Indian medical student perspectives on online mode of education

Amandeep Singh¹, Ranveer S. Jadon¹, Upendra Baitha¹, Prayas Sethi¹, Harleen Kaur², Arvind Kumar¹, Piyush Ranjan¹, Naveet Wig¹

¹Department of Medicine, AIIMS, New Delhi, ²Department of Psychology, Banaras Hindu University, Varanasi, Uttar Pradesh, India

ABSTRACT

Purpose: The coronavirus pandemic has led to drastic changes in the education system globally. The medical education curriculum has also undergone a significant drift from traditional or physical classes to online classes. The study aims to explore the viewpoints of the Indian medical students toward online classes, their ramifications, and suggestions for improvement. Methods: The self-administered online questionnaire using the Google form was developed, validated, and circulated among students of All India Institute of Medical Sciences (AIIMS), New Delhi. The data of the survey were systematically analyzed by descriptive statistics. Results: A total of 223 students filled the Google form. After applying the inclusion and exclusion criteria, 171 students were finalized, and the analysis was done. The data suggested that 49.7% of the participants were facing technical glitches, poor Internet connectivity being the commonest. Eye straining (56.7%) was the major physical health hazard, whereas lack of concentration (53.8%) was the major psychological issue reported by the students. The major advantage of online classes reported was its accessibility (93%) at any time and place, whereas students also reported that the traditional learning method is more interactive and motivating (72.5%). Overall, 72.5% of the students wanted to continue both modes of education after the coronavirus disease (COVID-19) pandemic. Conclusion: As per the analysis of the results, it is concluded that, since both online and offline modes of education have advantages and disadvantages, henceforth, mixed or blended method of learning is the best form of learning medical science.

Keywords: COVID-19, medical education, online teaching, technical glitches

Introduction

The COVID-19 disease is no more an unknown entity in this century. From the outbreak in Wuhan, Hubei Province, China, in December 2019, and the declaration as a pandemic by the World Health Organization on March 11, 2020, the novel severe acute respiratory syndrome coronavirus (SARS CoV-2) virus has severely affected every aspect of human life.[1] In India, the first case of COVID-19 was reported from Kerala on January 30, 2020, followed by an upsurge in the COVID-19 cases in the whole nation.[2] The rampant increase in the cases forced the Indian government to impose a nationwide lockdown on March 24, 2020, to curtail the spread of this dreadful disease.[3] It came as a significant blow on the educational institutions in the country, including nursery schools and higher educational institutions. The teaching and training activities were massively affected in the medical institutions. The MBBS undergraduate students were asked to relocate at home to ensure social distancing to curtail the virus spread. No one ever imagined such a major change in the medical education system, as the offline teaching mode had been wholly shifted to online mode. The lecture halls were shut and bedside clinical teachings, believed to be the heart of medical training, were halted.[4]
With this unprecedented disruption in the medical education delivery system, that is, the classes of basic sciences, laboratory practical sessions, clinical skill sessions, faculty, and undergraduate students are transitioning to adjust with the online mode of education. The commonly used e-learning methods are online video lectures with interactive clinical discussion, pre-recorded videos by the specific departments of the institutes, online workshops, and webinars. Different online teaching platforms like Zoom, Google Meet, Google classroom, etc., were introduced in various institutes. However, there are multiple challenges like lack of face-to-face interaction, difficulty in using technology tools or applications, the availability of these tools and gadgets, assessment or examination of students, and time management that comes with this flipping of classroom to online mode. In resource-limited settings, the unavailability of high-speed Internet also hampers learning. On the other side, many of the teachers and students are technophobic, which delays the adoption of this new emergent education mode.

The All India Institute of Medical Sciences (AIIMS), the premier institute of India, was also not spared by the COVID-19 pandemic. The MBBS students were asked to shift at home, and all theory classes and physical ward posting sessions have been transitioned to an online mode of medical teaching. Moreover, all departments, including the Department of Medicine, have started providing online lectures using various platforms like Zoom, Google Meet, etc. The study is equally relevant for primary care physicians as it will update them about the various ways of online medical education and also stimulate them to remain updated by joining various online courses during this ongoing pandemic as well as in the coming era of digital medical education. Therefore, our study aimed to assess the perception of online teaching among MBBS students and the technological and psychological challenges faced during the makeshift of this digital medical education.

**Subject and Methods**

This cross-sectional observational study was conducted at the AIIMS New Delhi with approval from the institute’s ethics committee. The study population included MBBS undergraduate students from the 3rd to 9th semester. Only those students who were enrolled in AIIMS New Delhi, attended online classes, and had given consent for participation, were included. A self-administered online questionnaire using Google Forms was developed. The survey contained an introductory paragraph informing the participants about the study’s aims, consent for the study, the confidentiality of the responses, and the freedom to decline to answer any question or to withdraw from the study altogether. The questionnaire comprised demographic details (age, sex, and semester) of the participants and multiple-choice questions about the availability and preferences to various technologies, and comparative difficulties faced by online and offline modes and psychological issues. The questions were a combination of closed and open-ended questions. We involved 3 faculty members and 10 students in piloting the survey’s initial draft to validate the questionnaire. First, 10 undergraduate students were asked about their views on the online mode of education and its merits and demerits. All points were discussed and a questionnaire was made. The draft of the questions was then shared with 10 undergraduate students and faculty members. The tailoring of the survey draft was done after a group discussion and incorporation of the feedback. The draft had been circulated to the study population via the ‘WhatsApp’ messenger, and the emails and responses were collected. The data of the survey were systematically analyzed using descriptive statistics, and the results were drawn.

**Results**

The data were collected from 223 participants, out of which 213 gave consent for the study. Only 171 respondents were attending online classes. The respondents comprised 124 males and 47 females. The minimum age was 18 years, and the maximum was 23 years. N (60.8%) of the participants were using smartphone/mobile devices for attending classes, 20.5% were found using only iPad/tablets, and 18.1% were attending online classes via laptops. For analyzing the data using descriptive statistics, two sections were created; the first one analyzed the barriers and facilitators of the present online medical education and the latter analyzed the measures required to reduce the ramifications caused due to online classes.

**Online Mode: Barriers and facilitators of medical education**

**Technical and connectivity glitches**

In our study, 49.7% of the respondents agreed that they always faced technical glitches, while 34.5% claimed to have this issue often, and only 13.5% rarely faced the issue. Poor Internet connectivity was found to be the most prevalent glitch felt by the students (60.2%) and teachers (76.6%). The usage of multiple applications also created a hindrance in attending the classes (49.1%). The lack of technological knowledge germinated the problem experienced by both the students (1.8%) and teachers (33.9%).

In further detail, about the technical issues, we found that the lag in the transmission of audio-visuals creates the fundamental problem (36.8% video lag; 14.6% audio lag). Simultaneous speaking by multiple speakers created echo problems during the classes, which was observed by 18.7% of the respondents. At least 29.8% claimed that they even experience unwanted noise in the background while attending the classes. Analyzing the connectivity issues due to the Internet, we found that 31.6% of the students were facing slow connectivity on their Internet. At the same time, 19.9% reported having limited access to Internet connectivity. Moreover, there were complaints of losing the Internet connectivity during the classes (31.6%).

**Health repercussions**

To understand the health complications among the students due to online mode of classes, we found that prolonged screen time
led to eye straining (56.7%), low backache (8.8%), irregularity in sleep patterns (11.1%), body ache (0.6%), and headache (0.6%). On the contrary, 14% did not face any health complications at all. On exploring the psychological issues, it was found that students were experiencing a lack of concentration (53.8%), frustration (21.8%), and anxiety (3.5%). On the contrary, 21.6% of the respondents did not report any psychological issues. The major causal factor for these mental health concerns was prolonged screen timing (71.9%), no active participation (33.3%), frustration (40.9%), overload of information (69%), and lack of interest in the topic of discussion (38%).

**Comparison over the physical method of teaching**

When the physical method of teaching was compared over online, it was found that students skip online classes for several reasons. When it was explored, it gave us insight that there is a lack of interest among students while attending online classes. Furthermore, respondents were asked for their preferred mode of learning; 22.8% agreed to some extent for online classes, whereas 71.1% completely denied the notion of online medical education. Regarding replacing physical ward teaching and out patient department (OPD) exposure, some students agreed that such replacement is possible in online learning (28.1%), whereas 67.3% were completely against this replacement. Regarding the benefits of online classes, 93% of the students felt that learning is accessible anytime and place if connectivity is available. There is no risk of transmission of communicable diseases (84.8%), audio transmission is receptive to each student at the same intensity (15.2%), and the content is found to be more graspable (21.2%).

However, to understand why physical learning is sometimes preferred, students responded that the environment of the physical setting motivates them to focus on the study (72.5%), and post-class intervals are available for students for discussion among students (22.8%). Discussions are way better in physical classes as every student gets a chance to speak (55%). Moreover, in the traditional learning method, face-to-face interaction makes the class interesting (72.5%). Additionally, the physical mode of education is preferred since it is entirely not dependent on technology (14%).

When the causal factors of lack of interest in online classes were explored, it was found that the long duration of the classes makes it dull (65.5%). Furthermore, the lack of face-to-face interaction adds fuel to this boredom (38.6%). Moreover, as there is only one moderator, the class is not easy to deal with (13.5%). However, students find there is more theory discussion despite discussing clinical cases (67.3%), and the inclination is more toward completing the syllabus rapidly (54.4%).

A major drawback of online assessment reported by the students is its superficial assessment (45%) and lack of in-depth evaluation (32.7%). The respondents also stated that the queries of students were not addressed during the classes (43.9%). Meanwhile, the actual stimulation of the exams is not present (47.4%), and there is no examination apprehension in the online mode of classes (28.1). Additionally, the vulnerability of cheating in the online mode of examination is higher (36.8%) as shown in Table 1.

**Measures reducing the ramifications**

When the measures reducing the ramifications of online teaching were understood from the students’ viewpoint, it was found that they wish to have their continuous evaluation. Students stated that the frequency of these assessments should be monthly (45%), fortnightly (29.2%), and weekly (24.6%). Addressing the possible measures of making online classes more interactive, students chose that discussions of clinical cases should be done after each lecture (77.8%), more videos and images should be included in the presentation (77.8%), and two-way communication needed to be enhanced (42.7%). Students also stated that directing a few questions to random participants (24%) and making mandatory video presence by each student (6.4%) could also make online classes more interactive.

Analyzing how online classes can be made more productive, students responded that the effectiveness could be fueled by the active participation of all participants (46.2%). Also, they assert that the faculties can provide study materials at the end of classes (80.7%), and feedback should be taken daily from the students (18.7%). Moreover, they insisted that for all online classes, the virtual medium (App) should remain the same (41.5%), and the moderators should address the doubts of the participants (40.9%).

The students suggested solutions to the barriers faced due to online classes. They felt that the evaluator should take the assessment independently and not set the pre-designed questions on the apps (64.9%). Besides multiple choice question(s) (MCQs), long questions/essay-type questions should be asked, and plagiarism should be checked (31%). Moreover, there should be a manual evaluation of responses (40.4%). In addition, each class should have different batches which have to appear in the exam in the same real-time (42.1%). Finally, they also insisted that the evaluator should have a video presence and watch while the participants face the examination. Keeping their video on will prevent cheating (35.7%).

When the students were asked which teaching method they would prefer after the coronavirus pandemic gets over, the majority (72.5%) said that they are willing to continue with online methods for theory classes. Clinical classes and practical sessions should be in physical teaching only. Thus, a blended or mixed method of learning should be continued. Only 3.5% of the respondents wanted online classes to replace offline or traditional methods of learning completely. Similarly, 1.8% agreed to continue learning online but only for clinical and practical classes, and 1.2% of the respondents said clinical case discussions should be done online. Lastly, 19.3% of the respondents denied online classes and wished to study via the physical teaching method only as shown in Table 2.
Table 1: Exploration of online classes

| Subsection                                      | The theme of the question asked | Respondents (%)                                                                 |
|------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------|
| **Technical and connectivity glitches**         | Frequency                       | Always (2.3)                                                                    |
|                                                 |                                 | Often (34.5)                                                                    |
|                                                 |                                 | Sometimes (49.7)                                                                |
|                                                 |                                 | Rarely (13.5)                                                                   |
| Types of glitches                               |                                 | Poor Internet connectivity at the student's end (60.2)                          |
|                                                 |                                 | Poor Internet connectivity at the teacher's end (76.6)                          |
|                                                 |                                 | Using different apps for conduction of classes (49.1)                           |
|                                                 |                                 | Lack of understanding of technology at the student's end (1.8)                  |
|                                                 |                                 | Lack of understanding of technology at the teacher's end (33.9)                 |
| Audio-video glitches                            |                                 | Often having lag in the audio (14.6)                                            |
|                                                 |                                 | Often having lag in the video (36.8)                                            |
|                                                 |                                 | Multiple speakers at the same time create echo problems (18.7)                 |
| Internet connectivity issues                    |                                 | Link of class not working (4.1)                                                 |
|                                                 |                                 | Slow speed of Internet (31.6)                                                   |
|                                                 |                                 | Limited net data (19.9)                                                         |
|                                                 |                                 | Abrupt loss of Internet connectivity (44.4)                                     |
| Health repercussion                             | Ill physical effects            | Eye straining (56.7)                                                            |
|                                                 |                                 | Low backache (8.8)                                                              |
|                                                 |                                 | Sleep irregularity (11.1)                                                       |
|                                                 |                                 | Psychological issues (8.2)                                                      |
|                                                 |                                 | Body ache (0.6)                                                                 |
|                                                 |                                 | Headache (0.6)                                                                  |
|                                                 |                                 | None (14)                                                                       |
| Psychological problems                          | Anxiety (3.5)                    |                                                                                 |
|                                                 | Frustration (21.1)               |                                                                                 |
|                                                 | Lack of concentration (53.8)      |                                                                                 |
|                                                 | None (21.6)                      |                                                                                 |
| Causal factors of psychological problems        | Prolonged screen time (71.9)     |                                                                                 |
|                                                 | No active participation (33.3)    |                                                                                 |
|                                                 | Technical glitches causing frustration (40.9)                                  |                                                                                 |
|                                                 | Overload of information (69)      |                                                                                 |
|                                                 | Lack of interest in the topic, but bound to study (38)                         |                                                                                 |
| Comparison of physical teaching over the online mode of classes | Absenteeism from online classes | Always                                                                          |
|                                                 |                                 | Often (17.5)                                                                    |
|                                                 |                                 | Sometimes (53.2)                                                                |
|                                                 |                                 | Rarely (27.5)                                                                   |
|                                                 | Substitute practical learning with online classes | Completely (3.5)                                                            |
|                                                 |                                 | To some extent (22.8)                                                           |
|                                                 |                                 | Not at all (71.3)                                                               |
|                                                 |                                 | Cannot say (2.3)                                                                |
|                                                 | Replacement of physical ward and OPD teachings with online classes | Completely (2.3)                                                            |
|                                                 |                                 | To some extent (28.1)                                                           |
|                                                 |                                 | Not at all (67.3)                                                               |
|                                                 |                                 | Cannot say (2.3)                                                                |
| Advantages of online classes                    | No risk of transmission of communicable diseases among the participants (84.8) |                                                                                 |
|                                                 | Accessible at any time and place if Internet connectivity is available (93)    |                                                                                 |
|                                                 | Audio transmission is at the same intensity for each participant (15.2)         |                                                                                 |
|                                                 | Things are more graspable (21.2)                                                |                                                                                 |
| Advantages of physical classes                  | The environment of the physical setting motivates one to focus on study (72.5)  |                                                                                 |
|                                                 | Post-class intervals are vital for the next lecture (22.8)                      |                                                                                 |
|                                                 | Discussions are way better as one point gives a lead to another to speak (55)   |                                                                                 |
|                                                 | The presence of face-to-face interaction makes it more interesting (72.5)        |                                                                                 |
|                                                 | Not fully technology-driven (14)                                                |                                                                                 |
| Causal factor of lack of interest in online classes | Long duration of the class (65.5)     |                                                                                 |
|                                                 | No face-to-face interaction (38.6)                                              |                                                                                 |
|                                                 | Only one moderator is there (13.5)                                              |                                                                                 |
|                                                 | More theory than clinical case discussion (67.3)                                |                                                                                 |
|                                                 | Rapid completion of the syllabus is focused on (54.4)                           |                                                                                 |

Contd...
Globally, the coronavirus pandemic has a widespread impact on the education system. As a result, medical education has witnessed a drastic change as the mode of schooling circumnavigated to online. As this paper sought the overview of such impact on the Indian medical students, the analysis of data yielded two significant sections. First, we explored the challenges faced during online medical education. Later, we dwelled on the viewpoints suggesting improvement for the quality of this new trend.

In exploring the technical and connectivity issues in the online mode of education in our study, we found that most respondents sometimes faced glitches. The major technical issue was poor Internet connectivity at the teacher (76.6%) and student (60.2%) end. The use of different apps for the conduction of classes also created a hindrance. O’Doherty et al.,[10] in their integrative review, have also found that 86% of the population faced poor Internet connectivity and lack of physical infrastructure as a significant barrier in online learning. Students also faced lag in the video (36.8%) and audio (14.6%) most of the time. Similarly, Syed et. al., in their study, reported that 75.6% of the study population faced an unstable Internet connection as a major interrupting factor in online medical education.[11]

Likewise, Thomas et al.[12] also quoted that 85.8% of the population faced Internet connectivity problems and low quality of audio and video. Moreover, there are other studies which have similarly concluded that the cost of Internet data and connectivity are significant barriers to e-learning access among medical students.[13,14]

The coronavirus pandemic manifested a mandatory check on our well-being. Even though medical students are willing to serve humanity in challenging circumstances, the online mode of education seems to be an additional stressor for maintaining their overall well-being. In our study, most of the respondents (56.7%) faced straining of eyes while attending online classes. Irregularities

| Subsection | The theme of the question asked | Respondents (%) |
|------------|--------------------------------|-----------------|
| Frequency of online assessment | Daily (1.2) Weekly (24.6) Fortnightly (29.2) Monthly (45) | |
| Enhance two-way communication (42.7) | Discussion of clinical cases at the end of class (77.8) More video and images to be used (78.4) Directing a few questions to random participants (24) Mandatory video presence for all participants (6.4) |
| Having active participation by all participants (46.2) | Providing study materials at the end of classes (80.7) Moderators should ask daily for feedback/suggestions (18.7) For all online classes, the virtual medium (app) remains the same (41.5) Moderators entertaining doubts of the participants (40.9) |
| The evaluator should take the assessment on his/her own, not setting the pre-designed questions on apps (64.9) | Besides MCQs, long questions/essay-type questions should be asked, plagiarism of the same should be checked (31) |
| Yes, online classes can conduct both theory and clinical classes (3.5) | Yes, but only theory classes; clinical classes and practical sessions should be in physical teaching only (72.5) |
| Yes, online classes can conduct both theory and clinical classes (3.5) | Yes, but only practical classes; theory classes should be in physical (1.8) |
| Yes, but only practical classes; theory classes should be in physical (1.8) | No, all online classes should be discontinued, and physical classes should be continued (19.3) |

Table 1: Contd...

| Subsection | Theme of the questions asked | Respondents (%) |
|------------|------------------------------|-----------------|
| Steps to increase productivity | | |
| Dissipation in the aftermath of COVID-19 | | |

Discussion

Globally, the coronavirus pandemic has a widespread impact on the education system. As a result, medical education has witnessed a drastic change as the mode of schooling circumnavigated to online. As this paper sought the overview of such impact on the Indian medical students, the analysis of data yielded two significant sections. First, we explored the challenges faced during online medical education. Later, we dwelled on the viewpoints suggesting improvement for the quality of this new trend.

In exploring the technical and connectivity issues in the online mode of education in our study, we found that most respondents sometimes faced glitches. The major technical issue was poor Internet connectivity at the teacher (76.6%) and student (60.2%) end. The use of different apps for the conduction of classes also created a hindrance. O’Doherty et al.,[10] in their integrative review, have also found that 86% of the population faced poor Internet connectivity and lack of physical infrastructure as a significant barrier in online learning. Students also faced lag in the video (36.8%) and audio (14.6%) most of the time. Similarly, Syed et. al., in their study, reported that 75.6% of the study population faced an unstable Internet connection as a major interrupting factor in online medical education.[11]

Likewise, Thomas et al.[12] also quoted that 85.8% of the population faced Internet connectivity problems and low quality of audio and video. Moreover, there are other studies which have similarly concluded that the cost of Internet data and connectivity are significant barriers to e-learning access among medical students.[13,14]

The coronavirus pandemic manifested a mandatory check on our well-being. Even though medical students are willing to serve humanity in challenging circumstances, the online mode of education seems to be an additional stressor for maintaining their overall well-being. In our study, most of the respondents (56.7%) faced straining of eyes while attending online classes. Irregularities
in sleep (11.1%) and psychological issues (8.2%) were also found among the students. Research by Rafi et al.\cite{20} analyzed that 1.2% of the study population felt that eye straining is a barrier for online education. However, Rishi et al.\cite{16} studied the efficacy of online classes among medical students and showed that 58.2% of the population felt the dryness of the eyes and felt that it might affect the eyesight as well. Apart from this, 42.9% of the people expressed problems with sleeping patterns. This implies that prolonged screen time and long duration of sitting hours are leading to physical ill effects.

Dwelling on the psychological impacts, lack of concentration was the major problem faced by the respondents (53.8%), followed by frustration (21.1%). Singh et al.\cite{17} also observed a lack of concentration in 59.7% in the study population while attending online classes. Similarly, Rajab et al.\cite{18} reported in their research that 48% of the population had faced pandemic-related anxiety and stress as a challenge of online medical education. In our study, the major causes of frustration were technical glitches, whereas no active participation, overload of information, and less interesting topics all led to a lack of concentration and interest.

On the contrary, for ages, medical education throughout the world has been more dependent on physical teaching, bedside clinical case discussion, theory lectures in the conference rooms, and hands-on with various medical procedures in in-patient wards. Amid this pandemic and sudden closure of medical universities, medical education suddenly drifted into the online mode with the aid of webinars and video lectures. This mode of medical education seemed like either a boon or a bane.

In the segment which explores the advantages of online classes in our study, most respondents (93%) felt that the class could be accessed at any time and place. Also, 84.8% of the respondents thought that the risk of transmission of infectious diseases is negligible. A study done by Rawat et al.\cite{21} revealed that 43.7% of the population felt that the online mode of teaching is convenient. The majority of the people in their study also expressed that it provides more learning and retention of the topics. Similarly, in a research done by Al-Balas et al.\cite{21} 79% of the students felt that the online mode of education is time-saving and easily accessible.

In our study, the analysis for the segments of the drawback of online classes revealed that 67.3% of the population felt that the learning is more theoretical than practical, the duration of the classes is long (65.5%), and no or little interpersonal interactions (38.6%) causes lack of interest. Regarding assessment, most respondents (47.4%) felt that the actual stimulation of the exams is absent in online assessment and only provides a superficial academic evaluation (45%). Other substantial lacksings in the online evaluation include no feedback mechanism and high chances of cheating or using unfair means by the students (36.8%). Similar findings were found in the study by Mukhtari et al.\cite{22} where they stated that the majority of respondents felt that with online classes, only theoretical knowledge is gained, and practical and clinical work are not possible. Also, a feedback mechanism is lacking, and chances of using unfair means were also high. Henceforth, the drawbacks reported by the participants are constructive and justified.

Subsequently, in our study, when we explored the ways to improve the online mode of education and assessment, various suggestions were given by the students. The majority of the respondents (78.4%) said that online classes could be interactive by incorporating more visual material in the presentation. Also, discussing clinical cases at the end of the course (77.8%) and enhancing two-way communication (42.7%) were other common suggestions. To increase the productivity of the classes, the respondents (80.7%) said that study material should be provided to the students at the end of class. Students also noted that the platform used for each online class should also be the same always. Regarding assessment, the students (45%) said that it should be done monthly. The majority of the respondents (64.9%) noted that the evaluator or examiner should take the assessment himself rather than pre-designed questions, and the evaluation of the responses should be done manually (40.4%).

As there are facilitators and barriers to the online mode of medical education, on similar grounds, we also found that this mode is the facilitator to some extent creates a barrier to students’ health. Even after the coronavirus pandemic, education should be online where the theory lectures are delivered online. In our study, 72.5% of the students favored both modes of education, that is, mixed or blended education. On the other hand, the clinical classes and practical sessions need to be performed in physical teaching only. Similar results were substantiated by the findings of Wang et al.\cite{23} where 87.5% of the students think that the mixed teaching method is better than the traditional teaching method.

As the coming era is of digital health and the ongoing pandemic has shifted the method of education to online, our primary care physicians working in the primary health center can now update themselves with various online sources developed in the ongoing pandemic. The rapidly changing management guidelines, new diagnostic modalities, and learning of clinical medicine can be easily accessed through online platforms of medical education. In a study done by Shvartzman P et al.\cite{22} to assess lifetime learning and continuation of medical education among the primary care physicians in Israel, the results have demonstrated that primary care physicians have a low tendency to engage in continuous and updated medical education. Research studies and policies are required to make them aware of the various online methods of medical education, as, in the study, a majority of the health care providers accessed the medical education by the computer with Internet facilities.

Henceforth, students are inclining toward the mixed methodology of education and prefer the same as only the pros of both online and offline modes are included in the mixed method.
Limitations and Implications

Though this cross-sectional survey brings constructive perspectives of the medical students toward the online mode of teaching, this study has some methodological limitations. For the generalization of the findings, the sample size in this survey was not enough. This survey has a sample bias as only the students from the MBBS courses enrolled in AIIMS Delhi were studied.

This study brings valuable insights from the students pursuing medical education in the premier institute of India. It could be beneficial as it presents barriers and facilitators of medical education through the online method at a single gateway. Moreover, through this study, students suggested potential solutions to the faced problems. However, this study calls the administration of medical colleges to work closely with both teachers and students to design the upcoming physical and online mode of education after the coronavirus pandemic.

The key take-home message from the study is that online medical education is the new way to learn medicine but the best is both offline as well as on online or hybrid mode of learning.

The novelty of our study is that it highlights the health repercussions of online medical education among medical students in detail and also studied and discussed the measures to solve it.

Conclusion

This study concludes that though the online mode of education is accessible in any way around, there are ample technical glitches faced by the moderator and attendees at large. It also highlights the forsaken health complications faced by the students due to the online mode of education. It further suggests that the amalgamation of the online and physical mode of teaching could be an acceptable method for medical education but it requires further studies. Clinical case discussions including history taking, examination of patients, practical sessions in labs, and workshops are beneficial when done in the physical mode of education, while theory classes and webinars are the preferred online mode of education.

Acknowledgments
Dr. Chhavi Gupta, Dr. Ayushi Sachan, Dr. Kirti Verma.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Alsoufi A, Alsuyihili A, Mshegri A, Elhadhi A, Atiyah H, Ashini A, et al. Impact of the COVID-19 pandemic on medical education: Medical students’ knowledge, attitudes, and practices regarding electronic learning. PLoS One 2020;15:e0242905.
2. Andrews MA, Areekal B, Rajesh KR, Krishnan J, Suryakala R, Krishnan B, et al. First confirmed case of COVID-19 infection in India: A case report. Indian J Med Res 2020;151:490–2.
3. Lamba I. Why India needs to extend the nationwide lockdown. Am J Emerg Med 2020;38:1528–9.
4. Pattanshetti V, Pattanshetti S. The impact of COVID-19 on medical education in India. J Sci Soc 2020;47:1-2.
5. Rose S. Medical student education in the time of COVID-19. JAMA 2020;323:2131-2.
6. Mian A, Khan S. Medical education during pandemics: A UK perspective. BMC Med 2020;18:100.
7. Roy H, Ray K, Saha S, Ghosal AK. A study on students’ perceptions for online zoom-app based flipped class sessions on anatomy organized during the lockdown period of COVID-19 Epoch. J Clin Diagn Res 2020;6:1-4.
8. Rajab MH, Gazal AM, Alkattan K. Challenges to online medical education during the COVID-19 pandemic. Cureus 2020;12:e8966. doi:10.7759/cureus.8966.
9. Setia MS. Methodology series module 3: Cross-sectional studies. Indian J Dermatol 2016;61:261–4.
10. O’Doherty D, Dromey M, Lougheed J, Hannigan A, Last J, McGrath D. Barriers and solutions to online learning in medical education – An integrative review. BMC Med Educ 2018;18:130.
11. Syed S, Rastogi A, Bansal A, Kumar A, Jindal A, Prakash A, et al. Future of e-Learning in medical education—Perception, readiness, and challenges in a developing country. Front Educ 2021;6:598309.
12. Thomas A, Shenoy MT, Shenoy KT, Kumar SS, Sidheeque A, Khovidh C, et al. Survey among medical students during COVID-19 lockdown: The online class dilemma. Int J Med Stud 2020;8:102-6.
13. Olum R, Atulinda L, Kigozi E, Nassozi DR, Mulekwa A, Bongomin F, et al. Medical education and E-learning during COVID-19 pandemic: Awareness, attitudes, preferences, and barriers among undergraduate medicine and nursing students at Makerere University, Uganda. J Med Educ Curric Dev 2020;7:2382120520973212.
14. Kapasia N, Paul P, Roy A, Saha J, Zaveri A, Mallick R, et al. Impact of lockdown on learning status of undergraduate and postgraduate students during COVID-19 pandemic in West Bengal, India. Child Youth Serv Rev 2020;116:105194.
15. Rafi AM, Varghese PR, Kutchitra P. The pedagogical shift during COVID 19 pandemic: Online medical education, barriers and perceptions in central Kerala. J Med Educ Curric Dev 2020;7:2382120520951795.
16. Rishi SK, Vamshi T, Solanke P, Midila B. To study efficacy of online classes among medical students during covid-19 situation. Indian J Public Health Res Dev 2020;2021:40-7.
17. Singh KV, Aequel KI, Misra SK. A cross-sectional study of perception among medical students on online learning amid
COVID-19 pandemic, at government medical college, Agra, India. Int J Community Med Public Health 2021;8:248-52.

18. Rawat R, Singh P. A Comparative study between traditional and online teaching-learning: Medical students’ perspective in the wake of corona pandemic. Natl J Community Med 2020;11:341-5.

19. Al-Balas M, Al-Balas HI, Jaber HM, Obeidat K, Al-Balas H, Aborajooh EA, et al. Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: Current situation, challenges, and perspectives. BMC Med Educ 2020;20:1-7.

20. Mukhtar K, Javed K, Arooj M, Sethi A. Advantages, limitations and recommendations for online learning during COVID-19 pandemic era. Pak J Med Sci Q 2020;36:S27-31.

21. Wang Q, Huang C, Hu X, Mei H. The application of the online and offline interactive teaching method in clinical anesthesiology teaching. Educ Res Int 2021;2021:1-6.

22. Shvartzman P, Tandeter H, Vardy D, Matz E, Heymann A, Peleg R. Continuing medical education for primary care physicians in Israel: A cross-sectional study. Pediatrician. 2013;215:20-6.