

## Research Article

# The Association between COVID-19 Pandemic Stress Level with Migraine and Drug Overuse Headache Incidency in Young Adults

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### Abstract

**Background:** The COVID-19 pandemic resulted in the establishment of a pandemic response policy by the government that caused a direct impact in the form of physiological stressors felt by the community. Stressors trigger stress, which is the cause of migraine attacks that will increase after puberty and about 90% of patients have their first attack before age 50 and prevalence of medication of overuse headache is 1 until 2% in the world population. This study was conducted to find out the relationship of stress levels during the COVID-19 pandemic to the incident of migraine and drug Overuse Headache Incidency in young adulthood.

**Methods:** Observational analysis with cross-sectional study design conducted by spreading questionnaires on employees of the Directorate General of Population and Civil Registration of the Ministry of Home Affairs of the Republic of Indonesia who are young adults with an age range of 18 years-40 years on November 1<sup>st</sup>, 2021. The variables collected and to be studied were the clinical characteristics of respondents, stress levels during pandemics measured using the Pandemic-Related Perceived Stress Scale of COVID-19 (PSS-10-C), and the incidence of migraine headaches with the SPSS V25.0 for windows program with a 0.005 meaningful level.

**Results:** The results of the analysis between gender and the incident of migraines show a value of  $p=0.417>0.05$  then  $H_0$  was accepted, it can be concluded that there is no relationship between gender and the incident of migraines. The results of the analysis between the age range of young adults with the incident of migraines shows a value of  $p=0.178>0.05$  then  $H_0$  was accepted, it can be concluded that there is no association between the age range of young adults and the incidence of migraines. The results of the analysis between the stress level of the COVID-19 pandemic and the incident of migraines shows a value of  $p=0.254>0.05$  then  $H_0$  was accepted, it can be concluded that there is no association between the stress level of the COVID-19 pandemic and the incident of migraines

**Conclusion:** The study showed that there are no association between gender, young adulthood, and the stress levels of the COVID-19 pandemic and the incidence of migraines. Considering that possibly anyone with primary episodic headache may be at risk Drug Overuse Headache in the stress levels of the COVID-19 pandemic.

**Keywords:** Gender; Young Adulthood; COVID-19 pandemic stress levels; Migraines

### Introduction

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by a new type of coronavirus with clinical manifestations of mild to severe respiratory distress depending on the patient's characteristics such as age and comorbidities [1]. On March 11<sup>th</sup> 2020, the World Health Organization (WHO) has designated COVID-19 as pandemic [2]. In order to break the chain of transmission of COVID-19, the government and related health authorities have established mitigation policies by separating direct contact between positive and suspected individuals from healthy individuals. This is manifested in the form of policies in the form of isolation, quarantine, social distancing, semi-lockdown, as well as total lockdown so that direct contact between humans that can become a transmission medium for COVID-19 can be minimized [3].

With the implementation of the mitigation policies of COVID-19 transmission, the community feels direct impacts, such as limitations in carrying out work, anxiety over the termination of work and bankruptcy, and anxiety about the COVID-19 infection itself due to the spread of hoax news and limited knowledge. As a result of these physiological stressor, many people experience nervousness, frus-

tration, fear, and mood swings [4]. Stressors will trigger stress which is the cause of 70% of migraine attacks [5].

Migraines affect almost 15% of the world's population. The lifetime prevalence of migraine is around 10%-20%, depending on the case definition and the age and sex distribution of the study population. After puberty, migraine prevalence is increasing and approximately 90% of all patients have their first attack before the age of 50 [6]. Based on a review of 19 studies in the adult population by Merikangas KR, the prevalence of diagnosed migraine sufferers was 11.5% [7]. A person is said to be entering young adulthood when he is 18 years-40 years old [8]. In this age range, migraine cases are common with three times more incidence in women than men [9].

Based on the research by Al-Hashel et al. in 2020, stress is the most significant migraine trigger out of several stressors related to the COVID-19 pandemic with a predilection rate of 24%. However, based on research conducted by Kovasc et al., there is no differences in perceived stress levels between migraine sufferers and the control group during the COVID-19 pandemic [10,11].

Based on this background, the authors are interested in researching how the impact of stress caused by the COVID-19 pandemic has been on the incidence of migraine headache in young adults in Indonesia and its relation to demographic conditions.

## Methods

The research design used in this study is an observational analysis design that aims to assess the relationship between the independent variables and the dependent variable. The approach used is a *potong lintang* or cross-sectional approach, a type of research that emphasizes the time of measurement or observation of data, both independent variables (stress level and demographic characteristics) as well as the dependent variable (occurrence of migraine) at the same time. This research was carried out after obtaining ethical approval from the Research Ethics Committee of the Faculty of Medicine, University of Trisakti with number 50//KER-FK/IX/2021 and was carried out on November 1<sup>st</sup>, 2021 at the office of the Directorate General of Population and Civil Registration of the Ministry of Home Affairs of the Republic of Indonesia.

Respondents who participated at this age were young adult employees (18 years-40 years old) who met the requirements for clinical research criteria. The research was carried out by distributing clinical characteristic questionnaires, PSS-10-C, and MS-Q. The research was followed

by 85 respondents, but only 78 respondents whose data were processed because they met clinical criteria. Data analysis used the Chi-square test and was processed with the SPSS V25.0 for windows program with a significance level of 0.005.

## Results

Based on the research conducted, the results are as follows:

### Univariate analysis

From the univariate analysis, the characteristics of respondents and their frequency distribution were as follows (Table 1):

**Table 1:** Frequency distribution of gender, young adult range, stress levels and migraine incidence

Variable	N	%
<b>Gender</b>		
Man	44	56.4
Women	34	43.6
<b>Young adult age</b>		
18-29	50	64.1
30-39	28	35.9
<b>Stress Level</b>		
Mild	2	2.5
Moderate	46	59
Severe	30	38.5
<b>Migraine incidence</b>		
Not Migraine	64	82.1
Migraine	14	17.9

Based on the results of this study, it was found that the percentage of stress levels during the pandemic most experienced by employees was moderate stress levels with a percentage of 59% or a total of 46 employees. From the study, the number of employees suffering from migraines was also 14 employees with a percentage of 17.9%. The majority of employees who took part in this study had a male gender with 44 employees with a percentage of 56.4%.

### Bivariate analysis

Bivariate analysis is carried out to determine the relationship between free variables and bound variables so that an assessment of the level of meaningfulness of the variable relationship can be carried out. Bivariate analysis using the chi square test where the assessment of the level of meaningfulness obtained is  $p < 0.05$ , then there is a statistically meaningful relationship (Table 2).

**Table 2:** Relationship between gender, young adult age, and COVID-19 pandemic stress levels and migraine incidence

Variable	Migraine Incidence						P Value
	Positive		Negative		TOTAL		
	N	%	N	%	N	%	Relationship
<b>Gender</b>							
Man	8	18.2	36	81.8	44	100	0.951
Woman	6	17.6	28	82.4	34	100	

Young Adult Age							
18-29 years old	7	14	43	86	50	100	0.225
30-39 years old	7	25	21	75	28	100	
Stress Levels							
Mild	0	0	2	100	2	100	0.254
Moderate	6	13	40	87	46	100	
Severe	8	26.7	22	73.3	30	100	

In this analysis it was found that men suffer more from migraines with a percentage of 18.2% and the proportion of migraine sufferers is greater in the age range of young adults 30 years-39 years with a percentage of 25% even though the number of sufferers is the same as those aged 18 years-29 years. From the Chi-square test conducted, between the variables of gender and young adult age with the incidence of migraine, the results obtained were p-values of 0.951 and 0.225, where the two p-values exceeded 0.05 so that it could be concluded that there was no statistically

significant relationship between type's gender and age of young adults with the incidence of migraine.

For the analysis of the chi square test of the stress level of the COVID-19 pandemic with the incidence of migraine, it does not meet the requirements for the chi square test, which if it is a  $2 \times 3$  table, then the number of cells with an expectation frequency of less than 5 cannot be more than 20%. It is necessary to combine cells and do fisher analyses test to assess the relationship between stress levels and the occurrence of migraines (Table 3).

**Table 3:** Fisher test analysis between stress level and migraine incidence

Stress Levels	Migraine Incidence				TOTAL		P Value
	Positive		Negative		N	%	
	N	%	N	%			
Mild	0	0	2	100	2	100	0.1
Moderate-severe	14	18.4	62	81.6	76	100	

Before conducting the Fisher test which is an alternative to the chi square test, it is necessary to require a  $2 \times 2$  table. Therefore, a cell is merged first so that stress levels are classified into two categories, mild stress levels and moderate-severe stress levels. This is also consistent with the research conducted by Dharmawita et al. From the results of the Fisher test, a p value of 0.1, therefore it could be concluded that there was no relationship between levels of COVID-19 pandemic stress with migraine incidence.

## Discussion

Of the 85 young adult employees who became respondents by filling out the Clinical Characteristics, PSS-10-C, and MS-Q questionnaires on November 1<sup>st</sup>, 2021, a total of 78 respondents' answers were obtained that could be used as research samples and processed research data. The sampling of the processed data is adjusted to the criteria of inclusion and exclusion.

The results of data processing can also be reviewed through the division of data groups by gender. Of the 78 respondents, they were categorized into two gender groups, namely men and women. In this study, researchers found that 8 respondents (10.25%) with migraines suffered from migraines and 6 female respondents suffered from migraines (6.4%). The findings in this study are different from the migraine prevalence data which shows that the increase in the incidence of migraine after puberty in women is three times more than in men [6].

The greater prevalence of migraine events after puberty in women is due to the type of migraine that is only experienced by women but not experienced by men, the type of

migraine is menstrual migraine. Based on research by Vetvik, More than 1 in 5 women with migraines experience menstrual migraines [12]. In this study, researchers did not ask female respondents questions about headaches related to the menstrual phase, so there is a possibility that if it can be further traced in the population there are undiagnosed menstrual migraine headaches. This study showed the results of the analysis between sex and the incidence of migraine. In this study, the results of the analysis between sex and the incidence of migraine produced a  $p=0.417 > 0.05$  then  $H_0$  was accepted, therefore it can be concluded that there is no relationship between sex and the incidence of migraine.

In this study, researchers categorized young adults into two age groups, namely young adults with a range of 18 years-39 years and young adults with ages 30 years-39 years. The division of young adults into both ranges is in accordance with research conducted by the American Migraine Prevalence and Prevalence (AMPP) study program which aims to determine the prevalence of migraine incidence in the United States [13].

In this study, the most respondents were respondents with a young adult age range of 18 years-29 years old of 50 people (64.1%) but in this study the number of migraine events was equally found in both age ranges even though the number of young adult respondents with a range of 30 years-39 years was less numerous. The finding that more migraine incidence is present in young adults with a range of 30 years-39 years is also found in a study on the prevalence of migraine events in the United States conducted by the American Migraine Prevalence and Prevalence

(AMPP) study program [13].

The incidence of migraine increases after puberty. Based on Hsu YW et al., the younger the age at the onset of migraine events is influenced by the history of migraine sufferers in the patient's family [14]. In this study, the researcher did not ask about the history of migraine sufferers in the respondent's family, therefore related to the presentation of age data, The number of findings that the proportion of migraine sufferers is more in young adults with an age range of 30 years-39 years is only limited to data on the prevalence of migraine sufferers in the employee population of the Directorate General of Population and Civil Registration of the Ministry of Home Affairs of the Republic of Indonesia without further interpretation. This study showed that the results of the analysis between the range of young adults and the incidence of migraine produced a  $p=0.178 > 0.05$  then  $H_0$  was accepted, therefore it can be concluded that there is no relationship between the range of young adults and the incidence of migraine.

Researchers hypothesize that stress resulting from the COVID-19 pandemic can induce the incidence of migraines in young adults because according to Al-Hashel et al. in 2020, stress is the most frequent migraine trigger of some COVID-19 pandemic-related stressors with a prevalence count of 24% [10]. and according to Alqarni et al. migraine attacks increase after puberty with 90% onset of attacks found before the age of 50 [6]. However, from the results of the chi-square test of this study, the results were obtained at  $p=0.254$  where the value was greater than the value of  $\alpha=0.05$  which means that there is no statistically meaningful relationship between the stress level of the COVID-19 pandemic and the incidence of migraine in young adults. In this study, the stress level of the COVID-19 pandemic was divided into three levels, namely mild stress, moderate stress and severe stress. From these stress levels, it was found that the most migraine incidence was found in severe stress levels with 8 respondents (57.1%) followed by moderate stress levels of 6 people (42.9%). Meanwhile, at mild stress levels, there is no migraine event found. The results of this study are different from studies of stress levels and other migraine events. Research conducted by Dharmawita found that there was a relationship between the level of stress experienced by students of the Malhayati University medical program and the incidence of primary headaches (migraine and TTH) [15].

The results of this study are also different from the research conducted by Amelia C with the conclusion that the higher the level of stress, the higher the pain and migraine incidence in employees of the BATAMINDO industrial estate who go to the BIP clinic in Batam city [16]. The difference between this study and the previous two studies is that in this study, data collection was carried out during a pandemic COVID-19 So that the risk factors that cause migraine events are not only purely caused by pandemic-related stressors.

At the time of the COVID-19 pandemic, stress was not just the only risk factor that could affect migraines. According

to Ahmed SF et al. lifestyle changes such as sleep patterns and eating habits can influence the incidence of migraine headaches. Increased consumption of food during quarantine and lockdown can trigger migraines. Lack of sleep can lead to fatigue that will trigger sympathetic nerve activation to ensure energy availability. Excessive activation of sympathetic nerves can trigger the occurrence of migraines [17].

In this study, researchers only examined stress as the sole risk factor for migraine in respondents. Whereas during the COVID-19 pandemic, respondents also experienced lifestyle changes that could also affect the incidence of migraines. This is an assumption why the results that the researchers found were different from the previous two studies. What researchers found was in line with research conducted by Kovasc, et al. which found that there was no difference in perceived stress levels among migraine sufferers and control groups during the COVID-19 pandemic [11].

There are several other findings that assess the link between stress due to the COVID-19 pandemic and migraine headaches. Based on Haghdoost's research, using self-reported data from migraine tracking smartphone application Migraine Buddy, a total of 124,717 respondents from various countries found an increase in habits such as stress, lack of sleep, neck pain and anxiety in 2018 to 2020, which was in line with the increase in migraine frequency. When the COVID-19 pandemic occurred, these bad habits decreased compared to the increase in 2018 to 2020 [18]. Based on a survey conducted by Kato Y, it was found that there was an increase in stress-related migraine at the beginning of the COVID-19 pandemic [19]. The findings made by Kato Y differed from what was found by Haghdoost because the survey was answered by respondents in April and May while the largest increase in stress-related migraine occurred in March 2020.

## Conclusion

Based on the results of research that has been conducted on employees of the Directorate General of Population and Civil Registration of the Ministry of Home Affairs of the Republic of Indonesia who are young adults (18 years-40 years old), it can be concluded that the percentage of stress levels during the pandemic most experienced by employees is moderate stress levels with a percentage of 59% or a total of 46 employees. From the study, the number of employees suffering from migraines was also 14 employees with a percentage of 17.9%. The majority of employees who took part in this study had a male gender with 44 employees with a percentage of 56.4%

There is no relationship between sex and migraine incidence, with  $p=0.417 > 0.05$ , No relationship between young adult age range and Migraine Incidence, with  $p=0.178 > 0.05$ , No relationship between COVID-19 pandemic stress level and migraine headache,  $p=0.254 > 0.05$ .

Some suggestions that can be conveyed by researchers are that in the next study, researchers can then take data

by filling out questionnaires in a guided manner so as to minimize the occurrence of bias, confirm the diagnosis of migraine events not only using screening tools in the form of questionnaires but also with clinical diagnoses from doctors, consider the existence of lifestyle factors that change during the COVID-19 pandemic and the existence of a history of migraine in families, and asking questions about headaches related to the menstrual phase to female respondents so as to prevent the possibility of undiagnosed migraine menstrual headaches.

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#### Conflict of Interest

Authors have no conflict of interest to declare.

#### References

1. A.G. Hadi, M. Kadhom, E. Yousif, N. Hairunisa, In COVID-19 time, how to protect myself and others? A review, *J Biomedika dan Kesehatan*, 3(2020):153-158
2. World Health Organization (2020) Archived: WHO Timeline-COVID-19.
3. S. Khan, D. Huremović, Social distancing, quarantine, and isolation in psychology of the pandemic, *Springer*, 5(2019):85–94.
4. M. Song, Psychological stress responses to COVID-19 and adaptive strategies in China, *World Dev*, 136(2020):105-107.
5. N. Maleki, L. Becerra, D. Borsook, Migraine: Maladaptive brain responses to stress, *Headache*, 52(2012):102-106.
6. M.A. AlQarni, K.A. Fayi, M.N. Al-Sharif, A.F. Siddiqui, A.A. Alhazzani, Prevalence of migraine and non-migraine headache and its relation with other diseases in the adults of Aseer Region, Saudi Arabia, *J Family Med Prim Care*, 9(2020):1567-1572.
7. K.R. Merikangas, Contributions of epidemiology to our understanding of migraine, *Headache*, 53(2013):230-246.
8. D.W. Kumala, M. H. K. Dewi, Suwanti, The happiness on the blind males of young adult, (2019).
9. P. Rizzoli, W.J. Mullally, Headache, *Am J Med*. 131(2018):17-24.
10. J.Y. Al-Hashel, F. Abokalawa, S.F. Ahmed, Triggers of migraine during COVID-19 pandemic lockdown, *Research Square*, 2021.
11. L.N. Kovács, D. Baksa, D. Dobos, N. Eszlári, K. Gecse, et al. Perceived stress in the time of COVID-19: The association with brooding and COVID-related rumination in adults with and without migraine, *BMC Psychol*, 9(2021):68.
12. K.G. Vetvik, E.A. Macgregor, C. Lundqvist, M.B. Russell, Prevalence of menstrual migraine: A population-based study, *Cephalalgia*, 34(2014):280-288.
13. R.B. Lipton, A.A. Manack, D.C. Buse, K.M. Fanning, M.L. Reed, A comparison of the chronic migraine epidemiology and outcomes (cameo) study and American migraine prevalence and prevention (ampp) study: Demographics and headache-related disability, *Headache*, 56(2016):1280-1289.
14. Y.W. Hsu, C.S. Liang, J.T. Lee, H.T. Chu, M.S. Lee, et al. Associations between migraine occurrence and the effect of aura, age at onset, family history, and sex: A cross-sectional study, *PLoS ONE*, 15(2020):e0228284.
15. D. Dharmawita, D. Dalfian, A.D. Lestari, Analisis hubungan stres dengan nyeri kepala primer pada mahasiswa program studi kedokteran fakultas kedokteran universitas malahayati tahun 2020, *Maheesa*, 1(2021):3.
16. C. Amelia, The level of stress with the event of migraine head pain in the BATAMINDO industry employees who were conducted to The BIP CLINIC of the city of Batam in the month of July-October 2017, *batam*, 9(2019):2.
17. S.F. Ahmed, F. Abokalawa, J. Al-Hashel, Triggers of migraine during COVID-19 pandemic lockdown, *J Neurol Sci*, 429(2021):119325.
18. F. Haghdooost, C. Carcel, D. Chandrasekhar, A. Rodgers, C. Delcourt, The impact of Coronavirus disease 2019 (COVID-19) pandemic on migraine disorder, *J Neurol*, 268(2021):4429-4435.
19. Kato Y, Poh W, Horvath Z, F. Cadiou, T. Shimazu, et al. Impact of COVID-19 pandemic on migraine management in the United States: Insights from migraine tracking app users, *BMC Neurol*, 21(2021):345.