

Original Research Paper

The Relationship between anxiety, stress, depression, and insomnia in migrant students during the COVID-19 pandemic

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Abstract

Various conditions that occurred during the COVID-19 pandemic in Indonesia had a psychological effect on the community. This is because the COVID-19 pandemic is a severe stressor. Mental health disorders that occur during a pandemic include anxiety, stress, depression, and insomnia. The purpose of the study was to determine the relationship between levels of anxiety, stress, and depression with the degree of insomnia in overseas students during the COVID-19 pandemic. This study used an observational analytic method with a cross-sectional approach. The sampling technique used in this study was probability sampling with simple random sampling on overseas students in Yogyakarta. The data obtained were analyzed using the chi-square and logistic regression tests with the SPSS program. Based on the chi-square test, the results showed that there was a relationship between anxiety, stress, depression on insomnia, each having a p-value of 0.012, 0.001, and 0.000. The results of the logistic regression test on the variables of anxiety, stress, and depression obtained an R-Square value of 0.455. This value means that the variables of anxiety, stress, and depression influence 45.5% of insomnia disorders. Thus, the levels of anxiety, stress, and depression affect the degree of insomnia of overseas students during the COVID-19 pandemic. Therefore, positive activities and psychological and physical health consultations are needed by overseas students to reduce levels of anxiety, stress, and depression that lead to insomnia during the pandemic.

Keywords: anxiety; COVID-19; depression; insomnia; stress

1. Introduction

WHO (World Health Organization) declared the COVID-19 (Corona Virus Disease 2019) disease outbreak a global pandemic in March 2020. COVID-19 is caused by SARS-CoV-2 (Severe Acute Respiratory Syndrome-Related Corona Virus), a coronavirus variant. Global COVID-19 diagnoses are estimated at more than 38,317,777 cases, with more than 1,088,704 deaths as of October 13, 2020. (Johns Hopkins, 2020). Confirmed cases of COVID-19 in Indonesia from January 3, 2020, to March 11, 2021, were 1,398,578 cases with 37,932 deaths. The total doses of the COVID-19 vaccine administered until March 8, 2021, were 4,534,798 doses (WHO, 2021).

Mental health problems experienced by students have increased during the COVID-19 pandemic. Mental health problems during the COVID-19 pandemic are determined by psychosocial factors that affect how a person adapts. These psychosocial factors include personality, gender, age, experience, learning process, physical condition, and environment (Sadock et al., 2017). In addition, a person's adaptability also plays a role in preventing mental health problems because they can handle negative feelings that arise when faced with challenges or pressures (Fauziyah & Aretha, 2021).

The Ministry of Health noted increased mental health disorders from 2019 to 2020, precisely during the COVID-19 pandemic. In 2019, mental health disorders were recorded in 197 thousand cases. In June 2020, these cases increased to 277 thousand (Susanto, 2020). In addition, the results of a literature review showed that the COVID-19 pandemic increased anxiety levels in students, with a distribution

of 53% of students not anxious, 28.9% of students mildly anxious, 10.7% of students moderately anxious, 6.6% of students severely anxious, and 0.8% of students very severely anxious (Walean et al., 2021).

The impact of the COVID-19 pandemic has caused many losses, such as physical health problems, economic disparities, social disparities, and mental disorders (Wang Z, 2020). Various conditions that occur during the COVID-19 pandemic have a psychological effect on society (WHO, 2020). This is because the COVID-19 pandemic is a severe stressor. Mental disorders that occur during the COVID-19 pandemic are anxiety, fear, stress, depression, panic, sadness, frustration, and anger (Huang et al., 2020).

Anxiety is a generalized condition of fear or uneasiness (Nevid, et al., 2018). Anxiety is an emotional condition with a sense of discomfort in a person. It is a vague experience accompanied by a feeling of helplessness and uncertainty caused by something that is not yet clear (Annisa & Ifdil, 2016) in (Dinah & Rahman, 2020). Anxiety can persist and even increase when a truly threatening situation does not exist. When these emotions grow excessively compared to the actual danger, these emotions become non-adaptive. Excessive anxiety can have a detrimental impact on the mind as well as the body and can even lead to physical illness (Dinah & Rahman, 2020). Each person's level of anxiety can differ depending on related factors, including demographic factors that may influence anxiety due to the pandemic (Goodwin et al., 2011).

The prevalence of anxiety disorders in Indonesia, according to the results of Riskesdas (2018), is 9.8% for ages 15 years and over, or around 14 million people in Indonesia experience mental-emotional disorders indicated by symptoms of anxiety and depression. Another mental disorder that has emerged during the COVID-19 pandemic is depression. The prevalence of depression, according to the Riskesdas results in the same year, showed a figure of 6.1% in the population aged 15 years, and only 9% of people with depression took medication or underwent medical treatment.

In addition to anxiety disorders and depression, the incidence of insomnia has also shown a similar increase. Cure Research 2017 reports that 30% of the world's population commonly experiences chronic insomnia. This research report states that residents in the United States occasionally get poor sleep, and nearly 10% experience chronic insomnia (Delzo, 2017). The prevalence rate of insomnia in Indonesia is 10% of the total population, and the total population or about 28 million people who experience insomnia. The high rate of insomnia is associated with increased problems that occur in life, such as depression and anxiety (Havens et al., 2017).

The COVID-19 pandemic as a stressor contributes to an increase in the incidence of anxiety disorders, depression, and insomnia in university students. Students are one of the vulnerable groups to experience mental disorders. The results of Hasanah et al. (2020) research during the COVID-19 pandemic showed that the highest level of student anxiety was mild anxiety in as many as 79 students (41.58%) and moderate anxiety in as many as 32 students (16.84%), with online learning. Research results related to stress levels show that some students experience mild stress, namely 23 students (12.11%), due to online learning. The research results for depression showed that 7 (3.68%) students experienced mild depression.

Research in Milan measuring insomnia with the *Insomnia Severity Index* (ISI) in students showed a significant increase in insomnia from before the COVID-19 pandemic, which amounted to 6.9% to 16.3% during the COVID-19 pandemic. In the research of Pranata, R.H. and Asfur, R. (2021), most respondents had insomnia. As many as 28 respondents (56%) were at the Faculty of Medicine, Muhammadiyah University of North Sumatra. This is in line with research conducted by Daton, P.A. et al. (2019) that most respondents had insomnia, as many as 60.74% of respondents.

Research conducted by Martaria & Reni (2020) obtained the results of data analysis, which shows that personal risk assessment related to COVID-19 is significantly positively related to anxiety levels.

The higher the personal risk assessment related to COVID-19 will cause an increase in anxiety. The results of this study are in accordance with previous research, which reports that women show higher anxiety symptoms than men when using the total score from the BAI (*Beck Anxiety Inventory*). The study also obtained the results of a personal risk assessment related to COVID-19, which shows that many other factors still affect the Indonesian people's anxiety during the COVID-19 pandemic.

However, not many studies link the level of anxiety, stress, and depression to the degree of insomnia in overseas students. According to KBBI (*Kamus Besar Bahasa Indonesia*), overseas students seek knowledge at universities, not in their place of origin (Jayusman, 2018). According to Ward et al. (2001), migrants experience cultural and environmental changes that require psychological adaptation, which can cause sadness, anxiety, despair, and psychosomatic symptoms. Migrant students who come from outside the island of Java will experience language changes between the area of origin and the new area, difficulty in interpreting speech expressions, and differences in ways of speaking. This can be a source of difficulty in adapting to students, causing students to experience pressure and anxiety (Tyas & Savira, 2017). Therefore, this study aims to determine the relationship between levels of anxiety, stress, and depression on the degree of insomnia in overseas students during the COVID-19 pandemic.

2. Research Methods

This study used an observational quantitative analytic research design (non-experimental) with a cross-sectional study approach. This method is used to determine the relationship between levels of anxiety, stress, and depression with the degree of insomnia in overseas students during the COVID-19 pandemic. The sample of this study was 125 students who were members of the IPMKH (Kapuas Hulu Student and Student Association) in Yogyakarta, who were collected using a Google form questionnaire from May 2021 to September 2021. The research sample size was determined using the Slovin formula (Noor, 2011) with an error rate of 5%. Based on this formula, a minimum sample size of 95.23 was obtained and rounded to 95 people. The sampling technique used in this study was simple random sampling.

Data were processed using the SPSS (statistical product and service solution) software program version 25.0. Univariate analysis was used to see the percentage of anxiety, stress, and depression levels with the degree of insomnia in overseas students during the COVID-19 pandemic. Bivariate analysis using the Chi-Square test analyzes the relationship between the independent and dependent variables. Multivariate analysis using the logistic regression test to correlate two independent variables and one dependent variable.

This research has passed ethics with Ethical Clearance Letter No. 3835/B.1/KEPK-FKUMS/XI/2021

3. Results and Discussion

3.1. Univariate Analysis

Table 1 shows the respective number of respondents from all research variables. Based on univariate analysis of independent variables, respondents who experienced anxiety were 35 people (36.1%), stress was 37 people (38.1%), and depression was 32 people (33%). During univariate analysis of the dependent variable, respondents experienced insomnia were 50 people (51.5%).

Table 1 . Variable distribution of anxiety, stress, depression, and insomnia levels

	Variables	Frequency (N)	Percentage (%)
Anxiety	Normal	62	63.9
	Anxious	35	36.1
Stress	Normal	60	61.9

Variables	Frequency (N)	Percentage (%)
Stress	37	38.1
Depression Normal	65	67.0
Depression	32	33.0
Insomnia No insomnia	47	48.5
Insomnia	50	51.5

(Primary Data, 2022)

3.2. Bivariate Analysis

3.2.1. Bivariate Analysis of Anxiety Level with Insomnia

Based on data analysis in Table 2 using the chi-square test, the results showed that respondents who were not anxious (normal-light) and experienced insomnia amounted to 26 people (26.8%). Respondents who were not anxious (normal-light) and did not experience insomnia totaled 36 people (37.1%), while respondents who were anxious (moderate-very severe) and experienced insomnia totaled 24 people (24.7%). The number of respondents who were anxious (moderate-very severe) and did not have insomnia was 11 respondents (11.3%).

Table 2. Results of bivariate analysis anxiety level with insomnia

	Insomnia		No insomnia		<i>p-value</i>	OR Value
	N	%	N	%		
Anxiety						
Normal	26	26,8%	36	37,1%	0.012	3.021
Anxious	24	24,7%	11	11,3%		

(Primary Data, 2022)

The results of the bivariate analysis of anxiety on insomnia obtained a *p-value* of 0.012 (<0.05). This means that a person's anxiety level is significantly related to insomnia. In addition, the OR value obtained is 3.021. This means that if someone experiences anxiety, it will risk 3.021 times experiencing insomnia.

3.2.2. Bivariate Analysis of Stress Level with Insomnia

Based on data analysis in Table 3 using the chi-square test, the results showed that normal respondents (normal-light) and experienced insomnia were 23 people (23.7%), while respondents who were normal (normal-light) and did not experience insomnia were 37 people (38.1%). In addition, respondents who experienced stress (moderate-very severe) and experienced insomnia amounted to 27 people (27.8%). The number of respondents who experienced stress (moderate-very severe) and did not experience insomnia was ten people (10.3%).

Table 3. Results of bivariate analysis of stress level with insomnia

	Insomnia		No insomnia		<i>p-value</i>	OR Value
	N	%	N	%		
Stress						
Normal	23	23.7	37	38.1	0.001	4.343
Stress	27	27.8	10	10.3		

(Primary Data, 2022)

The results of the bivariate analysis of stress on insomnia obtained a *p-value* of 0.001 (<0.05). This means that a person's stress level is significantly related to insomnia. The OR value obtained is 4.343. This means that if someone experiences stress (moderate-very severe), it will risk 3.021 times experiencing insomnia.

3.2.3. Bivariate Analysis of Depression Level with Insomnia

Based on data analysis in Table 4 using the *chi-square* test, the results showed that the number of normal respondents (normal-light) who experienced insomnia was 24 people (24.7%). The number of normal (normal-light) respondents and did not experience insomnia amounted to 41 people (42.3%). Respondents who experienced depression (moderate-very severe) and experienced insomnia amounted to 26 people (28.8%), while respondents who experienced depression (moderate-very severe) and did not experience insomnia amounted to 6 people (6.2%).

Table 4. Results of bivariate analysis of depression level with insomnia

	Insomnia		No insomnia		<i>p-value</i>	OR Value
	N	%	N	%		
Depression						
Normal	24	24.7	41	42.3	0.000	7.403
Depression	26	26.8	6	6.2		

(Primary Data, 2022)

The bivariate analysis of depression on insomnia obtained a *p-value* of 0.000 ($n < 0.05$). This means that a person's level of depression has a significant relationship with insomnia. The OR value is 7.403. This means that if someone is depressed (moderate-very severe), it will risk as much as 7.403 times experiencing insomnia.

3.3. Multivariate Analysis

Based on data analysis in Table 5 using logistic regression analysis, the R-square value by Nagelkerke is 0.455 ($0.455 \times 100\% = 45.5\%$). This means that the variables of anxiety level, stress, and depression have an influence of 45.5% with insomnia disorder.

Table 5. Logistic regression multivariate test

Variables	B	OR (ExpB)	95% IK		<i>p-value</i>	R-square
			Min	Max		
Anxiety	2.317	10.140	2.920	35.219	0.00	
Stress	1.899	6.679	2.021	22.079	0.02	0.455
Depression	2.351	10.501	3.014	36.584	0.00	
Constant	-2,167					

(Primary Data, 2022)

Logistic regression hypothesis testing of anxiety variables obtained an OR (ExpB) value of 10.140 with a *p-value* of 0.00 ($P < 0.05$). This means partially that anxiety has a significant relationship with insomnia. If someone experiences anxiety, there will be a risk of 10.140 times experiencing insomnia. The stress variable obtained a *p-value* of 0.02 ($P < 0.05$) and OR (ExpB) of 6.679. Stress has a significant relationship with insomnia. If someone experiences stress, it will risk 6.679 times experiencing insomnia. The depression variable obtained a *p-value* of 0.0 ($P < 0.05$) and OR (ExpB) of 10.501. This means that if someone is depressed, there will be a risk of 10.501 times experiencing insomnia.

This study obtained 97 respondents with a distribution of anxiety of 35 (36.1%), stress distribution of 37 (38.1%), depression distribution of 32 (33%), and insomnia distribution of 50 (51.5). Based on the results of data analysis, there is a positive and significant relationship between the variables of anxiety level, stress, and depression with the degree of insomnia. Theoretically, insomnia is a complaint of difficulty initiating or maintaining sleep or non-restorative sleep that lasts at least one month and

causes significant impairment or impairment in individual functioning (Sadock et al., 2009). In people with insomnia, difficulty sleeping occurs almost every night, accompanied by discomfort after the episode. Insomnia is not a disease but a symptom. Several factors affect insomnia, namely emotional disorders such as anxiety, stress, and depression (APA, 2000).

The bivariate analysis of anxiety levels with insomnia obtained a p-value of 0.012 (<0.05) and an OR value of 3.021. This means that a person's anxiety level has a significant relationship with insomnia and that if someone experiences anxiety, it will risk 3.021 times experiencing insomnia. This is in accordance with the results of research conducted by Syarli and Arini (2021), which say that the psychological impact during a pandemic includes post-traumatic stress disorder, confusion, anxiety, frustration, fear of infection, insomnia, and feeling helpless. Anxiety during a pandemic can occur in a person due to predisposing factors, including restrictions on interaction so that they have to spend more than 9 hours at home, online information searches, and excessive intensity of online learning on the internet. The chance of anxiety occurrence is more likely to occur in women who have had babies, married status, and student status. The percentage of students with low anxiety levels was much greater than those with medium and high anxiety levels. This shows that anxiety is a common thing that everyone will experience. It is just that many people will not experience anxiety at a more severe level.

The bivariate analysis of stress levels with insomnia obtained a p-value of 0.001 (<0.05) and an OR value of 4.343. This means that a person's stress level has a significant relationship with insomnia and that if someone experiences stress, it will risk 3.021 times experiencing insomnia. This is in accordance with the results of research conducted by Pranata, R.H. and Asfur, R. (2021), which states that most respondents with severe stress levels have insomnia as much as (54%). The results of this study were reinforced by research conducted by Daton, P. A et al. (2019) found that as much as 60.74% of respondents had insomnia.

The bivariate analysis of depression level with insomnia obtained a p-value of 0.000 (<0.05) and an OR value of 7.403. This means that a person's level of depression has a significant relationship with insomnia and that if someone is depressed, there is a risk of experiencing insomnia 3.021 times. This is in accordance with the research results of Rosita (2021), which states a significant relationship between depression and insomnia.

The results of multivariate analysis using logistic regression analysis showed the amount of influence of anxiety, stress, and depression variables has an influence of 45.5% on insomnia disorders. Someone who experiences anxiety will have a risk of 10.140 times experiencing insomnia, someone who experiences stress will have a risk of 6.679 times experiencing insomnia, and someone who experiences depression will have a risk of 10.501 times experiencing insomnia. Research conducted by Fauziyah & Aretha (2021) shows that there is a relationship between anxiety, depression, and stress with the quality of sleep of FK UMS (Faculty of Medicine, Universitas Muhammadiyah Surakarta) students during the COVID-19 pandemic. The value of $R = 0.463$ in this study shows that anxiety, depression, and stress affect sleep quality by 46.3%, and as much as 53.7% is influenced by other variables.

Anxiety that occurs in overseas students during the COVID-19 pandemic is generally caused by excessive fear of contracting the virus and fear of facing lectures during the COVID-19 pandemic. Excessive anxiety in overseas students can lead to the emergence of a generalized anxiety disorder (GAD, Generalized Anxiety Disorder), which is a disorder characterized by excessive and irrational anxiety and worry and sometimes even unrealistic about various events of daily life (Sullivan et al., 2007). Anxiety disorders in students can also be caused by stress and depression. Excessive anxiety disorders can cause insomnia symptoms in students due to excessive fear and worry that will occur throughout the day, making students unable to stop thinking and causing sleep disturbances (Syarli & Arini, 2021).

Stress levels in overseas students during the COVID-19 pandemic tend to be high due to the emergence of pressures that burden them during the pandemic, such as feeling lonely or having difficulty in undergoing online lectures. Overseas students who experience stress will generally feel a mood that makes them feel uncomfortable, such as irritability, sadness, and feeling lonely, and losing interest in doing a job. High-stress levels in students during the COVID-19 pandemic can cause students to experience sleep disturbances because stress can provoke students' brains to continue working so that students will find it difficult to sleep. This is in accordance with the results of research conducted by Pranata & Asfur (2021), the chi-square test obtained in the study p-value of 0.000 (<0.05), so it can be concluded that there is a relationship between student stress levels during a pandemic and insomnia in students of the Faculty of Medicine, Muhammadiyah University of North Sumatra (Pranata & Asfur, 2021).

Apart from stress levels, insomnia can also be caused by depression. Depression is a disruption of human function related to sadness and accompanying symptoms, including changes in sleep and appetite patterns, psychomotor, concentration, anhedonia, fatigue, a sense of hopelessness and helplessness, and suicide (Kaplan et al., 2010). Depression experienced by overseas students during the COVID-19 pandemic tends to result from students being unable to deal with high-stress levels. Depression can cause insomnia or sleep disorders because in the depression phase, students tend to experience changes in mind, and students will often feel confused to deal with situations it will cause difficulty sleeping (Fauziyah & Aretha, 2021).

In theory, the neurotransmitters associated with GAD are GABA (Gamma Amino Butyrate Acid), serotonin, norepinephrine, glutamate, and cholecystokinin, which on PET (Positron Emission Tomography) examination of patients with GAD are found to be decreased in the basal ganglia and white mass of the brain. (Howard, 2007). Stress causes an increase in ACTH (Adrenocorticotrophic Hormone) secretion by the anterior pituitary gland, followed by an increase in hormone secretion in the form of cortisol within a few minutes (Guyton & Hall, 2012). Like GAD, two neurotransmitters are most involved in mood disorders, namely norepinephrine and serotonin. A decrease in serotonin can trigger depression and suicide, in addition to decreased dopamine activity in depression (Kaplan et al., 2017).

The hormone melatonin regulates the human sleep-wake process. The hormone melatonin is naturally produced when it gets dark (reduced light intensity), so when this hormone is produced, a person will be sleepy and eventually fall asleep at night. The opposite effect can occur through the hormone cortisol secretion due to the physical stress generated during exercise. The hormone cortisol, which is supposed to decrease at night, becomes elevated and can keep a person awake. Physiologically, the hormone cortisol is secreted to deal with the stress of exertion, so it increases alertness and makes it difficult to fall asleep (Guyton & Hall, 2012).

Insomnia is a sleep disorder that is widely experienced, especially among students during the COVID-19 pandemic. From the results of the literature review, it appears that insomnia has increased during the pandemic in students. Various literature also states that several factors cause the tendency of insomnia experienced by students. These factors include stress, psychological pressure, anxiety, depression, mental health services obtained, physical conditions, and using devices for a long duration. Some of the factors above can be changed in order to prevent the incidence of insomnia during the COVID-19 pandemic in college students. The government can consider education, dissemination of credible information related to COVID-19, and provision and revitalization of mental health services during a pandemic in reducing risk factors for insomnia. Then, consultations related to appropriate physical and psychological health conditions should be considered and included in the school counseling program so that students' sleep quality during the COVID-19 pandemic improves. Students'

awareness to be wiser about using devices also needs to be increased so that students are not affected by insomnia and diseases that can be caused by insomnia (Hanifah G.R. et al., 2023).

4. Conclusion

This study obtained the results of anxiety distribution of as many as 35 respondents (36.1%), the stress distribution of 37 respondents (38.1%), depression distribution of 32 respondents (33%), and insomnia distribution of 50 respondents (51.5). The analysis results show a significant relationship between the level of anxiety, stress, and depression with the degree of insomnia, with an R-square value of 0.455. This means that the variables of anxiety, stress, and depression influence 45.5% of insomnia disorders. To handle it, various positive activities and psychological and physical health consultations are needed for students during the COVID-19 pandemic. In addition, students' awareness to be wiser about using devices needs to be increased to avoid mental health disorders.

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Advice

For further researchers, it is hoped that they can develop this research either by adding independent variables or expanding the scope of the research sample to provide a new picture related to factors that can cause insomnia.

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