

ORIGINAL ARTICLE

Anxiety, Depression and Stress Among Medical Students in Malaysia During COVID-19: A Cross-Sectional Study

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ABSTRACT

Introduction: This study aimed to determine the prevalence and factors associated with psychological distress following the COVID-19 pandemic among medical students at one of the public universities in Malaysia. **Method:** From August to October 2020, a web-based cross-sectional study was conducted among undergraduate medical students at a public university. DASS-21, Brief Resilience Scale and WHOQOL-Bref questionnaires were used in this study. **Results:** The prevalence of depression was 40.5%, anxiety 46.0% and stress 30.9%. Based on multivariate logistic regression, a higher quality of life score is associated with a lower likelihood of depression (AOR=0.583, $p<0.001$), anxiety (AOR=0.726, $p<0.001$), and stress, (AOR=0.702, $p<0.001$) respectively. Likewise, a higher resilience score is less likely to be associated with depression (AOR=0.880, $p=0.002$), anxiety (AOR=0.880, $p=0.002$), and stress (AOR=0.850, $p<0.001$). Older age (OR=0.700, $p=0.020$) was associated with less stress and being on campus (OR=3.436, $p=0.021$) was at risk of stress during the COVID-19 pandemic. **Conclusion:** Our results suggest that medical students with higher quality of life and resilience scores had less depression, anxiety and stress. Older age was associated with less stress, and during the COVID-19 pandemic, being on campus was at risk of stress. Various stakeholders need to keep these findings in mind and identify those who are at risk for developing depression, anxiety, and stress in order to take further action to improve their quality of life and resilience
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INTRODUCTION

The new Coronavirus 2019 (COVID-19) has severely affected our lives (1) and we cannot predict when this pandemic will be fully under control and will pass (2). During this COVID-19 crisis, all educational institutions in Malaysia have been affected and virtual teaching mode, either fully virtual or hybrid, has since become the norm. This abrupt change in teaching has impacted all medical students psychologically (3). The psychological

impact of the severe lockdown from March 18th to May 12th, 2020 (two months), that were far from normal owing to the fact that effect of COVID-19 pandemic on them are only partially known. Students were banned from all outdoor activities and some stayed far from home in their respective hostels during the lockdown period. A study reported that medical students were affected by depression, anxiety and stress owing to the strain of the restricted movement and the perceived serious threat to their own health (4). This reflects the general perception among Malaysians that efforts to contain the local spread of the COVID-19 infection are limited.

During the COVID-19 pandemic, students may find

it even harder to adjust to additional public health measures, uncertainty about returning to normal living routines, and changes in the way they are currently being taught. There are evidences of high rates of medical students experiencing poor mental health (5, 6). However, the impact may differ due to unequal sociocultural, physical health, and family financial circumstances. Emotional resilience may affect the expression of detrimental mental health symptoms. Therefore, it is important to examine the equity of conditions that comprehensively addresses all potential determinants of poor mental health conditions in medical students during the COVID-19 pandemic.

On an individual level, some adults are more psychologically resilient than others. Therefore, their vulnerability to mental health crises varies (7). Resilience is an indication of positive mental health; where resilience is described as a person's ability to remain healthy and adapt to life's challenges after exposure to an adverse event (8). Resilience relies on functioning, supportive and meaningful social networks and positive attachments (9). Several studies have reported that resilience plays either a mediating or a protective role, cushioning the impact of mental health problems related to the COVID-19 pandemic, including psychological distress and poor quality of life (10-13).

Striving during the COVID-19 pandemic is challenging as the sweeping measures imposed to limit the spread of COVID-19 infection can impact the mental well-being of these medical students. Mental well-being can affect a person's professionalism in the performance of their duty. Cao et al reported a significant prevalence of the psychological effects of COVID-19 among medical students, affecting 24.9% of the 7143 medical students in China (14). As future medical professionals, such adverse effects will affect these students' careers and their ability to provide better medical care to patients. High level of psychological anxiety or stress will also reduce academic performance (15). Symptoms of anxiety and depression are also the main denominators associated with suicidal ideation in medical students (16). With around 15,000 medical students in Malaysia, understanding the prevalence and factors related to their psychological distress, especially amid the current COVID-19 pandemic, is critical to developing responses to mitigate the threats to their mental health and well-being.

Therefore, this study aimed to determine the prevalence of psychological distress among medical students during the COVID-19 pandemic at a public university in Malaysia. The secondary objective was to identify the factors associated with their psychological distress in the study population.

MATERIALS AND METHODS

Study Design and Study Location

A cross-sectional study was conducted among first- to fifth-year medical students at one of the public universities. We have selected the students of this university over other public universities for practical reasons. Firstly, conducting a research project is one of the program requirements during the undergraduate studies and secondly, we hope that the response rate to this study will be higher if the study is conducted at this university. Medical school at this university is a five-year program where the pre-clinical phase is in years one and two, while the clinical phase is in year three, four and five.

Participants, Sample Size and Sampling Method

Medical students aged 18-year and older studying at the university during the COVID-19 pandemic were deemed eligible for this study. Epi Info 7.0 was used to calculate the sample size based on the prevalence of depression among undergraduate students of 78.7% (17). The estimated sample size was 181 with 90 percent power, 95 percent confidence interval (CI), and statistically significant level (α) at 5 percent. After accounting for the 40% non-response rate, the total number required was 302 participants. The universal sampling technique was used for recruitment, where all medical students were approached through an online platform via an online platform using a Google form and 311 potential participants responded to the invitation.

The link to the survey was sent to the participants via WhatsApp by the student representatives of each year from August to October 2020, i.e. about eight weeks after the end of the first movement control order (MCO) in Malaysia. The study was voluntary as there was no financial incentive involved and the respondent has the right to stop completing the Google form at any time. Participants gave their informed consent after reviewing the study's objectives and purpose before beginning to answer the survey. Ethical approval was obtained from the respective university ethics committee (JKEUPM-2020-215) prior to data collection. In addition to the questionnaire, we also provided the respondents with flyers on mental health issues. The flyer included a list of NGO contact numbers in case respondents needed advice or consultation. We also ask them to provide their phone number if they would like to know the results of their mental health screening.

Data Collection Instrument and Procedure

The questionnaires were available in two different languages, i.e. English and Bahasa Melayu. Participants could choose their preferred language. For data collection, the questionnaires consisted of three sections:

- a. Socio-demographic data
- b. Depression, Anxiety, Stress Scale (DASS-21) Questionnaire
- c. World Health Organization Quality of Life Instrument (WHOQOL-bref) Questionnaire
- d. Brief Resilience Questionnaire (BRS)

The socio-demographic section included information on participants' age, gender, ethnicity, year of study, place of residence during COVID19, family income and underlying medical conditions.

The Depression, Anxiety, Stress Scale (DASS-21) section is a self-administered 4-points Likert scale tool for assessing the severity of emotional states of depression, anxiety and stress [13]. The participants considered their experience from the past week and current week before choosing their answers. The scores on the depression, anxiety and stress subscale were calculated by adding the scores on the relevant items in each domain. The final score was obtained by multiplying the initial total subscale score with two. (18). The scores for depression, anxiety, and stress were classified as normal, mild, moderate, severe and extremely severe categories (Table I). In this study, a participant was considered depressed if they scored ≥ 10 on the depression subscale; anxious if the anxiety subscale score was ≥ 8 ; and stressed if the stress score was ≥ 15 (18). The DASS-21 questionnaire has high internal consistency for depression, anxiety and stress scales (0.72, 0.77 and 0.70, respectively) (18). The Malay version of DASS-21 has been validated in Malaysia with good reliability (Cronbach's alpha values were 0.84 for depression, 0.74 for anxiety and 0.79 for stress) (19).

The World Health Organization Quality of Life Instrument (WHOQOL-bref) was developed to assess the quality of life of a specific population, to facilitate understanding of the problems, and to develop treatment methods (14). It was based on four domain structures. The first domain was physical health, the second domain psychological, the third domain social relationships, and the fourth domain was environmental. The domain scores have been scaled in a positive direction. The mean score of the items within each domain is used to calculate the total domain score. The mean scores were then multiplied by 4 to make domain scores comparable to those used in the WHOQOL-100(20). The WHOQOL-bref questionnaire has been validated in Malaysia with

good validity and reliability (21). The Cronbach's alpha value ranged from 0.64 to 0.80.

Brief Resilience Scale is a 5-point Likert scale questionnaire measuring perceived recovery to bounce back from COVID-19 related stress. The score was 1 for strongly disagree and 5 for strongly agree. The mean score was used for data interpretation. Higher total scores indicate that the participants' resilience is higher. Cronbach's alpha coefficient was 0.80-0.91, reflecting good reliability and validity (22). The convergent and discriminant validity showed moderate correlation to expected direction with multiple scales measuring life orientation, life purpose, alexithymia, coping and resilience. The Malay version of the CBI also has a good reliability as the Cronbach's alpha value was 0.93(23).

Statistical Analysis

All statistical analyzes were performed using the Statistical Package for Social Sciences (SPSS version 21). Continuous data were described as the mean and standard deviation when the distribution is normal. When the data was a skewed distribution, median with interquartile range were used to describe the data. Categorical data was reported as proportions (percent). Chi-square test or Fisher exact tests were used to look for the association for the categorical or dichotomous variables. Multivariate logistic regression analysis was used to determine the predictors of depression, anxiety, and stress among medical students during the COVID-19 pandemic. All variables with a p-value less than 0.25 in the univariate analyses and clinically significant variables were included in the multivariate logistic regression. The dependent variable was the presence of depression, anxiety or stress. The independent variables were age, gender, ethnicity, year of study, place of residence during the COVID-19 pandemic, family income, and the presence of underlying medical conditions. All analyses were carried out with 95% confidence intervals (CI), and the level of significance was set at $p < 0.05$.

RESULTS

A total of 311 participants were recruited for this study, with a response rate of 63.5%. Table II shows the sociodemographic data of 311 participants. The majority of the participants were females (71.7%). The median age of the participants was 21 years (interquartile range of =3). More than half of them were Malay (51.8%). One-third (34.7%) of the study participants were second year students, making them the largest group in comparison to the other year of study. Most participants stayed at home during the first week of MCO (92.6%). The majority of them were disease-free (92.6%). The participants' monthly family income was reported as a median of RM5000 with an interquartile range of 7000.

Prevalence of psychological distress

Based on the respective subscale scores shown in Table

TABLE I: Cut-off score for severity ratings of DASS-21

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely severe	28-42	20-42	34-42

Mild-Moderate-Severe-Extremely severe were classified as "presence symptoms" in this study

TABLE II Sociodemographic factors among medical students (N=311)

Sociodemographic Factors	n (%)	Median (IQR)
Gender		
Male	88 (28.3)	
Female	223 (71.7)	
Ethnic Group		
Malay	161 (51.8)	
Chinese	57 (18.3)	
Indian	82 (26.4)	
Others	11 (3.5)	
Current Year of Study		
Age		21(3.0)
Year of study, 1st Year	96 (30.9)	
2nd Year	108 (34.7)	
3rd Year	33 (10.6)	
4th Year	53 (17.0)	
5th Year	21 (6.8)	
Place of staying during the first week of MCO		
In Campus	23(7.4)	
At Home	288 (92.6)	
Underlying medical condition		
No Illness	288 (92.6)	
Allergic	3 (1.0)	
Asthma	10 (3.2)	
Others	10 (3.2)	
Family monthly income (RM)		5000.00 (7000.00)
Brief resilience scale		19.0 (3.6)
Quality of life score	14.8±2.0	

Others include eczema, supraventricular tachycardiac, major depression and etc

III, 126/311 medical students (40.5%) were depressed, 143 (46.0%) were anxious, while 96 of them (30.9%) were stressed.

Sociodemographic factors associated with psychological impacts

Table IV shows the association between depression, anxiety and stress and sociodemographic factors based on univariate analysis. Quality of life score and the brief resilience score were significantly associated with depression ($p < 0.001$). The year of study ($p = 0.004$), age ($p < 0.001$), brief resilience score ($p < 0.001$) and quality of life ($p < 0.001$) were significantly associated with anxiety. The brief resilience scale ($p < 0.001$) and quality of life score ($p < 0.001$) were meanwhile significantly associated with stress.

Predictors of psychological impacts following COVID-19 Table V shows the results of multiple logistic regression to identify the determinants of depression, anxiety and stress. In multivariate logistic regression analysis, the likelihood of depression among participants decreases with each one-unit increase in their quality of life

TABLE III: Prevalence of depression, anxiety and stress among medical students* (N=311)

	Depression		Anxiety		Stress	
	n	%	n	%	n	%
Normal	185	59.5	168	54	215	69.1
Mild	32	10.3	20	6.4	27	8.7
Moderate	56	18	57	18.3	30	9.6
Severe	17	5.5	18	5.8	20	6.4
Extremely severe	21	6.8	48	15.4	19	6.1
Total	311	100	311	100	311	100

* Mild-Moderate-Severe-Extremely severe were classified as "presence symptoms" in this study

($OR=0.583$, $p < 0.001$), and with each increase in brief resilience score ($OR=0.880$, $p=0.002$). Similarly, every one unit increase in quality of life ($OR=0.726$, $p < 0.001$) and brief resilience score ($OR=0.880$, $p=0.002$) was associated with the likelihood of a reduction in anxiety. An increase in quality of life ($OR=0.702$, $p < 0.001$), an increase in brief resilience score ($OR=0.850$, $p < 0.001$), an increase in age ($OR=0.700$, $p=0.020$) were associated with less stress. Those medical students who lived on campus were at least three times more likely to experience stress than those who stayed at home ($OR=3.436$, $p=0.021$).

DISCUSSION

This study reported that more than two-fifths of medical students (40.5%) suffered from depressive symptoms. Our finding therefore reported a lower prevalence of depression as compared to a recent study in which the prevalence of depression among medical students in Egypt during a pandemic was 75.2%(24). However, this prevalence was higher than in other studies from Indonesia (18.6%) (25), the United States (24.3%) (26), China (9.6%-31.9%) (27, 28) and India (10.8%-33.2%) (29, 30). The prevalence of depressive symptoms varied from study to study and this may be due to different populations and study locations. This study also reported that medical students who were more resilient were less prone to depression. This is consistent with another study that reported that resilience was negatively associated with depression (31). A possible explanation could be that those who are more resilient are able to adapt to the online learning method, even though the university workload has increased after the COVID-19 pandemic. As a result, they are less worried or depressed about not being able to successfully complete the academic year successfully due to the COVID-19 pandemic (32). Medical students with a good quality of life are also less likely to develop depression (33). This is consistent with another study that reported that quality of life was negatively associated with depression. A possible explanation could be that people with better quality of life are less afraid of COVID-19 and at the same time their family member is not severely affected by COVID-19 (33), but these variables were not examined in this study. Other studies have reported that there is

TABLE IV: Association between depression, anxiety and stress and sociodemographic factors among medical student using univariate analysis (n=311)

Parameters	Depression			Anxiety			Stress		
	No (n=217)	Yes (n=94)	p- value	No (n=188)	Yes (n=123)	p- value	No (n=242)	Yes (n=69)	p- value
Year of study 1st Yr	57(59.4)	39(40.6)	0.683	47(49.0)	49(51.0)	0.001	63(65.6)	33(34.4)	0.308
2nd Yr	59(54.6)	49(45.4)		47(43.5)	61(56.5)		70(64.8)	38(35.2)	
3rd Yr	21(63.6)	12(36.4)		19(57.6)	14(42.4)		26(78.8)	7(21.2)	
4th Yr	35(66.0)	18(34.0)		37(69.8)	16(30.2)		39(73.6)	14(26.4)	
5th Yr	13(61.9)	8(34.0)		18(85.7)	3(14.3)		17(81.0)	4(19.0)	
Age #	21.5(1.4)	21.3(1.3)	0.301	21.7(1.5)	21.1(1.1)	<0.001	21.5(1.4)	21.2(1.2)	0.064
Gender, Female	132(59.2)	91(40.8)	0.867	114(51.1)	109(48.9)	0.103	152(68.2)	71(31.8)	0.555
Male	53(60.2)	35(39.8)		54(61.4)	34(38.6)		63(71.6)	25(28.4)	
Ethnicity, Chinese	37(64.9)	20(35.1)	0.821	39(68.4)	18(31.6)	0.109	47(82.5)	10(17.5)	0.072
Indian	48(58.5)	34(41.5)		43(52.4)	39(47.6)		58(70.7)	24(29.3)	
Malay	94(58.4)	67(41.6)		80(49.7)	81(50.3)		103(64.0)	58(36.0)	
Others	6(54.5)	5(45.5)		6(54.5)	5(45.5)		7(63.6)	4(36.4)	
Place of staying during COVID19, at home	173(60.1)	115(39.9)	0.458	155(53.8)	133(46.2)	0.802	202(70.1)	86(29.9)	0.174
stay in campus	12(52.2)	11(47.8)		13(56.5)	10(43.5)		13(56.5)	10(43.5)	
Underlying medical condition, no illness	174(60.4)	114(39.6)	0.287	158(54.9)	130(45.1)	0.382	203(70.5)	85(29.5)	0.202
Allergy	2(66.7)	1(33.3)		1(33.3)	2(66.7)		2(66.7)	1(33.3)	
Asthma	3(30.0)	7(70.0)		3(30.0)	7(70.0)		4(40.0)	6(60.0)	
Others	6(60.0)	4(40.0)		6(60.0)	4(40.0)		6(60.0)	4(40.0)	
Family Income #	6476	6576	0.854	6227	6858	0.240	6587	6360	0.694
± SD	4711	4554		4814	4420		4714	4496	
Brief Resilience scale	20.3±3.5	18.0±3.2	<0.001	20.3±3.6	18.3±3.3	<0.001	20.1±3.5	17.8±3.2	<0.001
Estimated QoL ± SD	15.6±1.7	13.7±1.9	<0.001	15.4±1.9	14.2±2.0	<0.001	15.3±1.8	13.8±2.0	<0.001

+ Chi-square test
Mann-Whitney U test
*Significant at p < 0.05
Yr:year ; SD: standard deviation

TABLE V: Predictors of depressive, anxiety and stress during COVID19 pandemic among medicalstudents using multivariate logistic regression (n = 311)

Parameters	Depressive Symptoms		Anxiety Symptoms		Stress Symptoms	
	AOR	p- value	AOR	p- value	AOR (95% CI)	p- value
Age	-		0.802	0.263	0.701	0.020
Year of study						
Pre-clinicals	-		0.492	0.201	-	
Clinicals			1			
Ethnicity						
Non-Chinese	-		1.738	0.110	2.044	0.075
Chinese			1		1	
Gender						
Female	-		1.510	0.161	-	
Male			1			
Place of studying						
In Campus	-		-		3.436	0.021
At Home					1	
Medical illness						
Has medical condition	-		-		1.815	0.243
No					1	
Family income	-		1.000	0.400		
Total Brief resilience score	0.878	0.002	0.878	0.002	0.848	<0.001
Total quality of life	0.583	<0.001	0.726	<0.001	0.702	<0.001

*Significant at p<0.05

an association between depression in medical students and suicidal ideation (34). The literature also reports that medical students with underlying depression also tend to underperform in their undergraduate studies, have higher dropout rates, and also exhibit long-term impairments in their work performance and career development (35). Therefore, medical schools and public health officials should closely monitor outcomes and engage those at risk of depression in activities to improve psychological resilience and quality of life.

Our study showed that 46% of the medical students experienced symptoms of anxiety. This prevalence is similar to another study in Indonesia (47.8%) (25) but relatively higher than a study among university students in Malaysia at 29.8% (36). However, compared to values from another study conducted in Turkey (62.5%), the results were significantly lower (37). The determinants of anxiety found in this study were psychological resilience and quality of life and the possible explanation was outlined above. These results differed from a study conducted in Turkey because the presence of chronic diseases was associated with a higher prevalence of anxiety. (37) Increased anxiety has been associated with families of students having a lower household incomes (37), being left alone (36), and again, which was not found to be associated with anxiety in this study.

Our study showed that 30.9% of the medical students suffered from stress symptoms. This prevalence is lower than in another study in Indonesia (44.6%) (25). Our study showed that 30.9% of the medical students suffered from stress symptoms. This finding is lower than in a study in Indonesia (44.6%) (25) but higher than the ones conducted at Wannan Medical College in Anhui Province, China (14.6%) (28), at Shri M. P. Shah Government Medical College in India (15.6%) (30) and a medical college for treatment of COVID-19 in India (20.7%) (29). Our study showed that older students (OR=0.700, $p=0.020$) experienced less stress. The likelihood of increased stress among the younger participants could be due to the timing of data collection, which coincided with the first-year students preparing for the examination amid the era of this global pandemic. Another explanation could be that older students had a better knowledge about COVID-19, and its prevention measures than the younger ones, which may additionally protect them from unjustified fear of COVID-19 infection (38). Older students tend to be more health literate in accessing and evaluating health-related information from reliable scientific sources, although young medical students may rely more heavily on social media to gather any information (38). In this study, medical students who stayed in campus were more likely to be affected by stress than those who stayed at home. Social isolation on campus due to the movement control order and a lack of direct family support may explain such important findings (39). The results point to the central role of family and social

support in reducing the risk of psychological distress among students (40, 41). Those who stayed at home during the pandemic were likely to receive support from parents and siblings, which has been shown to reduce the likelihood of psychological distress (40-42). Other stressors that may have impacted the psychological well-being of university students (including medical students) during the pandemic include financial constraints (personal or family), the more demanding expectations of distance learning, and the uncertainty of the COVID-19 pandemic, and concerns about the future employment status (36, 43, 44).

In this study, better quality of life was associated with a lower likelihood of stress. Sleep-wake cycle patterns and eating habits can change significantly during a pandemic, and may affect the mental well-being (37, 43). One study showed that exercise can promote better sleep efficiency and duration (45), and a specific diet can lead to shorter sleep duration and a poorer sleep quality (46). Exercise that can be done indoors, and a healthy diet improves mental health, which should be recommended for people, including the medical students, who find themselves socially isolated during lockdowns (43, 47). Other strategies for maintaining a healthy state of mind included remote chatting and hobbies such as indoor exercise, reading books or magazines, and also gardening. (44). Villanueva EW et al. reported that better quality of life resulted from a greater life resilience (43). In this study, a higher resilience score was associated with a lower risk of stress among the medical students. Young adults with high levels of resilience are less likely to suffer from mental health problems, interpersonal conflicts, behavioral problems, and poor academic performance than those with a low level of resilience (48).

This study showed that the mental health of medical students is deteriorating during the pandemic. In the post-MCO era and subsequently living with the COVID-19 infection, the findings serve to alert the medical school leaders, educators, and the medical community to create a better support system for the cohort of medical students who are vulnerable to be significantly affected by the pandemic. Medical curriculum developers should be aware and implement measures to mitigate the impact of the pandemic on the well-being of medical students. In particular, the current assessment modalities should be tailored to address the nuances and challenges faced by medical students during their clinical training in the midst of this pandemic.

To date, this is the first study conducted in Malaysia to look at the psychological distress of medical students during the COVID-19 pandemic. However, the study was conducted at a university, which limits the generalizability of the findings. Since this was a cross-sectional study, causality cannot be established. Nonetheless, the results allow for the design of future

targeted interventions to improve the mental health of medical students affected by the COVID-19 pandemic. The tool used in this study attempts to quantify the burden and psychological impact of the pandemic on people, which may not fully explain the complexity of the experiences and factors related to mental well-being. Therefore, we must carefully interpret the results, taking into account all possible limitations.

CONCLUSION

Our findings suggest that the COVID-19 pandemic is having an important impact on student's psychological well-being. More than two fifths have symptoms suggestive of depression and anxiety and about a third, have symptoms of stress. Those with higher score in quality of life and resilience scores had less depression, anxiety and stress. Those older medical students experienced less stress. Those who stayed on campus experienced more stress than those who stayed at home. To ensure the well-being of the future medical professionals, all the relevant stakeholders must identify those at risk of developing psychological distress and implement strategic interventions by engaging them in activities to improve their psychological resilience and quality of life.

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