INTRODUCTION

Headaches are neurological disorders that can be divided into three types: primary headaches, secondary headaches, cranial neuralgia, and other facial pain. A primary headache is a headache without structural disturbance in the head and does not indicate another disease. There are four different kinds of primary headaches: migraines, tension headaches, cluster headaches, and other primary headaches.[1] In 2016, it is estimated that three billion people worldwide suffered from migraines or tension-type headaches. Overall, 1.89 billion people suffer from tension-type headaches, and 1.04 billion suffer migraines.[2] In Indonesia, 42% of all neurology patients have a primary headache. This is the most common complaint among neurology patients there.[3]

Stress is a common problem that many people face throughout their lives, and it can affect anyone and anywhere.[4] Students are the most likely to face stress during their studies. Stressed students will have decreased academic achievement [5] and worsening health conditions such as depression [6] and sleep difficulties.[7]

According to a study conducted in India, 42.3% of 442 medical students suffered from migraines. Migraines are triggered by sleep problems, emotional stress, head movements, and weather changes.[8] In 2011, a study of 210 medical students at Zahedan University in Iran found that the prevalence of migraine was 7.14% in both sexes, with the most prevalent migraine triggers being stress, difficulties sleeping, too much reading, and fasting.[9] In 2018, a study of 872 medical students at Soochow University in China found that migraine was frequent among medical students, with rates greatest in first-year students and those with a migraine history.[10]

A study was conducted in Indonesia in 2020 on the correlation between stress, anxiety, and depression levels with the incidence of migraine among medical students in Jakarta. The results revealed that stress, anxiety, and depression had a significant relationship with the incidence of migraine.[11] According to Egyptian research, the prevalence of migraine in medical students was 17.9%, causing moderate disability. Migraine causes much more disability in female university students than male university students.[12]

OBJECTIVE

1. Measuring the description of migraine in medical students of Duta Wacana Christian University Batch 2020
2. Measuring stress levels in medical students of Duta Wacana Christian University Batch 2020
3. Measuring the relationship between stress levels and migraine in medical students of Duta Wacana Christian University Batch 2020
4. Determining whether stress levels increase the incidence of migraine in medical students of Duta Wacana Christian University Batch 2020

METHODS

This study used an observational analytic design with a *cross-sectional* method and was conducted on 61 medical students at Duta Wacana Christian University, batch 2020, in February 2021. This research has received ethical approval from KEPK FK UKDW under code 1232/C. 16/FK/2021. Medical students from Duta Wacana Christian University batch 2020 who are 17 years old and willing to participate in the research are included in the research inclusion criteria. Students who had a history of mild to severe head trauma that happened at least 3 months before the study, who had been diagnosed with a brain tumor, who drank alcohol, coffee, or other caffeinated drinks, who used drugs that could cause headaches, or who did not fill out the form and questionnaire were not allowed to take part.

The *Perceived Stress Scale*, the Indonesian version of the (PSS-10) questionnaire, was used to measure stress.[13] The validity of the questionnaire has been tested in Indonesia with a good reliability score (α=0.85). The PSS-10 questionnaire has ten questions, six of which are negative and four of which are positive. Each question has a score of 0 to 4. Score 0 means never, score 1 means almost never, score 2 means sometimes, score 3 means often, and score 4 means very often. If you answer a positive question, this score is inverted, resulting in a score of 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0. The positive questions in this questionnaire are found in numbers 4, 5, 7, and 8. The stress level is known after adding up all the scores of the ten questions in the PSS questionnaire. A score of 0-13 indicates low stress, 14-26 indicates moderate stress, and 27-40 indicates high stress.

The *Migraine Screen Questionnaire*, the Indonesian version of the (MS-Q) questionnaire, was used to establish a diagnosis of migraine.[14] The MS-Q questionnaire's translator has approved the usage of this questionnaire. The MS-Q questionnaire is based on the diagnostic criteria by IHS and the National Consensus IV PERDOSSI 2013. The MS-Q consists of five questions, each with a score of 0, meaning "no," and 1, meaning "yes." The diagnosis of migraine was determined by adding the results of the five questions on the MS-Q questionnaire. A total score of 1-3 was declared non-migraine, while a total score of 4-5 was declared migraine. This study's data used the *Chi-Square for Trend* for the stress level

variable with the incidence of migraine, and it was followed by looking for the relative risk between groups of low, moderate, and high-stress levels.

RESULTS

This study included 61 medical students at Duta Wacana Christian University, batch 2020. The age range of students obtained is between 17 and 20 years. Most of the subjects in this study were 19 years old (44%) and female (Table 1). Stress descriptions were put into groups based on the PSS score, and migraines were found in 38 students, with more women migraines than men (Table 1).

Stress levels are divided into three categories (Table 1). Most medical students in this study have moderate stress levels, followed by those with high and low-stress levels. Results of the *Chi-Square for Trend* found that the p-value was 0.0002, or a probability less than 0.05. The conclusion is that there is a significant relationship between stress levels and the incidence of migraine in medical students at Duta Wacana Christian University.

The majority of respondents in this study were women, with a 3:1 gender ratio. Female students more often suffer from migraines (Table 1). Results of the *Chi-Square for Trend* found that the p-value was 0.04, or the probability less than 0.05. Therefore, it can be concluded that there is a significant relationship between gender and the incidence of migraine.

Based on age distribution, the majority of respondents in this study were followed by 19-years-old medical students (Table 1). Results of the *Chi-Square for Trend* found that the p-value was 0.133 or the probability was above 0.05. Therefore, it can be concluded that there is no significant relationship between age and the incidence of migraine.

According to the *Chi-Square for Trend*, migraines are associated with stress levels. This study could not use data from students with moderate stress to conclude that they were at a higher risk of migraines (Table 2), but students with high-stress levels were 11 times more likely to get migraines than those with low-stress levels (Table 3). Students with high-stress levels have a twice higher risk of suffering migraines than students with moderate stress levels (Table 4).

DISCUSSION

This study's results align with research conducted by Amelia (2020), which found a relationship between stress levels and the incidence of migraines.[15] People with high-stress levels are more likely to suffer migraines, while those with low-stress levels are less likely to suffer. The hypothalamic-pituitary-adrenal axis and the sympathetic nervous system are both activated when a person is under stress. The activation of these two systems will lead to behavioral and physiological changes in the body that are considered a response to stress and ultimately have the potential to trigger migraine attacks.[16] Hippocampal volume plays a role in migraine.[17] Smaller hippocampal volumes may result in persistent pain states. A cross-sectional study of episodic migraine found a significantly larger bilateral hippocampal volume in the low-frequency group than in the high-frequency and healthy control group.[18] The high-stress level experienced by a person will also increase the frequency of migraines.[19]

Gender is associated with the incidence of migraine. In this study, female students tended to suffer more migraines than male students. Women frequently get migraines during menstruation due to hormonal changes in women that occur in line with the natural hormonal cycle. These sex hormones in women affect neural circuits and result in changes in the hypothalamus and insula.[20,21]

Age is not associated with the incidence of migraine. This result is not in line with previous studies, where age has a relationship with the incidence of migraine. The incidence of migraine in women increased in the age group of 20-24 years, and in men, it raised in the age group of 15-19 years.[22]

Menstrual status is not associated with the incidence of migraine. This result is not in line with previous studies, where menstruation is a triggering factor for migraine. The appearance of migraine during menstruation is caused by estrogen withdrawal in the menstrual cycle. Migraine during menstruation occurs from two days before the onset to three days after the first day of menstruation. The type of migraine that occurs during menstruation is migraine without aura.[23]

Migraine during menstruation is due to mineral absorption by estrogen and estrogen receptors. Estrogen during menstruation increases copper absorption and prolongs its half-life. Copper is a natural antagonist of zinc and interferes with the absorption of zinc from the intestines. Melatonin requires zinc for synthesis, and melatonin can increase zinc absorption. Zinc and melatonin are needed by women who are menstruating.[24] The limitation of this study is that it does not delve deeper into subjects' menstrual status, so that it is possible to influence the results. This study only looked at the incidence of migraine without knowing the type of migraine. It was also limited because of the COVID-19 pandemic, which made it impossible for researchers to get data directly from research subjects.

CONCLUSION

The incidence of migraine has a relationship with stress levels, meaning that high-stress levels can trigger migraine. It is hoped that medical students of Duta Wacana Christian University, batch 2020, can control their respective stresses to avoid migraines. More research is needed to investigate the relationship between stress and migraine with other variables and use the *Depression Anxiety Stress Scales (DASS 42)* questionnaire to determine stress levels.

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ATTACHMENT

Table 1. Relationship between variables with migraine incidence

Category		Incidence Migraine				P
		Migraine		Without Migraine		
		n	%	n	%	
Stress Levels	Low	1	2	10	16	0.0002
	Moderate	22	36	21	35	
	High	7	11	0	0	
Age	17	2	3	1	2	0.133
	18	16	26	8	13	
	19	11	18	15	25	
	20	2	3	6	10	
Gender	Male	6	10	9	15	0.04
	Female	32	52	14	23	
Menstrual Status	Yes	5	11	4	9	1
	No	18	39	19	41	

Table 2. Analysis of the relative risk between low stress levels and moderate stress levels

No	Stress Levels	Incidence of Migraine		RR	95% CI	p
		Positive	Negative			
1	Low	1	10	5.66	0.8-37.3	0.07
2	Moderate	22	21			

Table 3. Analysis of the relative risk between low stress levels and high stress levels

No	Stress Levels	Incidence of Migraine		RR	95% CI	p
		Positive	Negative			
1	Low	1	10	11	1.7-71.2	0.01
2	High	7	0			

Table 4. Analysis of the relative risk between moderate stress levels and high stress levels

No	Stress Levels	Incidence of Migraine		RR	95% CI	p
		Positive	Negative			
1	Moderate	22	21	2	1,4-2,6	0.0001
2	High	7	0			