

Anxiety Levels of Medical Students in Online Learning During COVID-19 Pandemic

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Abstract

Background: The COVID-19 pandemic has affected the education sector and caused major changes. This situation provides challenges for students, resulting in increased anxiety, especially for medical students who tend to have higher level of anxiety. This study aimed to determine the proportion of anxiety levels among undergraduate medical students in online learning during the COVID pandemic.

Methods: This cross-sectional descriptive study was conducted in September–November 2022, involving 156 undergraduate medical students at Universitas Padjadjaran, Indonesia batch 2019–2021 who had no history of somatic or psychiatric disease. The stratified simple random sampling method was used. Anxiety levels was assessed using the Hamilton Anxiety Rating Scale (HAM-A) questionnaire. Data was analyzed using Pearson's Correlation.

Results: Participants were dominated by females (71.1%), average age 19.9 years with a grade point average (GPA) of 3.51–4.00 (88.5%). The anxiety level of most participants was mild (67.9%) and 19.2% were at the severe level. Interestingly, severe levels of anxiety seemed to occur more commonly in females, group batch 2020, GPA 2.51–3.00, living alone and in a place other than in the family home or rented house. Furthermore, respiratory manifestations tended to be the mildest, whereas intellectual manifestations were more often severely impacted.

Conclusions: The anxiety level of undergraduate medical students in Universitas Padjadjaran is mostly mild. Female more often experience anxiety at a more severe level. Further research is needed to identify and analyze more comprehensively other possible anxiety factors in medical students.

Keywords: Anxiety, COVID-19, medical education, medical students, online learning system

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Introduction

Coronavirus disease 2019, commonly called COVID-19, is a disease that primarily infects the respiratory system with the virus SARS-CoV.¹ This disease was first reported in Wuhan, China, in December 2019, and by the World Health Organization (WHO) stated as a pandemic on March 11, 2020.² The first case in Indonesia itself was reported on March 2, 2020. At the time of drafting, by November 21, 2022, the Indonesian Government had announced

6,608,367 total confirmed cases and 159,379 deaths caused by COVID-19; lastly there were 62,179 total active cases.³ The government announced that the pandemic was a public health emergency, and as a preventive measure, the Indonesian Government has announced to enact of a large scale social restriction, which consists of programs, such as wearing masks, washing hands, social distancing, and the community activity restrictions enforcement program.⁴ This situation may induce mental illnesses, such as anxiety disorders.⁵ The

pandemic has triggered adaptations, especially in the education system. All activities normally carried out on-site must adapt to online methods and work from home.⁶ This abrupt change poses challenges for students.⁷

Anxiety is very common, as a natural response to a stimulus to incoming threats.⁸ During the COVID-19 pandemic, the number of anxiety disorders has increased among students, especially medical students. A study conducted in China shows that 23.8% of respondents had experienced anxiety; whereas studies in Bangladesh and Malaysia in 20.9% and 9.5%, respectively.⁴ Moreover, in India 81.7% of the respondents had anxiety ranging from mild to severe.⁹ This increase in anxiety among medical students is mainly due to the fact that this group is very susceptible to high levels of stress.¹⁰ The pandemic itself is a crucial cause of the sudden increase in the number and severity of anxiety. Not to mention the psychological pressure of disease transmission, limitation of the study program, increased workload and study time may explain this phenomenon. This condition is exacerbated by students in their final years of studies due to the uncertainty of their future.¹¹ Anxiety greatly impacts the quality of life, as its manifestations are very varied, affecting almost all systems in the body that affect physically, psychologically and socially as to how an individual functions.¹² Anxiety could also impact the academic performance of students in their study.¹³ Those with high levels of anxiety have unsatisfactory performance, whereas the group with normal levels of anxiety have a better performance.¹³ This is supported by a study carried out in Indonesia, which measures the effect of anxiety on academic performance and shows that students with moderate anxiety have disappointing results; while those with mild have satisfactory results.¹⁴ Many other factors could cause a medical student to have anxiety. Some of these are the abrupt system change from offline to online programs; the students are also unprepared to face change and an uncertain future; some programs have not been implemented optimally, such as laboratory activity skills, which is a program for pre-clinical students to learn clinical skills, all of these can trigger anxiety.¹⁵

To our knowledge, no study has been conducted on the undergraduate students regarding their anxiety levels. The data concerning the proportion of student's anxiety levels could be a great help for the faculty and university to detect and take action

accordingly. It could also be an input for the faculty for improvement of the system in the future. Therefore, the aim of this study was to explore the proportion of undergraduate students at the Faculty of Medicine, Universitas Padjadjaran, in batch class of 2019–2021.

Methods

This study was a cross-sectional descriptive study conducted in September–November 2022 using a questionnaire and involving preclinical or undergraduate medical students at the Faculty of Medicine Universitas Padjadjaran batch 2019–2021. Participants with a history of cardiovascular, respiratory, gastrointestinal, genitourinary, autonomic or psychiatric disease in the past six months as well as those who failed to answer the questionnaire as instructed and who did not consent this study were excluded. The sample was calculated using the Slovin's formula with 10% addition to anticipate missing or non-response data. The sample was selected using a stratified simple random sampling. Stratification was based on batch class and using a simple random sampling based on student identification number.

The questionnaire consisted of 2 main parts. The first part was to collect data on the characteristics of the respondents, the batch class, GPA, economic conditions and living conditions during online lectures, gender and age. The second part was the Hamilton Anxiety Rating Scale (HAM-A) questionnaire, that assessed anxiety levels based on 14 different symptoms experienced in the last six months. The assessment of anxiety symptoms by summing up each respondents' score for each variable then classified into four levels, namely no symptoms or normal, mild symptoms, mild-moderate symptoms, and severe symptoms. Each item on the HAM-A was scored on a scale of 0 (not present) to 4 (severe), with the total score ranging from 0 to 56. A higher score indicated more severe anxiety symptoms.

The questionnaires were sent personally in the form of a Google Form to each selected respondent via LINE social media. The HAM-A questionnaire had been translated into Bahasa Indonesia by other researchers and had been tested for validity and reliability. To ensure the quality of the questionnaire, the questionnaire had been through a pilot study and assessment. The HAM-A questionnaire was retested for validity and reliability with satisfactory Pearson Correlation results ranging from 0.646 to 0.904 for each question. Cronbach's

Alpa was 0.946 thus the questionnaire was valid and reliable.

The validity and reliability of the questionnaire were analyzed using the IBM SPSS ver. The data was analyzed using Microsoft Excel 2020 to calculate the proportion and percentage based on the result of the questionnaire as well as to formulate the charts used. The Research Ethics Committee of Universitas Padjadjaran had approved the ethical clearance (no. 698/UN6.KEP/EC/2022).

Results

In total, 217 students filled out the questionnaire, however, 61 were excluded from the study, due to having a history of psychiatric and/or somatic illness (n=59), filling out the questionnaire incorrectly (n=1), and not willing to participate further in the study (n=1).

Overall, there were 156 registered respondents with an age range of 18–22 years, with the majority of respondents being female

Table 1 Respondents Characteristics

Characteristics	Female (n=111)	Male (n=45)	Total n=156
	n (%)	n (%)	
Class batch			
2019	41 (36.9)	18 (40.0)	59 (37.8)
2020	34 (30.6)	11 (24.4)	45 (28.8)
2021	36 (32.4)	16 (35.5)	52 (33.4)
Age (year)			
18	7 (6.3)	1 (2.2)	8 (5.1)
19	31 (27.9)	14 (31.1)	45 (28.8)
20	32 (28.8)	14 (31.1)	46 (29.5)
21	33 (29.7)	13 (28.9)	46 (29.5)
22	8 (7.2)	3 (6.7)	11 (7.1)
Mean (years)	19.9	20.1	
GPA (Grade point average)			
3.51–4.00	100 (90.1)	38 (84.4)	138 (88.5)
3.01–3.50	9 (8.1)	6 (13.3)	15 (9.6)
2.51–3.00	2 (1.8)	0 (0.0)	2 (1.3)
2.00–2.50	0 (0.0)	1 (2.2)	1 (0.6)
Income during pandemic*			
Parents income			
Above average (> IDR 5.000.000)	39 (35.1)	21 (46.7)	60 (38.5)
Average (about IDR 5.000.000)	27 (24.3)	3 (6.7)	30 (19.2)
Below average (< IDR 5.000.000)	40 (36.0)	14 (31.1)	54 (34.6)
None	5 (4.5)	7 (15.6)	12 (7.7)
Independent income			
Above average (> IDR 1.500.000)	1 (0.9)	3 (6.7)	4 (2.6)
Average (about IDR 1.500.000)	1 (0.9)	3 (6.7)	4 (2.6)
Below average (< IDR 1.500.000)	6 (5.4)	1 (2.2)	7 (4.4)
None	103 (92.8)	38 (84.4)	141 (90.4)
Living with			
Family	70 (63.1)	22 (48.9)	92 (59.0)
Alone	35 (31.5)	21 (46.7)	56 (35.9)
Friends	6 (5.4)	2 (4.4)	8 (5.1)
Living at			
Home with family	40 (36.0)	18 (40.0)	58 (37.2)
Rented house	68 (61.3)	27 (60.0)	95 (60.9)
Others	3 (2.7)	0 (0.0)	3 (1.9)

Note: * Reference range was based on data from the Badan Pusat Statistik (Indonesia's Central Bureau of Statistics) available from bps.go.id

Table 2 Distribution of Scores Based on Clinical Manifestations on the HAM-A Questionnaire

Clinical Manifestation	Score									
	0		1		2		3		4	
	Male (n)	Female (n)	Male (n)	Female (n)	Male (n)	Female (n)	Male (n)	Female (n)	Male (n)	Female (n)
Anxious mood	8	16	11	26	14	40	12	22	0	7
Tension	14	27	16	27	8	27	6	19	1	11
Fear	25	43	10	33	7	18	2	12	1	5
Insomnia	18	35	12	31	6	23	6	13	3	9
Intellectual	7	7	7	14	7	33	14	41	10	16
Depressed mood	12	25	13	36	9	21	6	18	5	11
Somatic (Muscular)	31	54	7	27	4	8	2	19	1	3
Somatic (Sensory)	31	65	7	13	3	25	2	6	2	2
Cardiovascular symptoms	37	57	5	27	2	19	1	7	0	1
Respiratory symptoms	37	79	7	23	0	6	1	2	0	1
Gastrointestinal symptoms	34	60	7	23	3	13	1	10	0	5
Genitourinary symptoms	35	73	7	20	2	8	1	9	0	1
Autonomic symptoms	27	46	12	35	1	14	3	12	2	4
Behavioral changes	28	56	9	29	4	12	3	10	1	4

Note: scoring on a scale of 0 (none) to 4 (severe), with a total score ranging from 0 to 56. Higher scores indicate more severe anxiety symptoms.

(n=111; 71.1%), aged 21 years (29.7%). The respondents were selected from three different batches of the Faculty of Medicine of Universitas Padjadjaran, namely the batch 2019, 2020, and 2021, where the batch of 2019 was the largest proportion of all batches (n=59; 37.8%) (Table 1).

Most respondents (n=138; 88.5%)

had excellent academic achievements, as indicated by the majority being in the GPA range of 3.51–4.00. In terms of economic conditions during the COVID-19 pandemic, most participants depended on their parents (n=141; 90.4%). During online lectures, most students returned homes and lived with their parents, although some lived alone during this

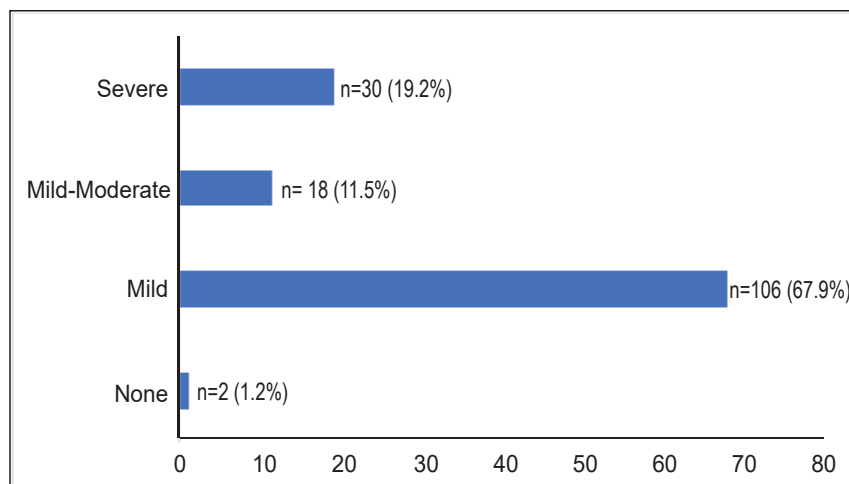


Figure 1 Proportion of Respondents Based on Anxiety Symptoms Assessment on the HAM-A Questionnaire

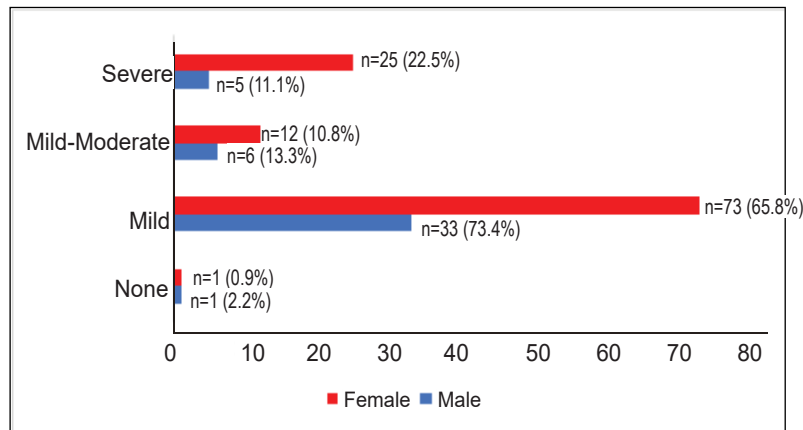


Figure 2 Level of Anxiety Symptoms of Medical Students Based on Gender

study period because there had been several transitions in the study program. Most of them lived in rented houses (60.9%) such as boarding houses, dormitories, and some lived with family and others (Table 1).

In clinical manifestation based on gender, there were differences in the most common symptoms. In both genders, the least recognized feature of anxiety among students was respiratory symptoms (n=37 and 79). However, there was a difference in terms of somatic sensory symptoms which were more common in female students (n=65), while in male students, the symptoms were cardiovascular disease (n=37), excluding respiratory and genitourinary symptoms (Table 2). For severe symptoms, intellectual

impairment characteristics were the most common symptoms experienced by students in both genders. However, in the female population, tension symptoms (n=11) were more common in severe forms, followed by insomnia (n=9)(Table 2).

The results of the anxiety symptom assessment using the HAM-A questionnaire showed that most participants had mild anxiety symptoms (67.9%), however, 30 (19.2%) of them were classified as having severe anxiety, which was concerning. Only two (1.2%) respondents admitted to not having any symptoms during online learning lectures (Figure 1).

Furthermore, there were differences in students' anxiety levels based on gender,

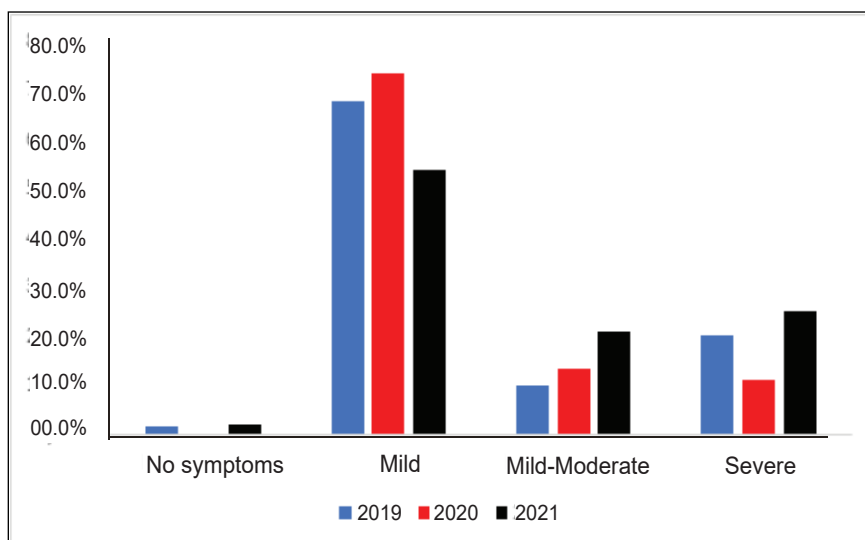


Figure 3 Proportion of Respondents for Anxiety Symptom Levels by Class (in percentage)

as study results showed that females were a group that more commonly experienced anxiety at a more severe level. The proportion among female students was 25 (22.5%) who experienced severe symptoms, 12 (10.8%) who experienced mild to moderate anxiety, 73 (65.8%) who experienced mild anxiety, and only one student (0.9%) admitted not having any symptoms related to anxiety. In contrast, for male respondents, there were 5 students (11.1%) with severe anxiety levels. Followed by mild to moderate anxiety affecting 6 students (13.3%), and 33 (73.4%) experienced mild anxiety. Besides, one student (2.2%) also admitted to not having any symptoms related to anxiety (Figure 2).

Based on age (Figure not shown) the same proportion pattern was found between age groups, in which respondents with mild symptoms were the most abundant group among other severity groups. However, interestingly, it could be seen that at moderate and severe levels of severity, the 22 year age group had a larger proportion of the respondents' population compared to the 20–21 year age group, and the same condition also occurred in the 20–21 age group compared to age group 18–19 year.

Meanwhile, when compared with class batch data, the mild severity level was still the largest proportion. Interestingly, the class batch of 2020 had the smallest proportion in the severe grading category, while the mild category had the highest proportion, although this class batch had the smallest proportion. The same patterns could also be seen in the batch class of 2021, which was the newest class at the time of data collection, which had a higher proportion of students with moderate and severe levels than other classes.

On the other hand, based on GPA (Figure not shown), students with lower GPAs (2.00–2.51) only experienced mild symptoms. Meanwhile, those with a fair GPA (2.51–3.00 and 3.01–3.50) had a higher proportion of experiencing more severe anxiety symptoms compared to those with a high GPA (3.51–4.00). Interestingly, some students with high GPAs admitted they did not experience anxiety-related symptoms.

Meanwhile, it showed that those whose parents had no income seemed to have mild symptoms. Whereas students whose parents' incomes were in the average range experienced a higher proportion of severe symptoms (26.7%). Moreover, those whose parents' incomes were below average income had a higher proportion compared to other groups to have mild-moderate anxiety

symptoms (24.0%), although this group had about the same proportions as those who had a high income for severe symptoms (both groups ranged at about 18%). In addition, those whose parents had independent income mostly experienced mild anxiety (61.7%). Not far behind were students whose parents had below-average independent incomes; these students had a higher proportion of those experiencing severe symptoms (14.3%) (Figure not shown).

Interestingly, there seemed to be differences in anxiety symptom levels based on living conditions and companions (Figure not shown). Those who lived alone during the online lecture tended to have a higher proportion (25%) of severe symptoms than those who lived with their family or friends (16.3% and 12.5% respectively). Also, another fascinating result was that those who lived with their friends seemed to have mild symptoms in a higher proportion (87.5%) rather than those who lived with their families (64.1%); this seemed to be true for the severe levels, as well. Meanwhile, those living in homes owned by their family seemed to have milder symptoms (72.4%), in contrast to those who did not live in rented spaces (61.1%) or other living spaces (66.7%). Respondents living in dormitories or boarding schools also seemed to have a higher proportion of severe anxiety (33.3%) than other groups.

Discussion

The results of this study indicate that most of the students majoring in medicine at the Faculty of Medicine of Universitas Padjadjaran batch 2019–2021 have experienced symptoms of anxiety during the last six months or precisely during online lectures. This phenomenon is due to the nature of the medical school itself, namely the lectures given are more challenging for students than other majors, so that it can trigger anxiety.¹⁶ Another factor that needs to be taken into account is the economic burden.¹⁷ In this study, most participants depended on their parent's income, and more than 30% of students' parents had incomes below the national average. This in turn can generate stress which can eventually lead to not only anxiety but also other psychological problems.^{18,19}

Lifestyle factors such as sleep habits¹⁷ can also result in anxiety by affecting the normal physiology of the brain and neurotransmitters in relation to the pathophysiology of anxiety. This is very interesting to mention because

one of the anxiety symptoms that respondents most often experience is insomnia. Thus, there might be a chain effect that affects the severity of anxiety symptoms.

Female gender appears to be another profound factor,²⁰ and anxiety tends to be more prevalent in females, although the exact mechanism by which this phenomenon occurs is unknown.²¹ Some theories, such as metacognition, suggest that females are naturally more anxious, which may be the cause of the condition.²¹ The COVID-19 pandemic and the changes it has imposed are also important factors to consider. Major transitions in daily life, such as social distancing and, in some countries, government-imposed lockdowns, are creating stressful times, coupled with rates of transmission and mortality from the disease itself, causing many people to become anxious about their health and the future. During social distancing, social support is limited, and many adolescents, like the participants in this study, cannot cope positively with the situation, thereby contributing to higher levels of anxiety.^{22,23} In contrast, during the online lectures, the group living with family had lower anxiety levels compared to those living alone. This shows that social support from the family and increased interaction with parents²⁴ can help cope with anxiety.

As previously mentioned in the results section, the class of 2021 had a relatively higher proportion of severe anxiety levels. The causes of these results included the fact that in 2020, there was a change in the curriculum from the previous curriculum. The main difference in the curriculum is that the previous curriculum focused more on problem-based learning and was based on prepared clinical cases. This is very different from the 2020 curriculum which is more centered on the students themselves in collaborating and solving problem. Online lectures have advantages, such as flexible time and high accessibility to lectures.¹⁵ Meanwhile the disadvantages are the lack of communication between lecturers and students, for activities such as skills laboratory activities being less than optimal, which could lead to the students having a lower level of understanding of the materials being studied.¹⁵ A tight schedule of daily study lectures and extracurricular activities imply that students are exposed to extended screen time during online lectures and sometimes lack physical activity. This is in line with a study conducted at Kunming University, China which showed that anxiety is commonly associated with lack of physical exercise, irregular diet and inability

to adapt to lectures.²⁵

In addition, at the time this study was conducted, students of the Faculty of Medicine, Universitas Padjadjaran were also adapting from online lecture to a hybrid learning system in which activities such as laboratory activities, clinical skills laboratory activities and some lectures, were mostly carried out offline in the campus, whereas activities that could still be done with an online lecture approach were still maintained. Another study also found that first-year students tend to have higher anxiety levels, which may be due to their high expectations and challenges in adapting to a new environments²⁴ and tend to be more stressful. Meanwhile, the class of 2019 has just entered its final year, and is facing various kinds of pressures, such as increasingly tight schedules and demands for thesis, lectures, and various other activities such as internships and other activities.

Compared to a study conducted on the general population of the community of Indonesian citizens using the HAM-A questionnaire, the results are quite similar.¹⁷ The difference is that in this study, carried out on medical students, the severity level is higher than in the general population and fewer respondents claim to have no symptoms or are normal. The results in this study are also similar to a study conducted on medical students of the United Arab Emirates,²⁶ most of whom experience mild anxiety, although a third of respondents from that study experienced severe anxiety symptoms. The difference may be due to the time of the study itself, which was carried out in the United Arab Emirates approximately at the beginning of the pandemic. Meanwhile, this study was conducted later; thus, the students were more prepared and more adapted to the conditions during the pandemic. In this study there are similar findings to other studies conducted previously, which show that female students are most likely to experience more severe anxiety symptoms.²⁶

Another study conducted in the United States,²⁷ including 40 medical schools, reported that 65.9% of total respondents admitted having symptoms of anxiety. Meanwhile, 30.9% of them have a positive screen for anxiety disorder. The study used a GAD-7 questionnaire as their research tool, and a score of more than 10 (classified as moderate anxiety) is considered to be a positive screen. A similar result was also obtained using the GAD-7 questionnaire, but it was carried out during the post-COVID-19 era. It is similar to this

study, showing that 25% of the students in the study in China are experiencing anxiety.²⁸ This is similar to our study, where approximately one-third of the total has moderate or higher levels of anxiety symptoms, but a lower proportion of those do not experience any symptoms. This may be due to the difference in the tool for assessing the anxiety level, which is relatively more simplified and compact with only seven items in their questions, or the time of study and geographical and cultural factors may contribute to this difference in results.

A study conducted in Lithuania also used the GAD-7 questionnaire as the main tool to assess anxiety and showed that 34.2% of the total respondents experienced anxiety.²⁹ This finding shows similarities with the study conducted at Universitas Padjadjaran, in which moderate and severe affected about one third of the total sample. This study also showed that female are more commonly affected by psychological illnesses such as anxiety and depression as well as also sleep disorders.

A study shows that Indonesia has a lower anxiety rates compared to other Asian countries.⁴ Interestingly, our study also found that the proportion of students with mild-moderate and severe symptoms of anxiety is quite high, affecting about 30% of students in total. This problem may be due to various reasons, such as the stigmatization of mental illness which is common, especially in Asian countries³⁰ or they may think that it is still normal or they feel able to cope with the symptoms; however, it could be a major threat especially if it develops to an anxiety disorder and disrupt many aspects of life. At the Faculty of Medicine, Universitas Padjadjaran, there are programs such as educational advisors which can be a means for students to ask questions or consult regarding their worries or anxieties. The university also provides a consultation center regarding mental illness carried out by experts from the Faculty of Psychology, Universitas Padjadjaran. However, during online lectures, it seemed that the function or socialization of the availability of this program was very minimal. Thus, this may explain the high proportion of severity levels.

The limitation of this study is that the response rate has not reached the target, which is only a response rate of 80.89%, even though the proportion of students in each class is quite good in terms of distribution. However, the number of respondents from the batch 2020 can still be increased. In further research, interpersonal relations are needed so that respondents are more willing to fill

out the questionnaire. The questionnaire itself seems highly subjective, although reliable and valid, so in an online setting, it is more difficult to observe respondents directly to see their responses when filling out the questionnaire; sampling on multiple occasions can also help eliminate subjectivity. A more comprehensive approach to the factors discussed in this study or other factors could also be included due to the nature of anxiety itself being highly multifactorial, such as ethnicity, social support, religion, and other factors.

This study concludes that the proportion of anxiety levels of undergraduate medical students at the Faculty of Medicine, Universitas Padjadjaran, is mostly with mild symptoms. Meanwhile, when compared between genders, the pattern is similar for both female and male, with the majority having mild symptoms. However, we female students seem to have a higher proportion with more severe.

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