



## THE IMPACT OF COVID-19 PANDEMIC ON MEDICAL STUDENTS: AN EXHAUSTIVE STUDY

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**ABSTRACT** The Coronavirus Disease 2019 pandemic has caused an unprecedented disruption in medical education and healthcare systems worldwide. The disease causes life-threatening conditions and it presents challenges for medical education as instructors must deliver lectures safely, while ensuring the integrity and continuity of the medical education process. It is therefore important to assess the usability of online learning methods and determine their feasibility and adequacy for medical students. We aimed to provide an overview of the situation and difficulties regarding curricular activities experienced by medical students during the COVID-19 pandemic and to determine the knowledge, attitudes, and practices of medical students regarding electronic medical education. A cross-sectional survey was conducted among 252 medical students from IQ City Medical College & Hospital using a predesigned and pretested questionnaire. The survey requested demographic and socioeconomic information, as well as information related to medical online learning and electronic devices during the COVID-19 pandemic; mental health assessments; and e-learning knowledge, attitudes, and practices. Our study showed that 98% students were able to manage online classes while 87.7% had acceptable- to- good access to internet connection. 42.1% of the students relied on lectures provided by university, however classes have been called-off majority of times. Thus, we can conclude that vast majority students cannot understand their academic lessons taught via online classes.

### KEYWORDS :

#### INTRODUCTION

The COVID-19 pandemic has created major global health impact. India has moved past the many waves of the pandemic. However, what is much less clear is the impact of COVID-19 on medical education system in the country.[1] Faculty and medical students are grappling with the dramatic changes in their field of work. In other fields like IT, Journalism, etc., students are already used to online work but in medical field where ground level work is more important, we are in dilemma. Changes that may seem relatively minor in comparison to the global pandemic have the potential to be drastic turning points in the career progression of many. As not much is known regarding the long-lasting impact of COVID-19 on medical education, it is therefore also necessary to record and study the full impact of the changes being made. COVID-19 presents various challenges for medical education; instructors must deliver lectures safely while ensuring the integrity and continuity of the learning process. The COVID-19 pandemic has seen the introduction of novel methods of delivering education to medical students via platforms such as Zoom, Google Meet. Therefore, it is important to assess the importance of online learning methods, and determine their feasibility for medical students.[2][3]

The path to entering a successful residency has been predictable for the last few years-do well in classes and exams, go the extra mile in internships and have meaningful non-academic extracurricular activities-all of which designed to best demonstrate a student's knowledge, persistence, spirit, and dedication to medicine. This trajectory has been changed with COVID-19 disrupting routines in hospitals, medical schools and beyond.[4] The replacement of in-person classes with online equivalents is an necessity at this time but creates a loss of collaborative experiences that has the potential to be a significant detriment to education.

#### METHODOLOGY

A cross-sectional study was conducted amongst the students of IQ City Medical College and Hospital from July 2021 to November 2021 with a predesigned and pretested questionnaire distributed via email. Students were selected as follows:

- Questionnaires with incomplete information or missing data were excluded from the analysis.
- A friendly reminder was sent to ensure the highest possible response rate.
- Participants were not aware of the outcomes to reduce the risk of any possible bias.
- The responses of only those students were accepted who attended online classes on a daily basis.

#### Study Tool

#### Google Forms Questionnaire

The questionnaire covered participants' basic demographic data. The questionnaire also addressed their experience with medical tele-education, including questions related to electronic device usage proficiency and experience with three-dimensional technology in medical education.[5]The survey also included a mental health assessment that measured levels of anxiety and depression

#### Stistical Analysis:

Data analysis was done using MS Excel software. The Kolmogorov-Smirnov test was done and it showed that the variables did not follow normal pattern of distribution.

#### Ethical Analysis

IEC & IRC clearances were obtained.

#### RESULTS

252 complete responses were collected from IQ City Medical College & Hospital. The estimated response rate was 67%.

Females constituted 135 (53.2%) and males 117 (46.8%) of the total study participants. The mean age was 21.5 years [N= 252]

Assessment of Technology Availability and Usability amongst Participants:

Lot of participants (122; 48.4%) claimed that they were good with electronic devices while 72(28.6%) claimed they were proficient enough to use electronic devices for online classes. Large number of people (107; 42.5%) accessed internet through third generation/ fourth generation Internet services. However only 100(39.7%) and 24(9.5%) of participants had a good and very good internet connection respectively. Majority of the participants (153; 60.7%) reported to using a smartphone for their classes. It was also observed that 106(42.1%) and 105(41.7%) depended on lectures provided by university and self-study respectively. Tables 1 summarizes the respective findings.

**TABLE 1**

Effect of Covid-19 on Medical Education and Variables	Total (n)	Percentage
Level of Proficiency in using Electronic Devices		
Inadequate	5	2

Proficient	72	28.6
Good	122	48.4
Very Good	23	21
<b>Types of Service Available</b>		
Wi-Fi	43	17.1
Broadband	14	5.6
3G/4G	107	42.5
In combination	88	34.9
<b>Quality of Internet Service</b>		
Poor	8	32
Bad	23	9.1
Acceptable	97	38.5
Good	100	39.7
Very Good	24	9.5
<b>Type of Device Used</b>		
PC	11	4.4
Laptop	55	21.8
Tablet	33	13.1
Smartphone	153	60.7
<b>Your education depends on</b>		
lectures provided by university	106	42.1
courses provided by private centre	41	16.3
self-study	105	41.6
<b>How many hours of online classes are there</b>		
2-4hours	40	15.8
4-6hours	165	65.4
>6hours	47	18.2
<b>Have your classes ever been called off</b>		
Yes	178	70.6
No	74	29.4
<b>Do you have breaks in between classes</b>		
Yes	215	85.3
No	37	14.7
<b>Do you think the time allotted for practical classes have been utilised properly</b>		
Yes	24	9.5
No	166	65.8
Maybe	62	24.7
<b>With the announcement of exams do you think there is an increase in efforts from both sides</b>		
Yes	141	55.9
No	30	12
Maybe	81	32.1
<b>Has the pandemic interfered with your ability to apply for residency</b>		
Yes	34	13.4
No	128	50.7
Maybe	90	35.9
<b>Were you worried at any point of time that your career might not be as successful as your senior in the said field</b>		
Yes	93	36.9
No	74	29.3
Maybe	85	33.8
<b>Has Covid-19 affected your future plans or interest</b>		
it has affected my plans	51	20.2
it has not, I have the same plans	153	60.7
has encouraged me to devote myself to public health	48	19.1
<b>Effect of Covid-19 on Medical Education</b>		
<b>Did you suspend Educational Progress due to any of the following reasons</b>		
could not understand lessons taught	88	34.9
personal problem/health issue	68	26.9
financial reason	30	11.9
did not suspend educational progress	59	23.5
civil unrest/relocation	7	2.8

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**Impact of Covid-19 on Medical Education**

Only 59 participants (23.5%) could continue with their education. Remaining 193 participants had to suspend their educational progress due to one reason or another. 178 participants (70.6%) have reported that their online classes have been called off due to pandemic. Vast majority (166; 65.8%) agree that the time allotted for practical classes have not been utilised properly. Career progress and stability is one of the major concerns in any field. However, we can say that our participants are quite determined as 153(60.7%) have stated that the pandemic has not affected their future plans or interest.

**Medical Students' Attitude towards Covid-19**

Attitudes were assessed through questions that focused on the applicability and usability of e-learning in medical schools. Each response was scored using a Likert-type scale (strongly disagree, disagree, neutral, agree, and strongly agree).

**TABLE 2**

Attitude towards Online Education	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
How much are you able to understand through online Classes	31 (12.3%)	74 (29.4%)	97 (38.5%)	33 (13%)	17 (6.8%)
How has been your interaction with professors and friends regarding academics	12 (4.7%)	45 (18%)	123 (48.8%)	58 (23.1%)	34 (5.4%)
How do you feel about online mode of education	45 (18%)	64 (25.3%)	81 (32.4%)	37 (14.7%)	25 (9.6%)
How do you feel about downloading study material	9 (3.6%)	34 (13.5%)	85 (33.9%)	81 (32.1%)	43 (17%)

From our study we can see vast majority are cannot understand their academic courses via online classes with 139 participants requiring 1month or more to get accustomed to online classes.

Statistics show 163 people would not like to continue with online classes or are not comfortable with them.

**Impact of Covid-19 on Student Health**

Covid-19 had a massive impact on the students' mental and physical well-being. Due to lockdown measures implemented students were cooped up in one place. Gyms, swimming pools were all closed. Of the 252 study participants 59(23.4%) suffered from Covid-19. However, 200(79.4%) has had someone in their social hub who was diagnosed with Covid-19. A frightening number of people (160; 63.5%) have had to deal with the emotional trauma of losing someone they know. Of the 252 participants, multiple have reported they had pain of eyes, back and hands. However, we can confer that the sleep schedule was maintained as only 44(17.4%) participants slept for <6hours. Table 3 slist the various findings reported.

On being asked “how do you perceive the risk of contagion during this period? [1= minimum danger; 5= extreme danger] 3.1% people answered with 1, 10.7% with a 2, 33.3% with a 3, 34.1% with a 4 and 18.7% with a 5. On enquiring which body part was most commonly affected with pain, 28.4% complained it to be the hands, 67.2% for back and a majority of 67.5% for eyes.

On a scale of 1-5, with the question “how have you been affected if anyone close to you was diagnosed with Covid-19” [1= not affected; 5= severely affected] 15.5% people answered with 1, 7.1% with a 2, 36.9% with a 3, 29% with a 4 and 11.5% with a 5. On asking “would you agree that you have anxiety attacks while procrastinating different scenarios based on current situation?” 6.7% felt it was 1, 17.9% agreed on 2, 35.7% a 3, 22.2% with a 4 and 17.5% with a 5.

**TABLE 3**

Effect of Covid-19 on Student Health	Total(n)	Percentage
<b>Has Covid-19 affected you personally</b>		
Yes	59	23.4
No	193	76.6
<b>Has anyone in your social hub suffered from Covid-19</b>		
Yes	200	79.4
No	52	20.6
<b>Has there been any deaths in your social hub during this period</b>		
Yes	160	63.5
No	92	36.5
<b>Have you endured any pain during online Classes</b>		
Yes	132	52.4
No	79	31.3
Maybe	41	16.3
<b>Has your relationship with friends/professors been affected by Covid-19</b>		
Yes	87	34.5
No	98	38.9
Maybe	67	26.6
<b>Do you think your financial burden who have eased if part of the academic fees was waived</b>		
Off		
Yes	179	75.8
No	25	10.6
Maybe	32	13.6
<b>Have you been admitted to the hospital for reasons other than Covid-19</b>		
Yes	213	84.5
No	39	15.5
<b>Have you interacted regularly with your friends during lockdown</b>		
Yes	130	51.6

No	75	29.8
Maybe	47	18.6
<b>Have you felt the need to see a therapist</b>		
Yes	61	24.2
No	128	50.8
Maybe	63	25
<b>Do you exercise regularly</b>		
Yes	59	23.4
No	123	48.8
Maybe	70	27.8
<b>How have you utilised your time during Lockdown</b>		
pursued hobbies	63	25.6
worked on health and fitness	64	26
learned new skill	41	16.7
felt too lazy/demotivated	78	31.7
<b>How many hours of sleep do you get on an Average</b>		
4-6hours	44	17.4
6-8hours	148	58.7
>8hours	60	23.9

**Supportive Strategies to deal with Covid-19**

With new variants of Covid-19 emerging we must prepare for the future. As we all witnessed it was difficult for us to adapt to online classes. In many medical colleges, even online classes were not properly being held. Majority (175; 69.4%) of the participants agreed to use new concepts like Remote Standardized Patients as a part of their online class regimen.38.5%(97) still believe that e-learning would not be the future of academics. Table 4 report the findings.

**TABLE 4**

Supportive Strategies	Total(n)	Percentage
<b>Which of the following do you think will help a student most</b>		
staying social	60	23.9
sleep schedule	71	28.1
Exercise	21	8.3
time management/organisation	100	39.7
<b>Do you believe in self-distracting strategies</b>		
Yes	114	45.2
No	63	25
Maybe	75	29.8
<b>It has been stated that e-learning along with traditional methods of learning is the future.</b>		
<b>Do you share the same views</b>		
Yes	111	44
No	97	38.5
Maybe	44	17.5
<b>Do you think in recent times RSPs should be implemented to supplement clinical exposure</b>		
Yes	144	57.1
No	49	19.4
Maybe	59	23.5
<b>Along with RSPs case study based review/examination would help the students. Do you</b>		
<b>Agree</b>		
Yes	156	67.1
No	23	9.1
Maybe	60	23.8
<b>Do you think having multiple lessons a day instead of having a dragged out 8hour class</b>		
<b>Help</b>		
Yes	133	52.8
No	41	16.2
Maybe	68	27

<b>Burnout, anxiety issues are faced by professors</b>		
<b>From that point of view do you think we can help them out</b>		
Yes	201	79.7
No	51	20.3
<b>Do you think a separate tech team should be hired to help out our respected professors during online classes</b>		
Yes	171	67.9
No	64	25.4
Maybe	17	6.7

## DISCUSSION

This study aimed to assess medical students' circumstances during the COVID-19 pandemic and to evaluate their knowledge, attitudes, and practices regarding e-learning. Most medical students were conversant with the use of online teaching methods. The results revealed an acceptable level of knowledge, attitudes, and practices regarding e-learning, which evidences the usability of e-learning during the COVID-19 outbreak.[5] The findings also highlight its potential to reach medical students and transform medical training. Additionally, the students were concerned about how e-learning could be applied to provide clinical experience, especially in the final year of medical school, which depends heavily on bedside teaching.

Approximately 68.7% of the respondents reported experiencing health issues, while a large percentage reported psychological illnesses. These issues are major concerns, and governmental intervention may be required to mitigate them.[6]

The main issue with online classes has been quality of education and student-professor interaction. 22.8% agree on the interaction level being not good enough. 40.2% have reported that the quality of education they have received is up to their satisfaction. The utilization of the time allotted for practical classes has been a disaster. While the desire to study is still there as over 55% people have downloaded study materials for their benefit, the acceptance rate to online education is not quite high.

The findings may support the feasibility of implementation of e-learning programs for medical students. According to the survey smartphones were the most used tool for e-learning. 67.8% of the study participants thought that it would be difficult to participate in e-learning due to various reasons.

It is vital to address the above issues by providing support to students. Internet companies providing a stable and reliable internet service and reducing costs for students would help. Faculties and medical schools could support students by providing lectures as downloadable and easy-to-access resources. Further, local governments should facilitate the educational process by providing financial support for students and their family.[3]

Only half of the students depended on university lectures. The online mode of teaching creates a sense of boredom during lectures and causes students to feel less motivated to attend future lessons. Other reasons include transportation issues faced by students who may be living in another city and access to multiple tutors in private institutes might be an easier method.[7]

Several new methods like case study-based learning, Remote Standardised Patients (RSPs) have been agreed on by our study participants. Fitting exercise into the time schedule with organisation and management of their time seems helpful. Several have agreed that pursuing their hobbies have helped them stay mentally healthy during this time period.

One of the proposed solutions is interactive online discussions about clinical cases. Here, students are initially granted a weekly series of immersive online cases to model a clinical role. They then use an online platform to present a review of the patient's history, findings from the physical examination, results of investigations, and proposed management plans which are discussed with a teaching physician. This visual interface will simulate bedside teaching.[8]

Our study suggests that students have undergone through some amount of depression. However, some participants have kept themselves busy with their hobbies and co-curricular activities which have helped them tremendously. Few of the participants have also gone to therapist to resolves their issues. What is encouraging is to see that they have looked after their mental and have not left it unbothered.

## CONCLUSION

As we can note from the discussion above, Covid-19 has affected the students quite severely both in terms of their education and mental well-being. However, with a strong resolve, they have endeavoured to keep them in the loop of their studies, including those participants who were not fond of online education. Thus, this study concludes that even though online education is a problem in our country at present, however, in the near future when technology will be more advanced, it will cease to be so and may become the mainstay of imparting education.

## LIMITATIONS

- The characteristics of the teacher might have influenced the students' perception of their online classes.
- There were no questions regarding proficiency of platforms used.
- Study looked only at the student's perspective and not the teacher's perspective, so the latter was not discussed.
- Study was performed in a single institution with specific settings. Therefore, the results may not be generalized to other medical colleges in the countries, and they must be validated by further studies.

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