



Review Article

Depression and Anxiety in Medical Students during the COVID-19 Pandemic

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ABSTRACT

Medical students are prone to anxiety and depression, largely due to the nature of their coursework. During the COVID-19 pandemic, many medical students were required to study from home without being involved in clinical practice. The aim of this study was to investigate depression and generalized anxiety disorder (GAD), plus possible risk factors in medical students around the world during the pandemic. A primary search was conducted using PubMed, limited to the period 2020–2021. A second search was conducted to acquire studies published before the pandemic, aiming to have a baseline prevalence value for these disorders in medical students. During the pandemic, the prevalence of depression in the USA (31.7%, 12.5%, and 10.8% for mild, moderate, and severe depression, respectively) was higher than the reported prevalence in Pakistan, Nepal, and Iran, although the four countries used different psychiatric instruments, making comparison difficult (9-item Patient Health Questionnaire, Self-rating Depression Scale, Hospital Anxiety and Depression Scale-Depression [HADS-D], and Beck Depression Inventory [BDI-II]). The prevalence of GAD in the USA was also higher (35.3%, 19.5%, and 11.1%, for mild, moderate, and severe GAD) than the prevalence in China (21.3%, 2.7%, and 0.9%, for mild, moderate, and severe anxiety), and the overall prevalence in Brazil, (46.2%), using the same instrument (GAD-7). The prevalence of GAD in the USA was also higher than the prevalence in Nepal, Pakistan, and Iran, although the researchers used a different psychiatric instrument (HADS-A, Self-rating Anxiety Scale, and Beck Anxiety Inventory instruments, respectively). Before the pandemic, the reported prevalence of depression in the USA was lower (11.6%, 9.0%, and 3.0% for mild, moderate, and severe depression), than in Pakistan (31.0%, 13.6%, and 4.8%), using the BDI instrument. In Nepal, the prevalence of depression (5.2%) was higher than in Portugal (2.3%), ascertained with the HADS-D instrument. The prevalence in Egypt (65% using Depression Anxiety Stress Scale DASS-21]) and India (14.7%, 19%, and 17.5% mild, moderate, and severe depression, using DASS 42) were the highest prevalence values reported before the pandemic. For anxiety, the prevalence of overall GAD in Nepal (16.2%) was comparable to the one reported in Portugal (14.2%), both identified with the HADS-A instrument. The prevalence of GAD reported in India and in Egypt were the highest values, determined with the DASS 42 and DASS 21, respectively. Studies have reported that general social isolation and loneliness are risk factors contributing factors toward depression. Other risk factors identified with depression and/or anxiety disorders were being female, having a lower GPA, lower COVID-19 awareness, and having more experience with COVID symptoms. High prevalence of depression and GAD was identified in medical students in various countries. It is imperative that during any crisis such as the one experienced in the present COVID-19 pandemic, vulnerable populations to mental health disorders, such as medical students, are identified and supported. Further research needs to be done to explore other possible factors, such as living conditions, marital status, social-cultural influences, financial issues, and their relationship to depression and anxiety in this population, to further understand the best interventions to support this population.

Keywords: Depression, Anxiety, Medical students, COVID-19, Pandemic and risk factors

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INTRODUCTION

According to the World Health Organization (WHO), more than 264 million are affected by depression around the world.^[1] The COVID-19 pandemic has changed the rhythm of society in a myriad of ways and its effect on mental health of the population is foreseeable. Social distancing and other public health measures that have been taken to reduce the burden of the infection have left people feeling isolated and searching for new ways to connect and maintain relationships.^[2] Common meeting places such as malls, restaurants, and movie theaters have limited entry or are closed, as well as college campuses and dormitories. Holidays now come with the guilt and risk of meeting with family or solitude of remaining alone. Travel restrictions make visiting family and friends an even more difficult task. Even professional life has become isolated, with many jobs no longer requiring one to come into the office.^[3] Academic institutions also require students across age groups to participate in remote learning.^[4]

Many medical students are also required to participate in remote learning. Medical students have a distinct perspective altogether as part of the health-care community, without being directly involved in the clinical aspect of the disease.^[5] Medical students, due to the nature of their coursework, are already prone to anxiety and depression.^[6]

How have the changes implemented on society to limit the spread of COVID-19 affected medical students' mental health in relation to generalized anxiety disorder (GAD) and depression? The following literature review aims to explore the ways in which the COVID-19 pandemic has affected the prevalence of these mental health disorders in these students and the identified risk factors around the world.

METHODOLOGY

Case definition

Depression, as described by the American Psychiatric Association's Diagnostic and Statistical Manual, Fifth Edition (DSM-5), consists of mood and cognitive symptoms: Dysphoria, anhedonia, worthlessness or excessive guilt, impaired concentration and decision-making, and suicidal ideation and behavior.^[7] Anxiety, another prevalent mental illness, affects one in every 13 people globally.^[8] The DSM-5 describes GAD as "excessive worry and anxiety more days than not for at least 6 months." GAD is intrusive, causes distress or functional impairment, and is often accompanied by physical symptoms such as gastrointestinal distress, headaches, or muscle tension.^[9] In cross-sectional and survey-based studies, various psychiatric instruments are used to ascertain anxiety disorders (GAD-7, Depression Anxiety Stress Scale [DASS-21], Beck Anxiety Inventory

[BAI], and Zung self-rating Anxiety Scale [SAS]) and depressive disorders (DASS-21, 9-item patient health questionnaire (PHQ-9), Beck Depression Inventory (BDI-I, BDI-II, and self-rating depression scale [SDS]).

Search strategy

The primary search used was PubMed and included the search terms: "Depression," "anxiety," "medical students," "COVID-19," "pandemic," and "risk factors," limited to the period of 2020–2021. Articles identified in PubMed using the search criteria were reviewed for reference. The main risk factors were obtained from the references extracted. A second search was done looking for studies published before the pandemic between 2011 and 2019, aiming to have a baseline value for the prevalence of depression and of anxiety in medical students [Figure 1].

RESULTS

Prevalence of depression and anxiety

Depression

A cross-sectional study by Halperin *et al.*^[10] surveyed 407 medical students at Yale and Rutgers College of Medicine in the USA during a 2-week period. The survey was conducted in April 2020 when positive COVID-19 cases were rising exponentially in the USA. Depression was identified using the PHQ-9, with 31.7% scoring 5–9 (mild depression), 13.5% scoring 10–14 (moderate depression), and 10.8% scoring between 15 and 27 for moderately severe/severe depression. The median and mean depression scores among all the students were 5 and 6.5, respectively.

An online cross-sectional survey conducted Zafar *et al.*^[11] in Pakistan, reported that 4.8% of the medical students

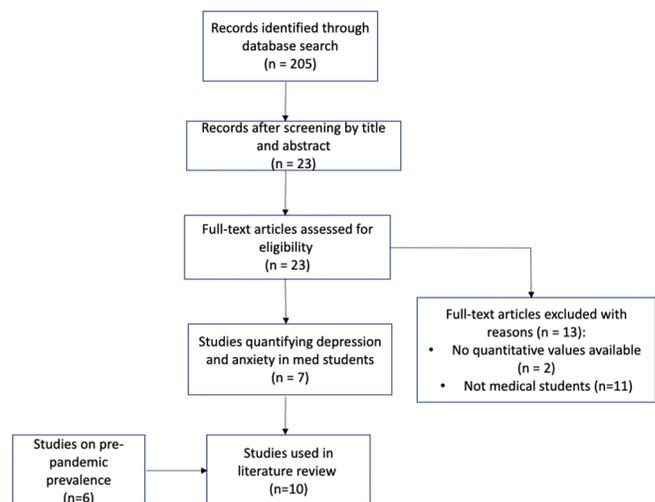


Figure 1: Study selection process used for the literature review.

Table 1: Prevalence of depression and of anxiety in medical students during COVID-19 pandemic.

Reference	Location	Sample size	Instrument	Prevalence (%)			
				Mild	Moderate	Severe	Overall
Halperin <i>et al.</i> ^[10]	United States	1428	PHQ-9	31.7	13.5	10.8	
Zafar <i>et al.</i> ^[11]	Pakistan	323	SDS	4.8	0.7	0.1	
Risal <i>et al.</i> ^[12]	Nepal	416	HADS-D	-	-	-	5.9
Nakhostin-Ansari <i>et al.</i> ^[13]	Iran	323	BDI-II	16.0	8.0	2.0	-
Cao <i>et al.</i> ^[15]	China	7143	GAD-7	21.3	2.7	0.9	-
Halperin <i>et al.</i> ^[10]	United States	1428	GAD-7	35.3	19.5	11.1	-
Risal <i>et al.</i> ^[12]	Nepal	416	HADS-A	-	-	-	11.8
Nakhotin-Ansari <i>et al.</i> ^[13]	Iran	323	BAI	23.8	9.6	4.6	-
Sartorão-Filho <i>et al.</i> ^[16]	Brazil	340	GAD-7	-	-	-	46.2
Xiao <i>et al.</i> ^[17]	China	217	GAD-7	-	-	-	17.1
Zafar <i>et al.</i> ^[11]	Pakistan	323	SAS	0.9	0.5	0	-

PHQ-9: 9-item Patient Health Questionnaire; SDS: Zung Self-rating Depression Scale; HADS-D: Hospital Anxiety and Depression Scale-Depression; GAD: Generalized Anxiety Disorder. GAD-7: 7-Item Generalized Anxiety Disorder Scale; BAI: Beck Anxiety Inventory; Zung SAS: Zung Self-rating Anxiety Scale; HADS: HADS-A: Hospital Anxiety and Depression Scale-Anxiety

experienced mild depression, 0.7% reported moderate depression, and 0.1% reported severe depression, using the Zung SDS.

In Nepal, Risal *et al.*^[12] reported the results of a cross-sectional study of 416 medical students^[12] and identified an overall prevalence of depression of 5.9%, administering the online Hospital Anxiety and Depression Scale Depression (HADS-D) instrument.

Nakhostin-Ansari *et al.*^[13] conducted a study in Iran reporting a prevalence of 16.7% for mild depression, 8.0% for moderate depression, and 2.8% for severe depression, among medical students.

Anxiety

In the study on medical students at Yale and Rutgers College of Medicine mentioned earlier,^[10] anxiety was ascertained using the 7-item GAD-7, with a score between 5 and 9 for mild anxiety, 10 and 14 for moderate anxiety, and 15 and 21 for severe anxiety. Results identified 35.3% of the students with mild anxiety, 19.5% with moderate anxiety, and 11.1% with severe anxiety.

The cross-sectional study performed in Nepal^[12] with 416 medical students and reported an overall prevalence of anxiety of 11.8%, using the online HADS-D instrument.

A systematic review and meta-analysis published by Lasheras *et al.*^[14] and explored the prevalence of anxiety in the medical student population of various countries. The meta-analysis included cross-sectional studies on medical students, published until June 26, 2020. These studies were done in Brazil, China, India, Iran, and the United Arab Emirates, although not all studies were of high quality, with only three studies reporting high response rate.^[15-17] Two of

these high-quality studies (quality score = 9) investigated the prevalence of anxiety in medical students in China.^[15,17] A high-quality study conducted by Cao *et al.*^[15] in China assessed anxiety using the GAD-7 Scale found the prevalence of mild, moderate, and severe anxiety to be 21.3%, 2.7%, and 0.9%, respectively. The other study done in China conducted by Xiao *et al.*^[17] had the lowest prevalence of GAD reported at 17.1% overall using the GAD-7 instrument. The other high-quality study was done in Brazil,^[16] reporting an overall prevalence of anxiety of 46.2%, using the GAD-7, higher than the study done in China. Another study (quality score = 8) done in Iran,^[13] part of the systematic review published by Lasheras,^[14] reported a prevalence of GAD of 23.8% for mild, 9.6% for moderate, and 4.6% for severe anxiety.

A cross-sectional survey conducted in Pakistan^[11] using the Zung SAS instrument reported that 0.9% of the medical students experienced mild anxiety and 0.5% reported moderate anxiety. No severe anxiety cases were identified.

Risk factors for depression and anxiety in medical students during the COVID-19 pandemic

The study by Halperin *et al.*^[10] reported that results differed significantly depending on geographic location within the United States. A key factor was that 81% of the students in the survey were quarantined away from their medical campus. The median anxiety score, using the GAD-7, of students living off campus was 6.5, while for those living on campus, it was 6. The median depression score, using the PHQ-9, of students living off campus was 5, while for those living on campus, it was 6.

In Pakistan, Zafar *et al.*^[11] found that medical students who were less aware of COVID-19's etiology and its effects were more likely to experience anxiety and/or depression ($P < 0.05$). Female medical students, compared to male

medical students, were more likely to experience both anxious and depressive symptoms. In the same study, participants older than 50 years did not show symptoms of anxiety. This study also reported a statistically significant difference in prevalence of these disorders in medical students compared to the general public and health-care professionals ($P < 0.05$).

The study by Nakhostin-Ansari *et al.*^[13] conducted in Iran determined the correlation between depression and/or anxiety to factors such as age and GPA. GPA was negatively correlated with anxiety and depression levels, with participants with higher GPA experiencing less depression and anxiety symptoms and vice versa. Age was found not to have a significant correlation with depression and anxiety ($P > 0.05$). Students' marital status, living environment, and experience with COVID-19 symptoms were also considered, although they were not found to be statistically significant. This study also found that anxiety was more common in females. Anxiety and depression were more frequent in those students who experienced symptoms of COVID-19.

The study by Cao *et al.*^[15] reported earlier and found that a stable family income (OR = 0.726; 95% CI = 0.645–0.817), living with their parents (OR = 0.752, 95% CI = 0.596–0.950), and living in an urban area (OR = 0.810; 95% CI = 0.709–0.925) were protective against GAD. Conversely, having relatives or acquaintances infected with COVID-19 were a significant risk factor for anxiety (OR = 3.007; 95% CI = 2.377–3.804).

Prevalence of depression and anxiety before the COVID-19 pandemic

Details of the studies that identified depression and anxiety in medical students before the pandemic are shown in Table 2.

The prevalence of anxiety and depression was notable among medical students before the COVID-19 pandemic.^[6]

A study by Ghodasara *et al.*^[18] in Vanderbilt University School of Medicine in the USA reported the prevalence of mild depression 11.6%, moderate depression 9.0%, and severe depression 3.0% among its students.

A study done in India by Iqbal *et al.*^[19] in medical students, reported 14.7% mild, 19.0% moderate, and 17.5% severe depression ascertained using the BDI instrument. The authors also reported 10.5% mild, 22.9% moderate, and 33.8% severe anxiety, ascertained with the BAI instrument.

The study done in Nepal by Risal *et al.*,^[20] reported an overall depression among medical students of 5.2%. The authors reported overall anxiety among medical students to be 16.2% pre-pandemic.

The study done in Pakistan published in 2017^[21] identified a prevalence of mild, moderate, and severe depression of 31.0%, 13.6%, and 4.8%, respectively, with the HADS-D instrument.

A study from Egypt found very high values for overall depression to be 65% (DASS-21 instrument) and overall anxiety to be 73%.^[22]

The study conducted in Portugal pre-pandemic reported 2.3% and 14.2% for depression and anxiety, respectively.^[23] The authors used the same instrument as in the study from Nepal.^[20]

Regarding the prevalence of anxiety before the pandemic, in the study done in Pakistan published in 2017,^[21] the prevalence of mild anxiety was 72% of the medical students, while 13.6% experienced moderate anxiety and

Table 2: Prevalence of anxiety and depression reported in medical students before the COVID-19 pandemic.

Publication	Location	Sample size	Instrument	Depression (%)		
				Mild	Moderate	Severe
Ghodasara <i>et al.</i> ^[18]	USA	301	BDI-II	11.6	9.0	3.0
Iqbal <i>et al.</i> ^[19]	India	353	DASS 42	14.7	19.0	17.5
Risal <i>et al.</i> ^[20]	Nepal	2100	HASD-D		Overall: 5.2	
Azad <i>et al.</i> ^[21]	Pakistan	354	BDI	31.0	13.6	4.8
Fawzy and Hamed ^[22]	Egypt	700	DASS 21		Overall: 65	
De Sousa <i>et al.</i> ^[23]	Portugal	512	HADS-D		Clinically relevant: 2.3	
Publication	Location	Sample size	Instrument	Anxiety (%)		
				Mild	Moderate	Severe
Azad <i>et al.</i> ^[21]	Pakistan	354	BAS	72.0	13.6	5.6
Iqbal <i>et al.</i> ^[19]	India	353	DASS 42	10.5	22.9	33.8
Risal <i>et al.</i> ^[20]	Nepal	2100	HADS-A		Overall: 16.2	
Fawzy and Hamed ^[22]	Egypt	700	DASS 21		Overall: 73	
De Sousa <i>et al.</i> ^[23]	Portugal	512	HADS-A		Clinically relevant: 14.2	

BDI: Beck depression inventory, BDI-II: Beck depression inventory II, DASS: Depression anxiety stress scale, BAS: Beck anxiety scale, HADS: Hospital anxiety and depression scale (A: Anxiety; D: Depression)

5.6% experienced severe anxiety, assessed with the BAS instrument.

DISCUSSION

Among the studies done during the COVID-19 pandemic on the prevalence of depression, the prevalence in the USA was higher than the reported prevalence in Pakistan, Nepal, and Iran, although the four countries used different psychiatric instruments, making any comparison difficult (PHQ-9, SDS, HADS-D, and BDI-II). The information obtained from the studies assessing the prevalence of GAD showed higher values in the USA compared to China, and compared to the overall prevalence in Brazil, all three studies using the same instrument (GAD-7). The reported prevalence of GAD in the USA was also higher than the prevalence in Nepal, Pakistan, and Iran, although the researchers used different psychiatric instruments (HADS-A, SAS, and BAI instruments, respectively).

Before the pandemic, the reported prevalence of depression in the USA was lower than in Pakistan, using the BDI instrument. In Nepal, the prevalence of depression was higher than in Portugal, both values ascertained with the HADS-D instrument. The prevalence in Egypt (using DASS 21) and in India (using DASS 42) was the highest prevalence values reported before the pandemic. For anxiety, the prevalence of overall GAD in Nepal was comparable to the one reported in Portugal, both identified with the HADS-A instrument. The prevalence of GAD reported in India and in Egypt was the highest values, using the DASS 42 and DASS 21, respectively.

Social isolation and loneliness were the main risk factors identified contributing mostly to depression. Living with parents and living in urban areas were found to be protective in GAD, as it was having a stable family income. Other risk factors identified in depression and/or anxiety disorders were being female, younger than 40 years, having a lower GPA, lower COVID-19 awareness, and having more experience with COVID symptoms. Having a relative or acquaintance infected with COVID-19 symptoms was a risk factor for these disorders.

There are many methodological issues to consider when ascertaining depression and anxiety in medical students during the COVID-19 pandemic. In many studies, the instruments used to quantify these mental health conditions were different, which can influence the dissimilarity of the reported results. This is also true of studies conducted on depression and anxiety in medical students conducted before the COVID-19 pandemic.

The populations considered in the studies were vastly different. Comparing the results of the present review, medical students were categorized differently among the studies; some included clerkship and clinical students, other

studies considered basic science students or any combination of the above. The varying ages of the participants observed in these studies may also contribute to the mental health status of the students. In countries such as Pakistan, India, Egypt, and Portugal, students enter medical school promptly after secondary school, whereas in the USA, it is most common to attend medical school after attaining a bachelor's degree. Consequently, students in the USA might be older, more independent, and accustomed to living away from their families.

The cultural background in various countries may influence how depression and anxiety are reported. Notably, most of the studies were focused on medical students in China, thus much of the reported results are dependent on how Chinese culture perceives mental health. Furthermore, some studies had a wide disparity between the genders of the participants. For example, Cao *et al.*^[15] reported that approximately two-thirds of the total study population were women. Another factor to consider was whether the students lived on or off campus. Halperin *et al.*^[10] studied U.S. medical students and most of which were living away from their primary campus in urban settings in the Northeast region. While the median GAD-7 score was higher for students living off campus versus on campus, the median PHQ-9 score was lower for students living on campus.

In addition, there are less studies assessing depression and anxiety in students in their basic science years, compared to those in their clinical science years. These values are expected to show different results based on the variation of required tasks between basic science and clinical science years. Students who are in clinical years face direct exposure to patients whose health was affected by the pandemic, in their respective hospital or office setting. The stresses of adjusting their clinical skills to new limitations and facing dying or severely ill patients are expected to lead to higher levels of anxiety and depression.^[10] Conversely, clinical students have more social interaction when compared to students in basic sciences, who were mostly isolated due to remote learning during the pandemic. Other possible risk factors such as whether the students were living at home, financial situation, gender, and grade point average should be considered when assessing causes for anxiety and depression in these populations.^[10]

CONCLUSION

The identified prevalence of depression and of GAD in the medical student population varied between countries before and during the COVID-19 pandemic. Various risk factors were identified such as being younger than 40 years old, being female, having lower GPA, social isolation and loneliness, lower COVID-19 awareness, and experiencing COVID symptoms. The social structure of each country,

habitation, and cultural norms are also factors to consider when assessing a specific nation's psychosocial burden. It is imperative that, during the present COVID-19 pandemic and other comparable future situations, populations vulnerable to depression and anxiety are identified, such as the medical student population. Further research needs to be done to ascertain the prevalence of mental health disorders and risk factors in medical students, and in general in health workers worldwide, knowledge that will assist in developing strategies to lower the prevalence of mental health disorders.

Declaration of patient consent

Patients' consent not required as there are no patients in this study.

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Conflicts of interest

Dr. Maria Elena Villamil is the editorial board member of the journal.

REFERENCES

1. Depression. Available from: <https://www.who.int/news-room/fact-sheets/detail/depression> [Last accessed on 2020 Jan 30].
2. Smith BJ, Lim MH. How the COVID-19 pandemic is focusing attention on loneliness and social isolation. *Public Health Res Pract* 2020;30:3022008.
3. Galanti T, Guidetti G, Mazzei E, Zappalà S, Toscano F. Work from home during the COVID-19 outbreak: The impact on employees' remote work productivity, engagement, and stress. *J Occup Environ Med* 2021;63:e426-32.
4. For Specific Industries and Occupations. (n.d.). Available from: <https://www.cdc.gov/coronavirus/2019-ncov/community/workplaces-businesses/specific-industries.html> [Last accessed on 2021 Apr 13].
5. Anderson V. Academic during a pandemic: Reflections from a medical student on learning during SARS-CoVid-2. *HEC Forum* 2021;33:35-43.
6. Moir F, Yelder J, Sanson J, Chen Y. Depression in medical students: Current insights. *Adv Med Educ Pract* 2018;9:323-33.
7. Battle DE. Diagnostic and statistical manual of mental disorders (DSM). *Codas* 2013;25:191-2.
8. Understand the Facts: Anxiety and Depression Association of America, ADAA. Anxiety Disorders and Depression Research and Treatment. (n.d.). Available from: <https://adaa.org/understanding-anxiety> [Last accessed on 2021 Nov 27].
9. Locke AB, Kirst N, Shultz CG. Diagnosis and management of generalized anxiety disorder and panic disorder in adults. *Am Fam Physician* 2015;91:617-24.
10. Halperin SJ, Henderson MN, Prenner S, Grauer JN. Prevalence of anxiety and depression among medical students during the Covid-19 pandemic: A cross-sectional study. *J Med Educ Curr Dev* 2021;8:2382120521991150.
11. Zafar S, Tahir M, Malik M, Malik M, Kamal Akhtar F, *et al.* Awareness, anxiety, and depression in healthcare professionals, medical students, and general population of Pakistan during COVID-19 Pandemic: A cross sectional online survey. *Med J Islam Repub Iran* 2020;34:131.
12. Risal A, Shikhrakar S, Mishra S, Kunwar D, Karki E, Shrestha B, *et al.* Anxiety and depression during COVID-19 pandemic among medical students in Nepal. *Kathmandu Univ Med J* 2020;18:333-9.
13. Nakhostin-Ansari A, Sherafati A, Aghajani F, Khonji MS, Aghajani R, Shahmansouri N. Depression and anxiety among Iranian medical students during COVID-19 pandemic. *Iran J Psychiatry* 2020;15:228-35.
14. Lasheras I, Gracia-García P, Lipnicki DM, Bueno-Notivol J, López-Antón R, de la Cámara C, *et al.* Prevalence of anxiety in medical students during the COVID-19 pandemic: A rapid systematic review with meta-analysis. *Int J Environ Res Public Health* 2020;17:6603.
15. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, *et al.* The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res* 2020;287:112934.
16. Sartorão-Filho C, de Las Villas Rodrigues W, de Castro R, Marçal A, Pavelqueires S, Takano L, *et al.* Impact of Covid-19 pandemic on mental health of medical students: A cross-sectional study using GAD-7 and PHQ-9 questionnaires. *medRxiv* 2020;2020:20138925.
17. Xiao H, Shu W, Li M, Li Z, Tao F, Wu X, *et al.* Social distancing among medical students during the 2019 coronavirus disease pandemic in china: disease awareness, anxiety disorder, depression, and behavioral activities. *Int J Environ Res Public Health* 2020;17:5047.
18. Ghodasara SL, Davidson MA, Reich MS, Savoie CV, Rodgers SM. Assessing student mental health at the Vanderbilt university school of Medicine. *Acad Med* 2011;86:116-21.
19. Iqbal S, Gupta S, Venkatarao E. Stress, anxiety and depression among medical undergraduate students and their socio-demographic correlates. *Indian J Med Res* 2015;141:354-7.
20. Risal A, Manandhar K, Linde M, Steiner TJ, Holen A. Anxiety and depression in Nepal: Prevalence, comorbidity and associations. *BMC Psychiatry* 2016;16:102.
21. Azad N, Shahid A, Abbas N, Shaheen A, Munir N. Anxiety and depression in medical students of a private medical college. *J Ayub Med Coll Abbottabad* 2017;29:123-27.
22. Fawzy M, Hamed SA. Prevalence of psychological stress, depression and anxiety among medical students in Egypt. *Psychiatry Res* 2017;255:186-94.
23. De Sousa JM, Moreira CA, Telles-Correia D. Anxiety, depression and academic performance: A study amongst Portuguese medical students versus non-medical students. *Acta Med Port* 2018;31:454-62.

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