

Mental Health Effects of Online Education among Medical Students during the COVID-19 Pandemic in Kalaburagi, Karnataka, India: A Cross-sectional Study

INSHA ARSHAD¹, LINAH MARYAM², ROOPA R MENDAGUDALI³, NITISH AGARWAL⁴

ABSTRACT

Introduction: Globally, the Coronavirus Disease-2019 (COVID-19) pandemic has had a significant impact on the mental health of the general population, including medical students. As part of the control measures, the Government of India implemented a nationwide lockdown, resulting in the closure of medical institutes. However, medical education continued through online teaching platforms, which was a new experience for students and caused them significant stress.

Aim: To assess the mental health effects, specifically anxiety and depression disorders, among medical students in Kalaburagi city during the COVID-19 pandemic.

Materials and Methods: A cross-sectional online survey was conducted between June 1st and June 30th, 2021, involving four medical colleges in Kalaburagi city: Khaja Banda Nawaz Institute of Medical Sciences (KBNIMS), Mahadevappa Rampure Medical College (MRMC), Government Institute of Medical Sciences (GIMS), and Employees State Insurance Corporation Medical College (ESICMC). A total of 261 students were surveyed using prestructured questionnaires that included socio-demographic

information, the Generalised Anxiety Disorder (GAD-7) scale for anxiety assessment, and the Patient Health Questionnaire (PHQ-9) scale for depression assessment. The questionnaires were prepared using Google Forms and distributed through WhatsApp groups. The data was collected and analysed using International Business Machines (IBM) Statistical Package for the Social Sciences (SPSS) software.

Results: Out of the 261 students, 99 (37.9%) reported moderate anxiety symptoms, and 72 (27.6%) reported severe anxiety symptoms. The depression score indicated that 119 (45%) students had moderately severe to severe depression symptoms.

Conclusion: The study revealed that online teaching and learning methods had a significant impact on students, leading to a higher prevalence of moderate to severe anxiety and depression symptoms during the COVID-19 pandemic. These mental health issues may adversely affect learning abilities and preparedness for the future. It is crucial for medical colleges to address these concerns and develop effective interventions to support students during pandemic situations and continuous online teaching.

Keywords: Anxiety, Depression, Learning, Mental effects, Teaching

INTRODUCTION

The World Health Organisation (WHO) declared a Public Health Emergency of International Concern on 30th January 2020 and characterised COVID-19 outbreak as a pandemic on 11th March 2020. The disease had also spread to India, and the first COVID-19 death in India occurred in Kalaburagi on 12 March 2020 [1,2]. Globally, the unprecedented pandemic presented numerous challenges for the entire population, including social, environmental, health, and economic challenges. To control and slow down the transmission of the virus, affected countries implemented measures such as social distancing, lockdowns, and increased testing and treatment facilities. In India, there were four lockdowns (25 March 2020-31 May 2020) and two unlock periods (1 June-31 July 2020) [3]. The COVID-19 pandemic had a significant impact on the mental health of people in many countries. Medical undergraduates were not exempt from this impact, as the pandemic affected their medical education. Concerns arose regarding the loss of meaningful educational experiences and months of clinical training, with unknown effects on their current well-being and future professional paths [4]. The pandemic also had a profound influence on higher education practices, including changes to academic work and life. This included the transition to online lectures and tutorials, closure of libraries, altered communication channels between teachers and students, new curriculum and

assessment methods, different examination patterns, and varied administrative support [5].

Following the nationwide lockdowns, medical institutes were also closed except for clinical emergencies. However, efforts were made to ensure that academic activities continued without disrupting the curriculum. One major step taken by all medical institutes in the Karnataka state was the switch to online teaching methods, eliminating in-person teaching sessions and adopting innovative approaches in medical education [3,6]. Medical students had to adapt to new educational environments, such as distance or remote e-learning methods, and those who required clinical exposure were further impacted by the cancellation of clinical postings [7]. Conversely, some researchers argued that the pandemic provided an opportunity to catalyse changes in medical education [8]. Furthermore, online learning took place at home or in hostel rooms. This system required greater self-directed learning, including self-regulation and self-management, to complete online courses, especially during the initial phase when students were adapting to the new system. The ability to adapt varied among students based on factors such as age, gender, and professional year [9,10]. The sudden shift from conventional classroom education to online teaching platforms, to which medical students were not previously exposed, caused them significant stress. While many studies on online learning have been conducted worldwide, including during the COVID-19

pandemic, very few studies have been conducted in India, especially in North Karnataka [11].

It was crucial to analyse the relationship between various factors such as age, gender, phase of MBBS, and the institute where students were studying, in relation to medical education and learning, and the impact on the mental health of medical students. This analysis can help in formulating policies and preparing for future pandemic situations [12]. Consequently, the study aimed to assess the mental health effects of online education, specifically anxiety and depression disorders, among medical students during the pandemic in Kalaburagi city. The objective of the study was to analyse the effects of age, gender, professional year, and institute on the mental health of medical students.

MATERIALS AND METHODS

A cross-sectional survey, which was an anonymous, self-administered, voluntary web-based survey, was conducted between 1st and 30th June 2021 among all four medical colleges in Kalaburagi city: KBNIMS, MRMC, GIMS, and ESICMC. The study received approval from the Institutional Ethical Committee of MR Medical College, Kalaburagi (HKE Society's Mahadevappa Rampure Medical College, Kalaburagi, approval number: 202307 dated 24/04/23).

Inclusion criteria: Students who provided informed consent and completed all the information in the Google forms were included in the study. A question was included in the questionnaire at the beginning, after obtaining consent, to determine whether the student was worried about their studies due to online teaching or if they were worried about the impact of COVID-19. Only students who indicated that their primary concern was about their studies were included in the study.

Exclusion criteria: Medical interns were excluded from the study.

Sample size: Based on a previous prevalence of depression (15.9%) using PHQ-9 scores [7], a 95% confidence interval, and an absolute error of 5%, the sample size was calculated using the formula to calculate sample size for proportions as $4pq/L^2$, where 'p' is the previous prevalence, 'q' is the complementary prevalence, and 'L' is the error. The calculated sample size was 214, while the effective sample consisted of 261 students who voluntarily responded and completed the Google forms.

Participants' consent was implied by their completion of the survey. Data collection was conducted using prestructured and prevalidated questionnaires that included general information on age and gender, phase of MBBS, the GAD-7 scale for assessing anxiety, and the PHQ-9 score for assessing depression [13-15].

The PHQ-9 scale is a common screening tool for mood disorders, based on which the diagnosis of Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) depressive disorders is made. It consists of nine questions. Participants were asked to indicate how often they had been bothered by certain feelings or experiences over the past two weeks. Each question had four response options: "Not at all" (0), "Several days" (1), "More than half of the days" (2), and "Nearly every day" (3). The total score on the PHQ-9 ranged from 0 to 27 and was interpreted as follows: 0-4 (Minimal or none), 5-9 (Mild), 10-14 (Moderate), 15-19 (Moderately severe), and 20-27 (Severe) [13,14].

The GAD-7 questionnaire, a 7-item self-report questionnaire, was used to screen for anxiety disorders. The total score on this scale ranged from 0 to 21. Participants were asked to indicate how often they had been bothered by certain feelings or experiences over the past two weeks. Each question had four response options: "Not at all" (0), "Several days" (1), "More than half of the day" (2), and "Nearly every day" (3). The total score was calculated accordingly and

interpreted as follows: 0-4 (Minimal), 5-9 (Mild), 10-14 (Moderate), and 15-21 (Severe). Both instruments assessed respondents' mental health status over the past two weeks [15,16].

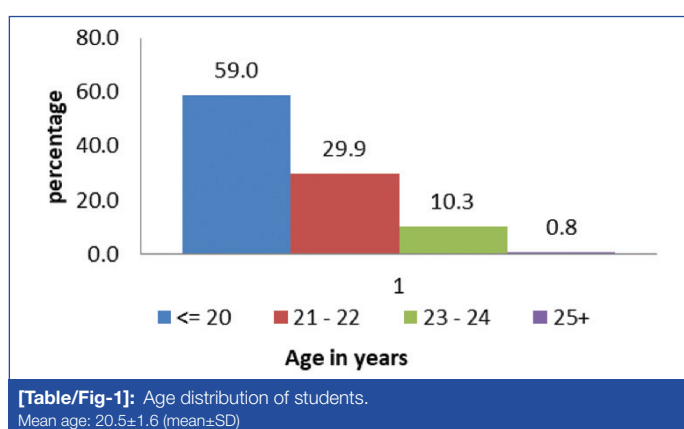
The study was conducted from 1st to 30th June 2021, during the end of the second wave of the pandemic in Karnataka [17,18]. All undergraduate medical students from the first to fourth phase in all four medical colleges were invited to participate in the study through "WhatsApp" groups. Data collection was done using Google forms.

STATISTICAL ANALYSIS

The data were analysed using IBM SPSS version 20.0 and presented as means, proportions, standard deviations, independent sample t-tests, and Chi-square tests. A statistically significant difference was considered if the p-value was less than 0.05.

RESULTS

Out of the total 261 participants, 109 (41.8%) were male and 152 (57.9%) were female. The mean age of the participants was 20.5 ± 1.6 (mean \pm SD) [Table/Fig-1].

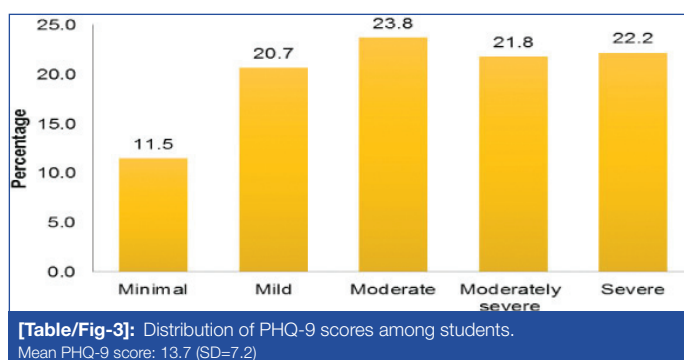


The majority of the participants were from MRMC (74; 28.35%), followed by KBNIMS (68; 26.05%), ESICMC (62; 23.75%), and GIMS (57; 21.84%). The majority of participants (113; 43.3%) were in their first year of MBBS, followed by the third year (69; 26.9%) [Table/Fig-2].

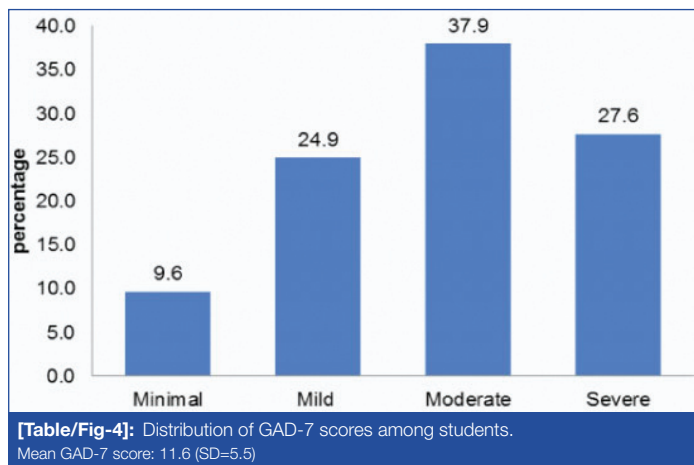
| College name | 1 st Phase | 2 nd Phase | 3 rd Phase | 4 th Phase | Total |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|-------|
| | n (%) | n (%) | n (%) | n (%) | |
| ESIC | 28 (45.2) | 9 (14.5) | 10 (16.1) | 15 (24.2) | 62 |
| GIMS | 19 (33.3) | 9 (15.8) | 22 (38.6) | 7 (12.3) | 57 |
| KBNIMS | 19 (27.9) | 8 (11.8) | 22 (32.4) | 19 (27.9) | 68 |
| MRMC | 47 (63.5) | 9 (12.2) | 15 (20.3) | 3 (4.1) | 74 |
| Total | 113 (43.3) | 35 (13.4) | 69 (26.4) | 44 (16.9) | 261 |

[Table/Fig-2]: College-wise and phase-wise distribution of the participants.

The results for the PHQ-9 scores showed that the majority of students experienced moderate (62; 23.8%) to severe (58; 22.2%) levels of depression [Table/Fig-3].



The results for the GAD-7 scores showed that the majority of students experienced moderate (99; 37.9%) to severe (72; 27.6%) levels of anxiety [Table/Fig-4].



An independent samples t-test was conducted to determine the difference in GAD-7 scores for anxiety between males and females. The results indicated that there was no significant difference between males (11.8±5.6) and females (11.5±5.4); t=0.490, p=0.625. Similarly, an independent samples t-test was conducted to determine the difference in PHQ-9 scores for depression between males and females. The results indicated no significant difference between males (14.5±7.0) and females (13.1±7.3); t=1.579, p=0.116 [Table/Fig-5].

| Scale | Gender | Mean±Std. Deviation | t | df | p-value | 95% confidence interval of the difference | |
|--------------|-----------------|---------------------|-------|-----|---------|---|-------|
| | | | | | | Lower | Upper |
| PHQ 9 scores | Males (n=109) | 14.50±7.036 | 1.579 | 259 | 0.116 | -0.352 | 3.197 |
| | Females (n=152) | 13.07±7.264 | | | | | |
| GAD 7 scores | Males (n=109) | 11.83±5.559 | 0.490 | 259 | 0.625 | -1.021 | 1.698 |
| | Females (n=152) | 11.50±5.444 | | | | | |

Table/Fig-5: PHQ-9 and GAD-7 Scores distribution of the participants.

Chi-square analysis revealed no significant difference between age and PHQ-9 and GAD-7 scores (p>0.05) [Table/Fig-6,7]. Similarly, the effect of the phase of MBBS and the college or institute the students were studying in on the scores was not significantly different (p>0.05) [Table/Fig-8-11].

| Age groups (years) | Minimal | Mild | Moderate | Moderately severe | Severe | Total | |
|--------------------|---------|------|----------|-------------------|--------|-------|--|
| ≤20 | 17 | 38 | 36 | 33 | 30 | 154 | Chi-square=7.657 df=8 p-value=0.467 (After merging >25+ age group to 23-24 age group) |
| 21-22 | 10 | 11 | 16 | 20 | 21 | 78 | |
| 23-24 | 3 | 5 | 8 | 4 | 7 | 27 | |
| 25+ | 0 | 0 | 2 | 0 | 0 | 2 | |
| Total | 30 | 54 | 62 | 57 | 58 | 261 | |

Table/Fig-6: Age wise distribution of PHQ-9 scores.

| Age groups (years) | Minimal | Mild | Moderate | Severe | Total | |
|--------------------|---------|------|----------|--------|-------|---|
| ≤20 | 12 | 42 | 63 | 37 | 154 | Chi-square=7.474 df=6 p-value=0.2792 (After merging >25+ age group to 23-24 age group) |
| 21-22 | 9 | 18 | 23 | 28 | 78 | |
| 23-24 | 4 | 3 | 13 | 7 | 27 | |
| 25+ | 0 | 2 | 0 | 0 | 2 | |
| Total | 25 | 65 | 99 | 72 | 261 | |

Table/Fig-7: Age wise distribution of GAD-7 scores.

DISCUSSION

The present research examined the mental health impact of online education during the COVID-19 pandemic among medical students from four Medical Colleges in Kalaburagi, Karnataka, India. The participants were aged between 18 and 25 years, with the majority being female. The study found that a significant proportion of the participants reported moderate (72; 27.6%) to severe (99; 37.9%) levels of anxiety and moderate (62; 23.8%) to severe (58; 22.2%) levels of depression. There was no significant difference in GAD-7 scores and PHQ-9 scores between different age groups (p=0.116) or between males and females (p=0.625). Similarly, the phase of MBBS and the college or institute where the students were studying did not show a significant difference in the scores (p>0.05). This suggests that anxiety and depression were equally distributed among all the students regardless of age, gender, or college affiliation.

A study conducted by Halperin SJ et al., at 40 US medical schools reported similar findings, with moderate (19.5%) to severe (11.1%) levels of anxiety based on GAD-7 scores and moderate (13.5%) to severe (10.8%) levels of depression. However, their study found significantly higher scores in females for both GAD-7 and PHQ-9 (p-value <0.00001), as well as higher scores in the pre-clinical phase for GAD-7 (p-value <0.00004) and PHQ-9 (p-value <0.00001), which was contrary to the findings of present study. Age did not demonstrate a significant difference in any of the scores, consistent with present study [19].

| College | Minimal | Mild | Moderate | Moderately severe | Severe | Total | |
|---------|---------|------|----------|-------------------|--------|-------|---|
| ESIC | 8 | 13 | 13 | 14 | 14 | 62 | Chi-square=20.73 df=12 p-value=0.0544 |
| GIMS | 9 | 13 | 13 | 13 | 9 | 57 | |
| KBNIMS | 4 | 9 | 13 | 19 | 23 | 68 | |
| MRMC | 9 | 19 | 23 | 11 | 12 | 74 | |
| Total | 30 | 54 | 62 | 57 | 58 | 261 | |

Table/Fig-8: College wise distribution of PHQ-9 scores.

| College | Minimal | Mild | Moderate | Severe | Total | |
|---------|---------|------|----------|--------|-------|--|
| ESIC | 3 | 16 | 25 | 18 | 62 | Chi-square=15.442 df=9 p-value=0.079 |
| GIMS | 6 | 19 | 17 | 15 | 57 | |
| KBNIMS | 5 | 15 | 22 | 26 | 68 | |
| MRMC | 11 | 15 | 35 | 13 | 74 | |
| Total | 25 | 65 | 99 | 72 | 261 | |

Table/Fig-9: College wise distribution of GAD-7 scores.

| MBBS phase | Minimal | Mild | Moderate | Moderately severe | Severe | Total | |
|-----------------------|---------|------|----------|-------------------|--------|-------|--|
| 1 st phase | 12 | 25 | 26 | 24 | 26 | 113 | Chi-square=5.626 df=12 p-value=0.933 |
| 2 nd phase | 2 | 9 | 11 | 7 | 6 | 35 | |
| 3 rd phase | 10 | 12 | 14 | 18 | 15 | 69 | |
| 4 th phase | 6 | 8 | 11 | 8 | 11 | 44 | |
| Total | 30 | 54 | 62 | 57 | 58 | 261 | |

Table/Fig-10: Phase wise distribution of PHQ-9 scores.

| Phase | Minimal | Mild | Moderate | Severe | Total | |
|-----------------------|---------|------|----------|--------|-------|--|
| 1 st phase | 10 | 28 | 43 | 32 | 113 | Chi-square =1.039 df=9 p-value=0.99 |
| 2 nd phase | 4 | 10 | 12 | 9 | 35 | |
| 3 rd phase | 6 | 16 | 27 | 20 | 69 | |
| 4 th phase | 5 | 11 | 17 | 11 | 44 | |
| Total | 25 | 65 | 99 | 72 | 261 | |

[Table/Fig-11]: Phase wise distribution of GAD-7 scores.

Another study by Nishimura Y et al., in Japan reported lower scores compared to present study, with only 15.9% experiencing moderate to severe depression based on PHQ-9 scores and 7.2% experiencing moderate to severe anxiety. Their study found no significant difference in depression between males and females (p -value=0.81) or in relation to age (p -value=0.45). Similarly, there was no significant difference in anxiety based on gender (p -value=0.58) or age (p -value=0.57), which aligns with the findings of present study [7]. AlJhani S et al., reported from South Arabia that 94.4% of students experienced moderate to high perceived stress, and two-thirds of the students reported symptoms of generalised anxiety (moderate to severe in 47%). These scores were much higher compared to the present study [20]. These varied reports from different medical institutes around the world highlight the need for further research in this area and comparison with traditional methods of classroom and clinical teaching for students.

The emergence of the novel COVID-19 pandemic has forced the global population to adapt to new norms of uncertainty, social isolation, and fear. Medical students have been particularly affected by these sentiments, along with concerns about disease exposure, separation from their communities, and the need to continue their learning activities. The abrupt shift to online teaching for medical students, with the aim of completing the curriculum, has caused clinical students to lose touch with their clinical postings, putting them under even more stress. To minimise the stress associated with online teaching, it is important to introduce online teaching and learning activities during regular teaching hours in the post-COVID-19 pandemic era. Students should be oriented to the learning systems used for teaching and learning platforms at the institute level. To ensure consistency across the colleges of the university, a common learning system could be adopted.

The strength of the present study lies in its assessment of the mental health effects of online education during the COVID-19 pandemic, which was a stressful period in itself. The study also attempted to exclude pandemic-related mental stress and its effects as confounders. Additionally, the study was conducted among students from multiple medical institutes, which enhances the generalisability of the results.

Limitation(s)

Although multiple centres participated in the study, the cross-sectional survey design does not allow us to establish causal relationships or address changes over time. Additionally, since the PHQ-9 and GAD-7 are self-reported questionnaires that measure psychiatric symptoms, one cannot make clinical diagnoses of depression or anxiety. There is a possibility of selection bias, as only those participants interested in the COVID-19 public health emergency or mental health may have responded to the study. Other confounding factors, such as the mental impact of the death of significant others during the COVID-19 pandemic/ first and second waves, and one's own ill health, could not be clearly elicited.

Further research should focus on longitudinal studies involving cohorts of medical students to overcome these limitations.

CONCLUSION(S)

In the present study, the students demonstrated higher scores indicating moderate and severe symptoms of both anxiety and depression due to the sudden shift to online teaching and learning during the COVID-19 pandemic. The study also found no significant differences in anxiety or depression scores among different age groups or between males and females, suggesting that the mental health effects were equally distributed among all the medical students included in the study. During the COVID-19 pandemic, when a stressful environment persists, such a rapid shift in teaching and learning interventions may have negative effects on the academic performance, physical health, and psychosocial well-being of undergraduate medical students. The current findings highlight the importance for medical institutes and health authorities to be prepared to offer prevention, early detection, and interventions for mental health disorders in medical undergraduate students.

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