

The Effect of Online Learning on the Psychological State of Medical Students during COVID-19 at a public Saudi University

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Abstract

Background: Coronavirus (COVID-19) is a pandemic infectious disease that caused a global health problem. Many countries suffered from this virus including impoverished and developed countries. Several studies have shown that COVID-19 affected the mental state of undergraduate medical students. This study aims to show the impact of online learning on the psychological state of medical students at Imam Mohammad Ibn Saud Islamic University (IMSIU) in Riyadh.

Methods: Cross-sectional, online survey. A 16- item questionnaire was designed and distributed to all medical students of IMSIU through emails and social media groups. Five-point Likert questions were used, ranging from strongly agree to strongly disagree.

Result: Out of 400 who participated in the study, 317 (79%) completed the survey; the majority were male (64.7%). Their mental state worsened in 143 (46.5%) students. At the same time, 77 (25%) felt psychologically improved and 97 (32%) students did not notice any change in their mental health.

Conclusion: The results show an effect on the mental state of the medical students during the quarantine measures imposed during the COVID-19 pandemic.

Keywords: Online learning, psychological well-being, COVID-19 pandemic, medical students, Saudi Arabia

Introduction

Coronavirus-2019 (COVID-19) is one of the biggest health challenges humanity has ever faced (1–4). It comes from a family of coronaviruses; large, enveloped, single-stranded RNA viruses. They can be found in humans and other mammals like cats, dogs, chickens, cattle, pigs, and birds (5). In addition to the Middle East Respiratory Syndrome (MERS-CoV), which first appeared in 2012 and is transmitted from dromedary camels to humans, and severe acute respiratory syndrome (SARS-CoV) (6–8), which appeared in 2002 and is transmitted from civet cats to humans, COVID-19 has been linked to the seafood and animal market in Wuhan, China (9,10). COVID-19 is one of the most aggressive diseases caused by coronaviruses. It is caused by a SARS-CoV-2 virus that affects the respiratory system and causes respiratory symptoms such as fever, cough, shortness of breath, and difficulty breathing (11,12). In some patients, more severe symptoms like pneumonia, severe acute respiratory syndrome, kidney failure, and even death might occur, but the main issue with COVID-19 is its ability to spread (13,14). In Saudi Arabia, 350,984 people were infected, and 5,559 died of COVID-19 (15). On 9 March 2020, a decision to suspend schools and universities led to the introduction of online learning from that date until the end of the semester of 2020-2021. This decision to close the face-to-face attendance at educational institutions was crucial to control the spread of the virus, but how it might affect students and their psychological welfare was unknown. A recent national survey reported that 94.4% of Saudi medical students reported moderate to high perceived stress as a result of their changed learning circumstances (16). The study aimed to explore the psychological state of medical students and the effects of online learning during the COVID-19 pandemic at a public University in Saudi Arabia.

Methods

Design and setting:

This observational, cross-sectional study was conducted between November and December 2020 in Riyadh, Saudi Arabia.

Subjects of the study: The study targeted medical students from Imam Mohammad Ibn Saud Islamic University (IMSIU) School of Medicine. The sample size was calculated to be 274 using Raosoft (Raosoft Inc., Seattle, Washington, USA) based on a confidence level of 95% and a 5% margin of error.

Tools of the study: The questionnaire consisted of two main parts. The first part included questions about the participants' demographic data, such as gender, year of education, and academic GPAs. The second part consisted of twelve questions to explore online education students' mental well-being during the COVID-19 pandemic. The five-point Likert scale was used to scale responses. The authors approached students in their respective classes and provided them with printed copies

of the questionnaire. Pre-testing was done to assess the reliability of the questionnaire for the sample. Data was collected using anonymous, self-administered online questionnaires distributed by emails followed by Short Message Service (SMS) and social media as reminders, to enhance the response rate.

Data Analysis

The mean and standard deviation were used to describe the continuous variables, and the frequency and percentage were used to describe categorically measured variables. The histogram and the statistical Kolmogorov-Smirnov test of normality were used to assess the statistical normality of metric variables. A total score for the students' perceived psychological impact from the quarantine was computed by adding up responses to the nine indicators measured with a 1-5 Likert scale (items 1-7 and 9-10), resulting in a total score bounded between 9-45 points characterizing the students' total perceived impact of the effects of COVID-19 on their psychological well-being. The independent samples t-test was used to assess the statistical significance of the mean differences in students' age and other metric perceptions across the levels of their dichotomized study hour changes. The chi-squared test of independence was used to assess the associations between categorically measured variables. The Multivariate Logistic Binary regression was used to determine the combined and individual associations between the students' sociodemographic, academic, and perceived psychological impacts from quarantine on their odds of increased study hours/burden. The association between these factors and covariates with the students' odds of having been studying longer hours was expressed as Odds Ratio with a 95% confidence interval. The SPSS IBM v21, commercially available, statistical analysis programme was used, and the alpha significance level was considered at 0.050.

Results

The survey was distributed amongst 400 convenient samples of medical students and 317 (79%) successfully responded. The mean age for all participants was 21.4 years and most of them were in their sophomore years (2nd and 3rd years). 201 (63.4%) participants had a GPA of more than 4.6 out of five. About two-thirds (64.7%) of them were male, as shown in Table 1.

Concerning the productivity of students, Table 2 shows the number of hours participants spent studying related to their GPA and identifies a decrease, no change or an increase. Most of the students have a GPA of more than 4.0, (231 students) and have higher degrees. 116 of them reported an increase in their study hours and 115 reported no change or a or decrease.

Regarding their mental state, Table 3 illustrates the number of students who felt depressed during online learning. A total of 317 participants, 175 (55.5%) responded by agreeing or strongly agreeing that they had felt depressed. On the other hand, 80 were undecided, while 62(19.6%)

students did not feel depressed throughout online learning.

Another question related to their psychological state was about feeling anxious or having insomnia during the online learning program imposed during the COVID-19 period. Table 3 confirms that 146 (46.1%) students had felt anxious or had insomnia while 89 (28.1%) disagreed that they had this negative experience, 82 were unsure if they had felt anxious or had insomnia during this period.

At the end of the questionnaire, there was a vital inquiry related to our research topic and concluded the 'psychological state' of the students of both genders during online learning for the period of the quarantine; whether it had improved, worsened, or remained the same.

Table 4 shows the answers to the question regarding the study hours. It shows the perceived psychological impact of the quarantine, the mean (S.D.) with a p-value of 0.228, and other important information. Regardless of the study hours, 77 participants reported an improvement in their mental state, while for 143 their psychological conditions had worsened. The other 97 students did not notice any change in their mental health.

Table 1: Descriptive analysis of the sociodemographic and academic characteristics of the student. N=317

| Table 2: Hours of study | Frequency | Percentage |
|-------------------------------|-----------|--------------|
| 1-Sex | | |
| Male | 205 | 64.7 |
| Female | 112 | 35.3 |
| 2-Age (years), mean (S.D.) : | | 21.40 (1.60) |
| 3-Study year | | |
| Junior-1st year | 57 | 18 |
| Sophomore (2nd and 3rd years) | 201 | 63.4 |
| Senior (4th and 5th year) | 59 | 18.6 |
| 4-GPA | | |
| 2.5 or below points | 6 | 1.9 |
| 2.6-3 points | 5 | 1.6 |
| 3.1-3.5 points | 13 | 4.1 |
| 3.6-4 points | 62 | 19.6 |
| 4.1-4.5 points | 113 | 35.6 |
| >=4.6 | 118 | 37.2 |

Table 2: Hours of study

Crosstab

| | | rec11.dic 15 - Are the hours of studying increased or decreased? | | | |
|----------------------------|---|---|-----------|--------|-------|
| | | same, decreased | Increased | Total | |
| GPA_Academic.perf 4 - GPA: | 2.5 or below points | Count | 3 | 3 | 6 |
| | | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 1.8% | 2.0% | 1.9% |
| | | Adjusted Residual | -.1 | .1 | |
| | 2.6-3 points | Count | 3 | 2 | 5 |
| | | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 1.8% | 1.3% | 1.6% |
| | | Adjusted Residual | .4 | -.4 | |
| | 3.1-3.5 points | Count | 7 | 6 | 13 |
| | | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 4.3% | 3.9% | 4.1% |
| | | Adjusted Residual | .2 | -.2 | |
| | 3.6-4 points | Count | 36 | 26 | 62 |
| | | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 22.0% | 17.0% | 19.6% |
| | | Adjusted Residual | 1.1 | -1.1 | |
| | 4.1-4.5 points | Count | 56 | 57 | 113 |
| | | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 34.1% | 37.3% | 35.6% |
| | | Adjusted Residual | -.6 | .6 | |
| | ≥4.6 | Count | 59 | 59 | 118 |
| | | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 36.0% | 38.6% | 37.2% |
| | | Adjusted Residual | -.5 | .5 | |
| Total | Count | 164 | 153 | 317 | |
| | % within rec11.dic 15 - Are the hours of studying increased or decreased? | 100.0% | 100.0% | 100.0% | |
| | | | | | |

Table 3

| Descriptive analysis of the students perceived indicators of the impact of the COVID19 pandemic on their online study method. N=317 | | | | |
|---|-------------|----------------------|------------|----------------------------|
| | Mean (SD) | Strongly agree/agree | Undecided | Disagree/Strongly disagree |
| 5 – Have you felt depressed during online learning? | 3.53 (1.24) | 62 (19.6) | 80 (25.2) | 175 (55.2) |
| 6 – Have you felt hopeless, exhausted or emotionally unresponsive during quarantine? | 3.64 (1.25) | 64 (20.2) | 58 (18.3) | 195 (61.5) |
| 7 – Have you noticed a reduction in your awareness or feeling of being confused? | 3.49 (1.16) | 66 (20.8) | 76 (24) | 175 (55.2) |
| 8 – Have you felt a sense of being emotionally detached from family, friends, etc.? | 3.26 (1.26) | 98 (30.9) | 71 (22.4) | 148 (46.7) |
| 9 – Have you been anxious or had insomnia during online learning? | 3.32 (1.30) | 89 (28.1) | 82 (25.9) | 146 (46.1) |
| 10 – Have you had episodes of indecisiveness or poor concentration during online learning? | 3.77 (1.21) | 51 (16.1) | 51 (16.1) | 215 (67.8) |
| 11 – Have you noticed deterioration in your work performance/studying? | 3.38 (1.22) | 72 (22.7) | 80 (25.2) | 165 (52.1) |
| 12 – Are you appropriately concentrating on your studies? | 3.33 (1.1) | 72 (22.7) | 95 (30) | 150 (47.3) |
| 13 – Do you have a sense of falling behind during online courses? | 3.57 (1.22) | 66 (20.8) | 65 (20.5) | 186 (58.7) |
| 14 – Are you having difficulty in recalling recent information? | 3.50 (1.11) | 60 (18.9) | 101 (31.9) | 156 (49.2) |

Table 4

| How do you describe your mental state during the online study? Related study hours | Studying hours decreased | Studying hours unchanged | Studying hours increased | Test statistics | P value |
|--|--------------------------|--------------------------|--------------------------|-----------------|---------|
| It improved | 29 (17.7) | 48 (31.4) | 48 (31.4) | chi(2)=15.61 | <0.001 |
| Remained the same | 65 (39.6) | 32 (20.9) | 32 (20.9) | | |
| Got worse | 70 (42.7) | 73 (47.7) | 73 (47.7) | | |
| Are you adequately concentrating on your studies, Likert rating mean (SD) | 3.16 (1.10) | 3.51 (1.1) | 3.51 (1.1) | t(315)=2.91 | 0.004 |
| The perceived psychological impact of the quarantine, mean (SD) | 30.90 (7.71) | 31.99 (8.50) | 31.99 (8.50) | t(315)=1.21 | 0.228 |

Discussion

Our study aims to identify the effect of online learning on the psychological state of medical students at IMSIU during COVID-19. The results indicate that, in general their mental condition, worsened during the COVID-19 quarantine. During the online learning period, many students felt depressed, hopeless, and emotionally detached from family, friends, etc. The findings were similar to previous studies which found that online learning has had a negative effect on students' mental states (17,18).

One of the findings was that almost half of the participants felt anxious and suffered from insomnia, while the other half disagreed or were not sure if they went through the same experience. This means there is no definitive proof that anxiety and insomnia increased during online learning during the duration of the quarantine. However, based on findings of a similar study, there was an increase in anxiety among females and a decrease among male students (19–21).

An interesting result was that some students experienced episodes of indecisiveness or poor concentration during their online learning, which made them concentrate more on their self-study/learning and spend more hours studying than normal. This may mean that students could benefit from this challenging situation. But it also means the situation affected their mental and psychological state.

These results are based on existing evidence of the effects of online learning during COVID-19 on the psychological and mental state of the students in our study group. One of the main effects was that the majority of the students felt depressed during the period of online learning and felt exhausted or emotionally unresponsive during quarantine. Also, participants felt a sense of being emotionally detached from family, friends, etc. The effect of the psychological state on their study was significant; they noticed a deterioration in their work performance, they felt they were falling behind in their studies, and they noticed a reduction in their awareness, confusion and had difficulty recalling recent information.

The experiment provides new insight into the relationship between the effectiveness of online learning and students' psychological and mental states and how it affects their studies. As we mentioned before, the effect of online learning on the psychological and mental state of the students leads to a decrease in their work performance. It also affects their concentration during online learning, which can lead a student to concentrate more on their self-learning and take more time to study (22–24). It is usual that the psychological state of university students, in general, and medical students, in particular, would have been affected because most medical courses before the pandemic were largely face-to-face and not online. Courses in the medical curricula contain a large proportion of study related to clinical and practical aspects, which require medical practice and training on patients. Medical students, in general, are not used to studying remotely.

This face to face education and training was impossible during the period of lockdown. This made many students feel anxious and, at times, stressed to the point of frustration and depression. Typically, they feared for their professional future, that they would not acquire the necessary medical skills or pass their final exams. They also feared the subsequent competition for postgraduate programme matching after graduation (25–27).

Further studies should consider other factors such as students' financial condition, diseases that could affect their mental and mental state, and their social status. Studies should also consider how online learning and mental state can interfere with academic achievement.

Limitations: As with most studies, the design of the current study is subject to limitations. The primary limitation is regarding the insufficient sample size for statistical measurement; the sample size for our online survey was relatively small compared to the usual survey-only studies, however, the online survey provides precise and additional clarifying details and complements the survey-based approaches of previous studies focusing on student mental health during this pandemic. The second limitation concerns the issues with sample and selection. An unequal variance between samples was found, meaning that fewer females participated in the survey compared to males, which can affect the study's statistical results.

Ethical consideration and consent to participate:

The Institute Review Board of Imam Mohammad Ibn Saud Islamic University (IMSIU) approved the study (Project number 114-2020; approval date, 8 December 2020). The paper was written based on the ethical principles of the Declaration of Helsinki. The introduction to the electronic questionnaire also included a clear explanation of the idea and purpose. Written informed consent was obtained from the study participants, after they had been informed that participation was voluntary and that the data would be treated confidentially and for research purposes only.

Availability of data and materials:

The data sets analysed during the current study are available from the corresponding author upon reasonable request. Due to data protection restrictions and participant confidentiality, we do not make participant data publicly available.

Competing interests:

The authors declare that there is no conflict of interest concerning the publication of this paper.

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