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Research

Association between Teaching and Learning Related Stressor and Anxiety Level among Medical Students during COVID-19 Pandemic

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ABSTRACT

Background: The COVID-19 pandemic has led to various impacts on public health, one of which is the mental health of medical students who are recognized as an at-risk group for developing anxiety disorders due to the teaching and learning system that has changed dramatically. This study aimed to assess the relationship between teaching and learning-related stressor (TLRS) and their anxiety levels during the COVID-19 pandemic.
Subjects and Method: This was a cross-sectional study. The population was medical students at the Faculty of Medicine, UIN, Jakarta, during September-October 2021. Sampling was carried out using purposive sampling. The dependent variable was anxiety levels during the COVID-19 pandemic. The independent variable was teaching and learning-related stressor based on Medical Student Stressor Questionnaire (MSSQ) instrument. The data were collected through questionnaires and analyzed by Cox proportional regression.
Results: The results revealed that 50.4% of medical students experienced anxiety because of teaching and learning stressor, but the data shows a non-significant difference when controlled with other stressor variables (Adjusted PR= 1.485; 95% CI= 0.71 to 2.97; p= 0.300).
Conclusion: There is no significant relationship between teaching and learning-related stressor and anxiety level among Medical Students during COVID-19 pandemic.

Keywords: mental health, medical students, COVID-19, anxiety, stressor.

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BACKGROUND

The World Health Organization (WHO) in March 2020 has declared the COVID-19 outbreak a global pandemic that has led to various impacts on public health, one of which is mental health. Anxiety disorder is one of the mental health problems reported since the beginning of the pandemic that can affect people of all ages and professsions (Bassi et al., 2021). Based on the previous studies, a medical school has various precipitating factors or stressors that may increase the incidence of stress in students, hence medical students are at high risk of experiencing anxiety disorders, and one of the predisposing stressors is stressor related to teaching and learning (Dhahri et al.,

2020; Lasheras et al., 2020; Pokhrel et al., 2020; AL-Husban et al., 2021)

In this pandemic situation, universities and students are required to adjust swiftly in making modifications to the teaching and learning system, particularly with an online learning system aimed to reduce the spread of the SARS-CoV-2 virus in the university setting. Research in Ireland stated that 5.45% of medical students experienced moderate to severe stress levels during the COVID-19 pandemic, and it has a correlation with their curriculum system that shifted to online (O'Byrne et al., 2021). In Indonesia itself during this pandemic the level of mild to severe anxiety of medical students reached 47.8% with stress levels 44.6% (Natalia and Syakurah, 2021).

South Tangerang City is one of the areas that has the highest cumulative incidence of COVID-19 in Banten until August 2021 (COVID-19 Response Acceleration Task Force, 2021), hence it has an impact on distance learning policy that has been implemented by the Faculty of Medicine, Syarif Hidayatullah State Islamic University, Jakarta, Indonesia.

Therefore, this study aimed to see the association between teaching and learning-related stressor and anxiety levels in medical students during the COVID-19 pandemic, which is expected to develop effective interventions to prevent mental health problems in medical students in the future.

SUBJECTS AND METHOD

1. Study Design

A cross-sectional design was conducted in the Faculty of Medicine, Syarif Hidayatullah State Islamic University (UIN) Jakarta, Indonesia in October 2021. which had 622 students as the source population of this study. Data was collected in October 2021.

2. Population and Sample

The population studied was students who have active academic status in 2021, sampling was carried out using purposive sampling. A total of 190 subjects were selected in this study.

3. Study Variables

The dependent variable was anxiety during the COVID-19 pandemic. The independent variable was teaching and learning-related stressor based on Medical Student Stressor Questionnaire (MSSQ) instrument.

4. Operational Definition of Variables

Anxiety level is persistent feelings of worry, restlessness, or fear, and may be accompanied by physical symptoms felt at least in the last month with or without a threatening situation. Anxiety level assessed by Indonesian version of the Hamilton Anxiety Rating Scale (HAM-A) with a 5-point Likert scale. The overall score will be divided into four categories: 0-17= no/minimal anxiety, 18-24= mild anxiety, 25-30= moderate anxiety, and 31-56=severe anxiety. In this study, the score >17 was categorized as anxiety (Ramdan, 2019).

Teaching and learning-related stressor is stressor comes from the activity of teaching and learning in the medical school during pandemic that cause stress in the past month. The stressor was assessed using the MSSQ instrument, which consisted of 40 questions to assess six domains of stressors, included: academic-related stressors (ARS), social-related stressors (SRS), intrapersonal and interpersonal-related stressors (IRS), drive and desire-related stressor (DRS), teaching and learning-related stressor (TLRS), and group activities-related stressors (GARS). The mean scores were calculated based on a 5-point Likert scale and classified as mild stress level if score=0-1; moderate stress=1.01-2; high stress=2.01-3; and severe stress=3.01-4. Mild and moderate stress levels were included in normal stress so they will be cate-

gorized as absent of stress in the analysis, while high and severe stress levels will be categorized as present of stress (Yusoff et al., 2010)

5. Study instruments

The data used in this study are primary data and secondary data. Primary data was obtained using a questionnaire. Secondary data was obtained from Syarif Hidayatullah State Islamic University Jakarta, Indonesia.

6. Data Analysis

Univariate analysis was used to see the frequncy ditribution and percentage of characteristics of study subjects. While, Cox proportional regression was used for bivariate and multivariate analysis to see each variable risk in this study to the dependent variable without being controlled by other variables, and the result was proportion ratio (PR) with 95% confidence intervals. In multivariate analysis, sociodemographic and covariate variables that have differences in the PR of more than 10% were still included in the final model as confounders in this study.

RESULTS

1. Univariate Analysis

Table 1. showed the frequency distribution of study subjects.

Table 1. Table 1. Sample characteristic (dichotomous data)

Characteristics	Category	Frequency	Percentage
Sex	Female	150	78.9%
	Male	40	21.1%
Study Rotation	Preclinic	152	80%
	Clinic	38	20%
Residence	Home with family	79	58.4%
	Dormitory	111	41.6%
Family Income	Unstable	108	56.8%
	Stable	82	43.2%
History of COVID-19 Infection In the Family or Relatives	Yes	97	51.1%
	No	93	48.9%
Anxiety	Yes	72	37.9%
	No	118	62.1%

Table 1 showed 190 respondents who filled out the questionnaire between October 21 and October 31, 2021, and analyzed in this study. Their median age was 20 years (IQR 16-23), 78.9% were female, and 80% were still undergoing preclinic rotation. In this study, 72 medical students (37.9%) experienced anxiety with the proportion of mild anxiety (14.2%), moderate anxiety (8.9%), and severe anxiety (14.8%).

Table 2 showed of stress in medical students based on stressor categories. Stressor categories included: Academic-related stressor, Social-related stressor, Intrapersonal and interpersonal related-stressor, Drive and desire related-stressor, teaching and learning related-stressor, and Group activities related-stressor. The majority of study subjects had a high anxiety level on each category.

Table 2. The proportion of stress in medical students based on stressor categories

Stressor Categories	Mild		Moderate		High		Severe	
	n	%	n	%	n	%	n	%
Academic-related stressor	8	4.2	28	14.8	89	46.8	65	34.2
Social-related stressor	17	8.9	71	37.4	87	45.8	15	7.9
Intra and interpersonal-related stressor	16	8.4	51	26.8	85	44.8	38	20
Drive and desire-related stressor	41	21.6	65	34.2	51	26.8	33	17.4
Teaching and learning-related stressor	22	11.6	51	26.8	82	43.2	35	18.4
Group activities-related stressor	27	14.2	50	26.3	83	43.7	30	15.8

2. Bivariate Analysis

Table 3. Determinants of Anxiety on Medical Students

Variable	Anxiety				Crude PR (95% CI)	p
	Yes		No			
	N	%	N	%		
Sex						
Female	60	40	90	60	1.333 (0.798-2.225)	0.247
Male	12	30	28	70		
Study Rotation						
Preclinic	61	40.1	91	59.9	1.389 (0.812-2.366)	0.204
Clinic	11	28.9	27	71.1		
Residence						
Home with family	28	35.4	51	64.6	0.894 (0.614-1.302)	0.557
Dormitory	44	39.6	67	60.4		
Family Income						
Unstable	37	34.3	71	65.7	0.802 (0.558-1.153)	0.236
Stable	35	42.7	47	57.3		
History of COVID-19 Infection in the Family or Relatives						
Yes	41	42.3	56	57.7	1.268 (0.876-1.853)	0.204
No	31	33.3	62	66.7		
TLRS						
Present	59	50.4	58	49.6	2.831 (1.676-4.785)	<0.001
Absent	13	17.8	60	82.2		
SRS						
Present	57	55.8	45	44.2	3.278 (2.004-5.363)	<0.001
Absent	15	17.1	73	82.9		
IRS						
Present	57	46.3	66	53.7	2.069 (1.274-3.361)	0.001
Absent	15	22.4	52	77.6		
DRS						
Present	46	54.7	38	45.3	2.232 (1.517-3.285)	<0.001
Absent	26	24.5	80	75.5		
ARS						
Present	71	46.1	83	53.9	16.59 (2.385-115.5)	<0.001
Absent	1	2.7	35	97.3		
GARS						
Present	60	53.1	53	46.9	3.407 (1.969-5.893)	<0.001
Absent	12	15.6	65	84.4		

Table 3 showed the significant relationship between stress based on six domains of stressors and anxiety. The majority of students (50.4%) that experienced stress by

teaching and learning-related stressors underwent anxiety, and this stressor increased the risk of anxiety during the COVID-19 pandemic by 2.8 times (Crude PR= 2.831; 95% CI= 1.686 to 4.785; p<0.001).

3. Multivariate Analysis

Table 4. Association between TLRS and anxiety among medical students

Independent Variables	Adjusted PR	95% CI		p
		Lower limit	Upper limit	
Teaching and learning-related stressor	1.46	0.715	2.976	0.300

Table 4 showed in this study, the association between teaching and learning-related stressors and anxiety was not statistically significant after being controlled by the other stressor variables (Adjusted PR= 1.458; 95% CI= 0.715 to 2.976; p= 0.300).

DISCUSSION

Anxiety disorders may be more likely to occur when there is an imbalance state between exposure from triggers and protective factors that happen persistently. The feeling of incompetence, punishment, failure, avoidance, overprotective parents or relatives, cognitive biases, and concerns were known as triggering factors of this condition (Dadds and Vasey, 2001; Mofatteh, 2021).

In addition, many factors that might explain why medical students have a higher prevalence of anxiety than the general population. Medical students tend to have neurotic and perfectionist personality traits, higher academic load, low amount of rest, financial burden, exposure to patient's disease, and both behaviorally or verbally abuse by colleagues. Furthermore, all of these factors were the cause of the prevalence of anxiety in medical students that reached 33.8% in 2019, with the highest proportion coming from Asia and the Middle East (Quek et al., 2019).

The outbreak of COVID-19 pandemic is a new situation for the whole society, including medical students who have encountered the uncertainty of less-optimal online learning system, the existence of family financial instability as a result of government policies, and delayed clinical rotations as a form to prevent the transmission of COVID-19. Therefore, the pandemic has become the latest predisposing factor of anxiety. Based on this study, medical students that have experienced moderate to severe levels of anxiety reached 23.7%.

Various studies which have been done previously in this pandemic situation showed the anxiety level of medical students was in the range of 23.1-47.8% (Guo et al., 2021; Kuman Tunçel et al., 2021; Natalia and Syakurah, 2021) Study conducted in Turkey (Kuman Tunçel et al., 2021) explained that women (OR= 2.82, 95% CI= 2.31 to 3.43), undergoing clinical rotation (OR= 1.53; 95% CI= 1.16 to 2.02), history of exposure to a patient infected with COVID-19 (OR= 1.44; 95% CI= 1.17 to 1.77), and the anxiety of re-infection when dealing with patients (OR= 1.25; 95% CI= 1.01 to 1.55) indicate significant differences with the level of anxiety. Nevertheless, the association between anxiety based on sociodemographic factors of medical students did not show a statistically significant difference in this study.

Similar results were found in the study conducted by Saravanan & Wilks (Saravanan and Wilks, 2014) in Malaysia and the 2019 meta-analysis study by Quek et al., 2019 which assessed that there was no significant difference in terms of gender

and year of study on anxiety. In the end, it provides information that attention and subsequent strategies in dealing with anxiety problems both in pandemic and normal situations must focus fairly on all student characteristics.

Based on the study in Malaysia, stressors were found as significant predictors of anxiety for medical students. The main stressors were academic overload because of the excessive academic tests, lack of sleep time, pressure, and excessive workload at the hospital (Saravanan and Wilks, 2014) This study showed that teaching and learning-related stressors were the third major cause of severe stress followed by academic-related stressors and intrapersonal and interpersonal-related stressors. The level of stress caused by the transition of teaching and learning system from this study was also found in several studies conducted in the early of the outbreak, which found that severe stress was perceived by medical students at the range of 12.8-23% (Abdulghani et al., 2020; O'Byrne et al., 2021). The study from Ireland found that the level of stress was statistically significant with the transition from conventional to online learning systems (rs= 0.315-0.444; p<0.002). (O'Byrne et al., 2021).

However, the previous study did not assess these stressors to the students' anxiety levels. Furthermore, based on this study, teaching and learning-related stressors did not have a statistically significant association with the anxiety experienced by medical students during the COVID-19 pandemic. This result, however, was found dissimilar with the study conducted in Nepal which found that teaching and learning-related stressors could increase anxiety in medical students (OR=1.74; 95% CI= 1.11 to 2.73) (Pokhrel et al., 2020).

The results of this study related to the one conducted in Kazakhstan (Bolatov et al., 2021) which stated that online learning during a pandemic reduced anxiety levels compared to conventional learning. This could happen by sudden changes that only affect the initial phase of transition. Therefore the students will tend to adapt more easily in the field of technology compared to the teachers. In this outbreak situation, medical students have many privileges to manage their own schedules and places to study according to each individual, so it could be stated that online learning has a positive impact on the mental health of medical students (Bolatov et al., 2021).

In addition, based on that research, a positive impact will be obtained when students have adaptive coping strategies against the stressors they encountered. The majority of medical students used active coping strategies such as planning to learn topics with study groups to get social support, compared to emotional coping strategies such as thoughts to deny or avoid stressors (Madhyastha et al., 2014; Schiller et al., 2018). However, as the years of study increased, emotional coping strategies were more common compared to active coping strategies, resulting in association to academic achievement in clinical medical students (Schiller et al., 2018). The use of mindfulness-based stress reduction in preclinical and clinical medical students has been shown beneficial in lowering stress, anxiety, and depression according to multiple studies, especially when students succeeded to adopt a new learning environment (Rosenzweig et al., 2003; Manning-Geist et al., 2020).

Furthermore, if students do not have adequate coping strategies to handle teaching and learning stress during the COVID-19 pandemic, it will give a negative impact on mental health, which could decrease academic achievement or students' self-confidence in their future jobs (Mofatteh,

2021). Knowing the level of anxiety and precipitating factors such as a specific stressor in medical students is one of the preventive measures to improve the factors that burden students in pursuing medical education. Also, this information will help students understand and strengthen their coping strategies in reducing their stress levels and burnout (Fares et al., 2016). In addition, the university can determine the appropriate intervention based on the characteristics of the student's coping strategies when there is a change in the teaching and learning environment. Thus, it is intended that students' achievement and self-confidence will improve towards competency they learned and gained when dealing with patients in the future.

This study has several limitations. First, medical students filled out questionnaires independently by recalling the symptoms they perceived during the last month. That would become a potential measurement bias from the respondent's error in remembering the stressor or anxiety symptoms they experienced. Second, the data were collected when the policy regarding conventional-online learning (hybrid) was gradually introduced. So, there was a chance that students have adapted to the online learning system and began to undergo the conventional system again, resulting in no significant differences between teaching and learning stressors on anxiety in this study. Third, the sample in this study was small with the participation rate from the source population below 50%. Fourth, this study was not asked about the coping strategies applied by students in dealing with stress and anxiety during the pandemic, it might be one of the confounding variables in this study that was not included in the analysis. Fifth, this study used a cross-sectional design, so it does not have an adequate time relationship between the independent and dependent variables.

In conclusion, teaching and learning-related stressor (TLRS) was the third leading cause of severe stress in medical students (18.4%) during the COVID-19 pandemic. However, there was no significant relationship between the anxiety level of medical students and TLRS itself, with the possibility of good coping strategies they had before. Furthermore, the results of this study are expected to prevent the occurrence of anxiety disorders in medical students by considering interventions in the teaching and learning system along with strengthening the coping strategies that are fairly focused on all student characteristics.

AUTHOR CONTIBUTION

Melia raised initial research question, ran the statistical analysis for the data, interpreted results, wrote the paper; Helda examined the methodology of the study and results, planned and ran the statistical analysis, suggested issues in discussion; Sarah managed data collection, planned and ran the statistical analysis, wrote the paper.

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This study is self-funded.

CONFLICT OF INTEREST

There is no conflict of interest in this study.

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REFERENCES

Abdulghani HM, Sattar K, Ahmad T, Akram A (2020). Association of covid-19 pandemic with undergraduate medical students' perceived stress and co-

ping. Psychol Res Behav Manag. 13, 871-881. DOI: 10.2147/PRBM.S2769-38

AL-Husban N, Alkhayat A, Aljweesri M, Al-harbi R, Aljazzaf Z, Al-Husban N, Elmuhtaseb MS, et al. (2021). Effects of COVID-19 pandemic on medical students in Jordanian universities: A multi-center cross-sectional study. Ann Med Surg (Lond). 67, 1-8. DOI: 10.1016/j.amsu.2021.102466

Bassi M, Negri L, Delle Fave A, Accardi R (2021). The relationship between post-traumatic stress and positive mental health symptoms among health workers during COVID-19 pandemic in Lombardy, Italy. J Affect Dis. 280, 1–6. DOI: 10.1016/j.jad.20-20.11.065

Bolatov AK, Seisembekov TZ, Askarova, AZ, Baikanova RK, Smailova DS, Fabbro E (2021). Online-Learning due to COVID-19 Improved Mental Health Among Medical Students. Med Sci Educ. 31, 183–192. DOI: 10.1007/s4-0670-020-01165-y

Dadds MR, Vasey MW (2001). The developmental psychopathology of anxiety. New York, NY: Oxford University Press Inc. DOI: 10.1093/med:psych/-9780195123630.001.0001

Dhahri AA, Arain SY, Memon AM, Rao A, Medical Education Pakistan collaborator group, Mian MA (2020). The psychological impact of COVID-19 on medical education of final year students in Pakistan: A cross-sectional study. Ann Med Surg. 60, 445–450. DOI: 10.1016/j.amsu.2020.11.025

Fares J, Al Tabosh H, Saadeddin Z, El Mouhayyar C, Aridi H (2016). Stress, burnout and coping strategies in preclinical medical students. North Am J Med Sci. 8(2), 75-81. DOI: 10.4103/-1947-2714.177299.

Guo AA, Crum MA, Fowler LA (2021). Assessing the psychological impacts of covid-19 in undergraduate medical students. Int. J. Environ. Res. Public Health. 18, 2952. DOI: 10.3390/ijerph18062952

Kuman Tunçel Ö, Taşbakan SE, Gökengin D, Erdem HA, Yamazhan T, Sipahi OR, Pullukçu H, et al. (2021). The deep impact of the COVID-19 pandemic on medical students: An online cross-sectional study evaluating Turkish students' anxiety. Int J Clin Pract. 75, 1–9. DOI: 10.1111/ijcp.14139

Lasheras I, Gracia-Garcia P, Lipnicki D, Bueno-Notivol J, López-Antón R, de la Cámara C, Lobo A, et al. (2020). Prevalence of anxiety in medical students during the covid-19 pandemic: A rapid systematic review with meta-analysis. Int. J. Environ. Res. Public Health. 17, 6603. DOI: 10.33-90/ijerph17186603

Madhyastha S, Latha KS, Kamath A (2014). Stress, Coping and Gender Differences in Third Year Medical Students. J Health Manag. 16(2), 315–326. DOI: 10.1177/0972063414526124

Manning-Geist B, Meyer F, Chen J, Pelletier A, Kosman K, Chen X, Johnson NR (2020). Pre-clinical Stress Management Workshops Increase Medical Students' Knowledge and Self-awareness of Coping with Stress. Med Sci Edu. 30, 235–241. DOI: 10.1007/s40-670-019-00881-4

Mofatteh M (2021). Risk factors associated with stress, anxiety, and depression among university undergraduate students. AIMS Public Health. 8(1), 36–65. DOI: 10.3934/publichealth.2021-004

Natalia D and Syakurah RA (2021). Mental health state in medical students during COVID-19 pandemic.. J Educ

Health Promot. 10, 208. DOI: 10.41-03/jehp.jehp_1296_20

O'Byrne L, Gavin B, Adamis D, Lim YX, McNicholas F (2021). Levels of stress in medical students due to COVID-19. J Med Ethics. 47, 383–388. DOI: 10.1136/medethics-2020-107155

Pokhrel NB, Khadayat R, Tulachan P (2020). Depression, anxiety, and burnout among medical students and residents of a medical school in Nepal: A cross-sectional study. BMC Psychiatry. 20, 298. DOI: 10.1186/-s12888-020-02645-6

Quek TTC, Tam WWS, Tran BX, Zhang M, Zhang Z, Ho CSH, Ho RCM (2019). The Global Prevalence of Anxiety Among Medical Students: A Meta-Analysis Int. J. Environ. Res. Public Health. 16, 2735. DOI: 10.3390/ijer-ph16152735

Ramdan IM (2019). Reliability and Validity Test of the Indonesian Version of the Hamilton Anxiety Rating Scale (HAM-A) to Measure Work-related Stress in Nursing. Jurnal Ners. 14(1), 33. DOI: 10.20473/jn.v14i1.10673

Rosenzweig S, Reibel DK, Greeson JM, Brainard GC, Hojat M (2003). Mindfulness-Based Stress Reduction Lowers Psychological Distress In Medical Students. Teach Learn Med. 15(2), 88–92. DOI: 10.1207/S15328015TL-M1502_03

Saravanan C and Wilks R (2014). Medical Students' Experience of and Reaction to Stress: The Role of Depression and Anxiety. Sci World J. 2014, 1–8. DOI: 10.1155/2014/737382

Satuan Tugas Penanganan COVID-19 (20-21). Analisis Data Covid-19 Indonesia: per 22 Agustus 2021. Available from: https://covid-19.go.id/p/berita/analisis-data-covid-19-indonesia-update-22-agustus-2021

Schiller JH, Stansfield RB, Belmonte DC, Purkiss JA, Reddy RM, House JB, Santen SA (2018). Medical Students' Use of Different Coping Strategies and Relationship With Academic Performance in Preclinical and Clinical Years. Teach Learn Med. 30(1), 15–21. DOI:10.1080/10401334.2017.134706

Tsegay L, Shumet S, Damene W, Gebreegziabhier G, Ayano G (2019). Prevalence and determinants of test anxiety among medical students in Addis Ababa Ethiopia. BMC Med Educ. 19(1), 423. DOI: 10.1186/s12909-019-1859-5

Yusoff MSB, Rahim AFA, Yaacob, MJ (2010). The development and validity of the medical student stressor questionnaire (MSSQ). ASEAN Journal of Psychiatry, 11(1), 13–24