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# Online medical teaching during COVID-19: Perspectives from teachers and taught

Jyoti Rohila, Kanchan Kapoor<sup>1</sup>, Jyotsna Singh<sup>1</sup>, Ravi Rohilla<sup>2</sup>, Palak Bansal<sup>1</sup>, Palak Chhabra<sup>1</sup>

## Abstract:

**BACKGROUND:** Online teaching has been practiced after lockdown due to Coronavirus Disease 2019 (COVID-19) pandemic which has replaced conventional classroom teaching. The aim of the present study was to know the perceptions regarding online learning as perceived by both teachers and students during COVID-19 pandemic.

**MATERIALS AND METHODS:** The present study was cross-sectional and questionnaire-based. Web-based respondent-driven sampling technique was used to recruit participants for the present study. Three hundred and thirty-two students and 130 teachers of varying ages and gender participated in the study. The link of web-based questionnaire was sent to respondents through WhatsApp/Facebook. Responses from all the participants were tabulated and analyzed using univariate analysis (Chi-square test).

**RESULTS:** Prerecorded lectures (38.9%) and Webinar apps (35/8%) were the most common modules of online teaching by students. One-third (34.3%) had the convenience to attend lectures from home whereas 44.3% had difficulty in concentration. Commonly cited disadvantage by students was inability to do practical work (37.9%). Regarding teaching faculty, 43.8% had no prior knowledge of online teaching. Sixty percent of teachers had 4 h/week of online teaching. No face-to-face interaction (67.7%) and internet issues (26.9%) were commonly stated barriers by faculty.

**CONCLUSION:** The pandemic has pushed the teachers and students toward newer teaching avenues. However, more needs to be done to supplement the existent teaching pattern and preparedness of teaching faculty by incorporating online assignments and assessment methods, strengthening digital infrastructure in medical schools, and training support for teachers.

## Keywords:

Coronavirus Disease 2019, distance education, e-learning, medical education, online teaching

Department of Anatomy,  
Dr. B. R. Ambedkar  
State Institute of Medical  
Sciences, Mohali, Punjab,  
India, <sup>1</sup>Department of  
Anatomy, Government  
Medical College and  
Hospital, Chandigarh,  
India, <sup>2</sup>Department of  
Community Medicine,  
Government Medical  
College and Hospital,  
Chandigarh, India

## Address for correspondence:

Dr. Ravi Rohilla,  
Department of Community  
Medicine, Govt. Medical  
College and Hospital,  
Sector-32, Chandigarh,  
India.  
E-mail: [ravi.rohilla84@gmch.gov.in](mailto:ravi.rohilla84@gmch.gov.in)

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## Introduction

“Necessity is the mother of invention,” this age-old proverb finds its supreme relevance in today’s scenario. It’s been more than a decade since when the policymakers are advocating the use of online resources in routine teaching and practical skills (e.g., simulation laboratories).<sup>[1]</sup> A sudden disruption in education during Corona Virus Disease 2019 (COVID-19) has precipitated the practice of online education in a big way.

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In India, Government-issued “stay at home” directive in March 2020, since then online classes have become a key component in continuity of education. For medical education in Northern India region before COVID era, conventional classroom teaching was the only method known for medical teaching. This led to a change in traditional classroom-based study into home-based distant learning by medical institutions. Anatomy is considered an important core subject for 1<sup>st</sup> year medical students. Cadaveric learning is essential

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for medical students in learning anatomy by dissection. There lies a big challenge for teachers to make students understand anatomy via online teaching as nothing can replace cadaveric teaching for better learning of anatomy.

Most institutions had switched to distant learning in the simplest way possible using webinar, Zoom, WhatsApp, Google classroom, and other internet-based communications. Electronic online teaching can provide students with easier, faster, and more effective access to a wide variety of information.<sup>[2]</sup> However, online teaching is not without challenges to both students and teachers in medical education. Firstly, changes and development in medical education are putting extra pressure on already overworked faculty.<sup>[3]</sup> Second, poor internet connectivity is a major issue faced by both students as well as teachers in a low- and middle-income country like India.<sup>[4]</sup> Background noises, poor video quality, frequent disruption in audio due to poor internet connectivity become frustrating for both students and teachers. Challenges to the online environment may delay the adoption of technology-based education during an emergency.<sup>[5]</sup>

On the other hand, online teaching sessions broke the monotonous routine and were a major stress reliever from this ongoing pandemic along with the pressure of completion of subject course.<sup>[6]</sup> It has been suggested that universities should consider utilizing other modes of learning like live teleteaching, video conferencing so that student engagement and interactivity can be preserved.<sup>[7]</sup>

Online teaching is helpful in the way to guide the student in learning in context to their curriculum rather than leaving the students on their own in the current situation. Adaptation and understanding to online teaching among students have to be assessed at regular intervals. Their points of view are of paramount importance in decision-making process for further medical education. Recently, the National Medical Commission has also mooted online teaching as valid for medical education. Medical students are interested in being part of this process which may impact their education.<sup>[8]</sup>

In the past year, various studies have been conducted in the region which are either limited by small sample size, sample from one medical institution, students from different professional years, and reflections from only students or teachers.<sup>[9-11]</sup> The present study takes into account the perspectives of both teachers and the taught. The present study was conceived to know the perspectives regarding online learning activities during COVID-19 as perceived by the teachers and 1<sup>st</sup> year medical students and challenges faced in online medical education. This endeavor will help to find a solution to problems faced by teachers and students while accessing

online platforms and hence, providing quality education in a prescribed time.

## Material and Methods

### Study design and setting

The present study was cross-sectional in nature and online web-based questionnaire was used for data collection.

### Sample size

Taking an assumed proportion of difficulty faced by students and teachers during online teaching as 30%, the minimum sample size was calculated as 323 participants with 5% confidence level and absolute precision of 5%.

### Study participants and sampling

First-year medical students from various colleges across India were the student participants whereas medical teaching faculty involved in teaching of 1<sup>st</sup> year medical students formed the sample for teachers.

Web-based respondent-driven sampling (WRDS) technique was utilized to recruit participants.<sup>[12]</sup> This technique has already been demonstrated of use in public health studies. In the present study, the authors selected the first waves (core seeds) as a representative of the diversity of sample population, i.e., age, gender, occupation, and education. A respondent was selected as a seed of WRDS if he/she had a commitment to generate recruitment of peers in the study. Participants in the seed groups were informed that they needed to assist in the recruitment of other participants through their individual social network. The recruitment was terminated after all contacts of core seeds or study duration exhausted.

After being invited to enroll in the study through WhatsApp/Facebook, the seeds were sent a web link which contained information about the study and the questionnaire. The average time to complete the questionnaire was approximately 5–10 min. The consent was considered as implied when a completed questionnaire was received.

### Data collection tool and technique

A questionnaire was developed by the first two lead authors which was validated by two independent teaching faculty. Validation of questionnaire included content and construct validity and for reliability. The internal consistency of the questionnaire was 0.78. In case of ambiguity, the specific item was discussed and the item was included (with or without edits) or dropped. For the assessment of feasibility of the study, pilot testing was done on 25 students and 10 teaching faculty, and their responses were incorporated for improvement of

questionnaire. The responses received on pilot testing were not included in the final sample. The duration of the study was 3 weeks (June 1-June 21, 2020). During this time, link for online study was placed and closed after 3 weeks duration.

### Ethical consideration

The study was conducted as per Helsinki declaration, 2000. The participants entered the study only after they gave online informed consent. The ethical concerns like confidentiality and the rights of respondents to drop out from the survey any time they wish were ensured. For the sake of confidentiality, we did not record the E-mail addresses of the respondents.

### Statistical analysis

Data collected was analyzed using SYSTAT software for Windows version 13.2 (San Jose, CA: Inpixon Inc.). Continuous data were presented as mean (standard deviation). Categorical data were presented as frequencies and percentages. The Chi-square test was used to test association between variables. The point of statistical significance was considered when  $P < 0.05$ .

## Results

In the present study, a link for online questionnaire was sent to 132 teachers and 356 students for which a response rate of 130 (98.5%) and 332 (93.3%) was received. The mean age of students was 19.30 (1.05) years with range of 17–24 years. Females constituted 176 (53.0%) of the study participants. All respondents (100%) said online teaching was started at their respective institutions. Among teachers, participants in the age group 41–50 years were maximum (36.9%) followed by 33.1% and 23.8% in the age group of 31–40 years and 51–60 years, respectively. Females outnumbered the male teachers with 63.8% being female. The designation of teaching faculty was Professors (36.2%) followed by Assistant Professors (32.3%). 97.7% of the faculty said that official online teaching was started by the respective Institute whereas only 3 (2.3%) had started teaching on their own. The most common teaching module during online teaching was prerecorded lectures on YouTube (38.9%) and Webinar apps (35.8%) as stated by students. Figure 1 shows the format of teaching modules for both teaching faculty and students.

### Students

#### *Impressions perceived of online teaching*

When asked about convenience to attend lectures from home, 114 (34.3%) and 71 (21.4%) answered yes and no, respectively. Difficulty in concentrating was observed by 147 (44.3%). Students were asked about impressions of online teaching where the most common cited response was difficult to understand (56.9%) followed by boring compared to physical teaching (15.9%) and not interesting

at all (11.1%). Online teaching was termed interesting by 14.5% of students. Regarding supplementing conventional teaching in future, 50 (15.1%) were optimistic whereas 179 (53.9%) and 103 (31.0%) students opined no and doubtful respectively.

### Teaching methods and assessment

Apart from theory lectures, other forms of online teaching included video demonstration (62.7%), small group teaching on WhatsApp (13.3%), simulation (3.01%), and YouTube (2.1%). No other online mode of teaching was used by 33.1% of students. Regarding the assessment method employed by the teaching institution, 233 (70.2%) had replied positively whereas 89 (26.8%) said no assessment method was used. Rest 10 (3.0%) students responded that assessment was taken sometimes (not all times) or by one department only (Physiology). A satisfactory response to online assessment was given by 157 (47.3%) students whereas 148 (44.6%) students perceived as not satisfactory. 27 (8.1%) students said that assessment was extremely helpful to them. Table 1 shows the frequency of students regarding feedback of online class and COVID-19 pandemic.

### Advantage, disadvantage, and overall response

Students were also asked about the perceived advantages and disadvantages of online teaching. Of the advantages, the most common was safety (20.5%), Accessible anytime

**Table 1: Distribution of student response to questions regarding feedback and corona virus disease 2019 situation**

Questions asked to students	Frequency (%)
Do you provide any feedback to your teachers?	
No	116 (34.9)
Yes	216 (65.1)
If yes, did your faculty address your concerns in a positive manner?	
Not at all	15 (6.9)
Rectified	64 (29.6)
To some extent	137 (63.4)
Did online teaching relieve you of the COVID-19 scare?	
Maybe	73 (22.0)
No	117 (35.2)
Yes	142 (42.8)
Besides subject teaching, were you asked about your general well-being or your concern about COVID-19?	
No	142 (42.8)
Yes	190 (57.2)
Do you want your teachers should address your concerns and insecurities in context with the present condition?	
Maybe	51 (15.4)
No	14 (4.2)
Yes	267 (80.4)

COVID-19=Corona virus disease 2019

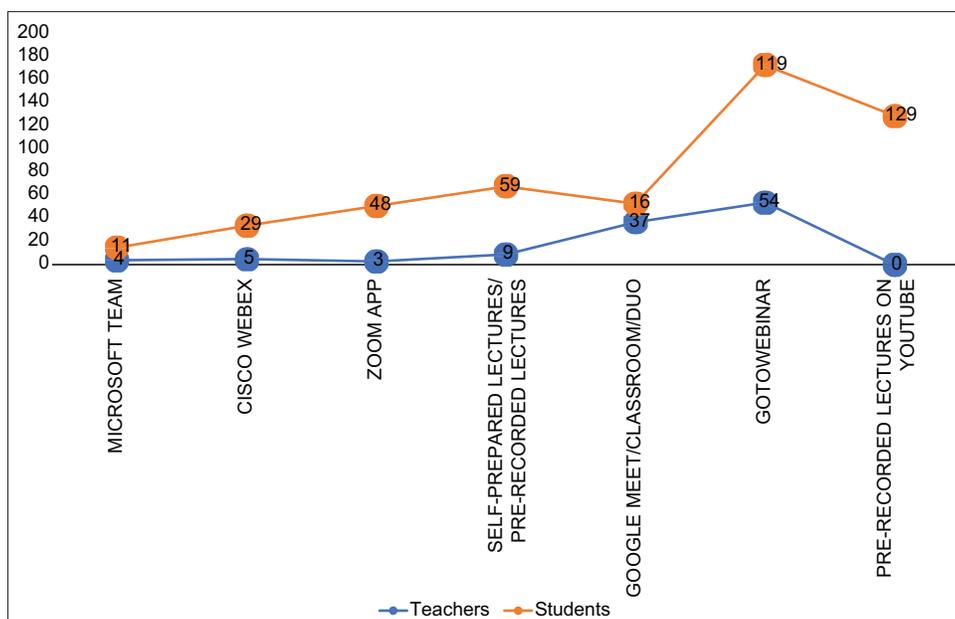


Figure 1: Showing modules of online teaching by students and teachers

anywhere (19.9%), and option to replay multiple times (18.7%). No advantage of online teaching was cited by 12.0% of students. Disadvantages of online teaching included inability to do practical work (37.9%), no understanding (24.7%), and poor network (15.1%). Table 2 shows details of advantages and disadvantages cited by students.

An overall response of the teaching/evaluation/feedback system of online teaching was sought from students in which 27.1% termed it as average, 23.8% as bad, and just satisfying by 19.6%. Excellent effort by teachers and the best response was given by only 6.3% and 20.5% students.

### Teaching faculty Impressions of online teaching

When asked about any prior knowledge of online teaching, 73 (56.2%) and 57 (43.8%) answered yes and no, respectively. The majority of teachers (86.9%) did not have any formal training to conduct online classes. Teachers were asked about impressions of online teaching felt initially where 57 (43.8%) felt mental resistance. Regarding the current response to online teaching, 36.9% and 54.6% were okay to an extent and satisfied. Only a small proportion termed it as not satisfied (8.5%). More than half of the teachers had 4 h/week of online classes (60%) followed by 30.7% for 5–6 h/week. Majority of teachers had the attendance of students recorded (87.7%).

### Teaching methods and assessment

Faculty/teachers were asked about other modes of online teaching where 56.2% had video demonstration followed by group video calls by 24.6%. No assignment

Table 2: Advantages and disadvantages as perceived by the students

Perception regarding online teaching by the students	Frequency (%)
<b>Advantages*</b>	
Safety	74 (22.3)
Accessible anytime anywhere	82 (24.7)
Videos can be replayed multiple times	62 (18.7)
Syllabus completed on time	40 (12.0)
Time saving	23 (6.9)
Helpful in concentration and understanding	13 (3.9)
Helpful	9 (2.7)
Connected with studies and teachers	10 (3.0)
<b>Disadvantages*</b>	
Unable to do practical work	132 (39.8)
No/poor understanding	82 (24.7)
Poor internet network	57 (17.2)
Difficult to concentrate at home	55 (16.6)
Boring	43 (12.9)
Eye straining	38 (11.4)
No physical interaction	36 (10.8)
Unable to clear all doubts	23 (6.9)
Less audible	16 (4.8)
Nonavailability of books at home	10 (3.0)
No assessment method	9 (2.7)

\*Contains multiple responses

was given by 40% of teachers [Table 3]. Response to assignment given to students as perceived by teachers was appreciative (39.2%), enthusiastic (13.1%), not interested (13.1%), and disapproved (1.5%). It was felt by 22.3% teaching faculty that students were as receptive as they are in the physical classroom. Doubts regarding receptiveness of students were present in 44.6% of faculty/teachers.

### Difficulties perceived, advantages, disadvantages, and overall response

Difficulties encountered in online teaching by teachers were asked in which no face-to-face interaction was cited as the most common (67.7%) followed by internet issues (26.9%) and unaware of student responses (24.6%). Regarding the replacement of conventional teaching by online teaching, the majority of teachers were not convinced (86.9%) with only a positive response from 13.1%. The assessment method of online teaching was asked in which video viva-voce (16.9%) and multiple-choice questions (8.5%) administration were the most commonly employed methods.

Response regarding online assessment as perceived by teachers was 22.3% termed it as average, 4.6% as poor and good by 31.5%. Very good response was perceived by only 10.0% of students. Advantages and disadvantages as perceived by teachers are depicted in Table 2. Recording of lectures/class and good platform for introvert students were the common advantages cited by teachers. On the other hand, lack of face-to-face interaction and difficult to assess students' clarity of topic were major disadvantage mentioned by teachers [Table 4].

Overall impression of online teaching was asked from teachers where an average response was given by 23.8%, followed by more improvement needed (20%), good (19.2%), and bad (13.8%). 22.3% of faculty opined that online teaching cannot replace regular/conventional classroom teaching.

Univariate analysis in Table 5 shows the gender difference for students' and teachers' perspectives. Both genders had similar perceptions regarding online teaching except a significantly higher relief of COVID-19 scare among female students and higher difficulty faced by male teachers during online teaching.

## Discussion

Conventional classroom teaching has been used for anatomy subject for a long period. Due to the COVID-19 pandemic, conventional teaching has taken a pause and a rapid transition in teaching happened from conventional teaching to online teaching which has off late become a source of anxiety and stress for both teachers as well as students.

### Students perspective

Students used different types of online teaching modules the most common were prerecorded lectures on YouTube and Webinar. In the present study, there was a mixed response observed regarding the replacement of conventional with online teaching. Rajab *et al.* stated

**Table 3: Distribution of teacher's response to following other modes of online teaching**

Questions asked to teachers	Frequency (%)
Besides the theory lecture, do you follow any other mode of online teaching?	
Assignments	2 (1.5)
Google meet/classroom	4 (3.0)
Email articles/study material	2 (1.5)
Online quiz	10 (7.7)
Simulation	6 (4.6)
Group video calls	32 (24.6)
Video demonstrations	73 (56.2)
Webinar	1 (0.7)
Do you give assignments to students? (if yes, please specify)	
No	52 (40)
Yes	78 (60)
Online MCQ	11 (14.1)
Diagrams	16 (20.5)
Google forms	5 (6.4)
After every lecture	5 (6.4)
Test/ECE/case presentation	3 (3.8)
Seminar	3 (3.8)

MCQ=Multiple choice questions, ECE=Early childhood educator

**Table 4: Advantages and disadvantages as perceived by the teaching faculty**

Perception regarding online teaching by the faculty	Frequency (%)
Advantages*	
Recording made available	38 (29.2)
Good platform for introvert students	37 (28.5)
Social distancing maintained	35 (26.9)
Comfortable (any time to take)	30 (23.1)
No need to take manual attendance	6 (4.6)
Learning new skills	2 (1.5)
No unnecessary disturbance from students	2 (1.5)
No advantage	14 (10.8)
Disadvantages*	
Lack of face-to-face interaction	83 (63.8)
Unable to assess student topic clarity	28 (21.5)
Practical classes are difficult	21 (16.2)
Monitoring is difficult	13 (10)
Lack of on-stage demonstration	10 (7.7)
Evaluation difficult	10 (7.7)

\*Contains multiple responses

in their study that 62.5% of respondents were in favor of combining online with face-to-face interaction.<sup>[13]</sup> Moreover, students were aware of different multimedia platforms and already using smartphones which were of great help during distant online learning. In an another study from Lucknow India, 25.9% medical students opined that nothing can replace traditional classroom teaching.<sup>[10]</sup>

Online lectures were found to be difficult to concentrate upon by nearly half of the students (44.3%) at home.

**Table 5: Univariate analysis showing association of gender with students and teacher's perspectives**

Variables	Category	Male (%)	Female (%)	P*
a. How many hours/week do you actually attend the lectures? (h)	6 or less	132 (84.6)	159 (88.6)	0.113
	>6	24 (15.4)	17 (11.4)	
b. Does it feel convenient for you to attend lectures from home?	Yes	119 (76.3)	142 (80.7)	0.329
	No	37 (23.7)	34 (19.3)	
c. Do you follow any other form of online teaching?	Yes	106 (67.9)	125 (71.0)	0.543
	No	50 (32.1)	51 (29.0)	
d. What is your response to online assessment?	Satisfactory	78 (50)	106 (60.2)	0.061
	Not satisfactory	78 (50)	70 (39.8)	
e. Do you provide any feedback to the teacher?	Yes	104 (66.7)	112 (63.6)	0.563
	No	52 (33.3)	64 (36.4)	
f. Did online teaching relieve you of the COVID-19 scare	Yes	90 (57.6)	125 (71.0)	0.011
	No	66 (42.4)	51 (29.0)	
g. Is your institution providing you support for online teaching to students?	Yes	45 (95.7)	78 (94.0)	0.667
	No	2 (4.3)	5 (6.0)	
h. Did you have any prior knowledge of online teaching?	Yes	24 (51.1)	49 (59.0)	0.378
	No	23 (48.9)	34 (41.0)	
i. Did you have any formal training to conduct online classes?	Yes	3 (6.4)	14 (16.9)	0.088
	No	44 (93.6)	69 (83.1)	
j. Did you feel mental resistance initially for online teaching?	Yes	18 (38.3)	39 (47.0)	0.337
	No	29 (61.7)	44 (53.0)	
k. Did you face any difficulty while conducting online teaching?	Yes	39 (83.0)	45 (54.2)	0.001
	No	8 (17.0)	38 (45.8)	
l. Do you think online teaching can replace conventional teaching methods?	Yes	8 (17.0)	9 (10.8)	0.315
	No	39 (83.0)	74 (89.2)	

\*Chi-square test applied. Students: (a-f), Teacher's: (g-l). COVID-19=Corona virus disease 2019

This can be explained by distractions due to various factors at home. Daroedono *et al.* also considered lack of concentration and lack of understanding of lessons as inhibitory factor in students' learning in their study.<sup>[14]</sup>

One of the major challenges was the students' online assessment. Various assessment methods such as online MCQs, diagrams, video viva were used to assess students regarding their understanding of topics and majority of students (55.4%) find this assessment method as satisfactory. The same finding was reported by Chopra *et al.* where half of the students desired for the need for assignment following online teaching.<sup>[10]</sup> Besides online teaching of medical subjects, teachers have a great role in providing moral support regarding COVID-19 scare. Online teaching itself has reduced this fear to some extent among students. Students were also asked about their general well-being and concern about COVID-19. Moreover, students were interested in addressing their concerns and insecurities in context with the present situation. Verma *et al.* suggested that online classes decreased the student's stress about COVID-19. It was also stated that lack of interactive teaching, easy distraction, and technical issues were common issues felt by them.<sup>[15]</sup> Kaur *et al.* reported that 34.8% of medical students wanted online teaching to be included in the curriculum as an aid to the routine teaching.<sup>[11]</sup>

The major advantages of online teaching as perceived by student are accessibility anytime and anywhere (24.7%).

Daroedono *et al.* also stated that flexibility in time and location is a favorable factor.<sup>[14]</sup> Studies have found that applying telemedicine technologies during undergraduate medical training contributed to improve core competencies, medical knowledge, overall learning, and higher quality patient care.<sup>[16]</sup>

Disadvantages of online teaching included the inability to do practical work and difficult to understand as practical exposure was absent. One barrier of online teaching is poor internet connectivity (17.2%). Majority of medical colleges are situated in urban areas where access to internet is present. However, a uniform platform which is of robust capacity and designed for medical teaching is required for online activity. Lack of personal interaction with the teachers, distractions at home and frequent technology failures were among common cited problems by medical students in Punjab, India.<sup>[11]</sup> In a thematic analysis conducted on medical students regarding dissatisfaction included lack of feedback, communication channel problems, the unpreparedness of the message receiver and the weakness in the educational content uploaded.<sup>[17]</sup>

In anatomy subject, physical presence of students is very important because of cadaveric learning where students perform dissection. Lecture part was still manageable and understandable but the practical part was more difficult to be managed through online mode. Moreover,

medical colleges/institutes were not prepared for online teaching. It was a new learning for institutes as well as teachers to become well versed with online teaching.

### Teacher's perspective

Almost every institute started online teaching shortly after lockdown due to pandemic happened. In the current study, challenges were faced by teachers to provide online teaching as majority were not having any prior knowledge and not having any formal training to conduct online classes. For successful implementation of online classes, key pillars are skills, resources, institutional support, and attitude.<sup>[18]</sup> This was a major challenge and source of mental resistance or anxiety for taking online classes. Initially, teachers were hesitant but later on they become used to it. This was a totally new and sudden experience for teachers to learn a new skill in a short span of time. Ferrel and Ryan also stated that implementing technology in teaching will allow students as well as teachers to develop collaboration skills and improved adaptability.<sup>[19]</sup>

Majority of teachers found online teaching by teachers as incomplete so they started other modes of teaching for better understanding of topics such as video demonstration and group video calls. Multipronged approach for assessment was also utilized which included online multiple-choice questions, diagrams, video viva, etc., and they found it good (31.5%) and average (22.5%) in majority of cases. Male teachers had a significantly higher proportion in terms of difficulty faced during online which may be explained by preference to traditional teaching by male teachers.

Major advantages of online classes as perceived by teachers were recording of lectures, safety as social distancing was maintained, good platform for introverted students who found it difficult to ask questions face to face, and convenience to take lecture anytime and anywhere. A study done by Rajab *et al.* stated that some students praised blended education since it removed some of the traditional teaching barriers that do not work for all students.<sup>[13]</sup>

Another study done by Agarwal and Kaushik suggested that online sessions broke monotonous routine, were a good utilization of time and the material was easy to access. Their study has also favored the inclusion of online teaching with the previous one even after prevailing lockdown.<sup>[6]</sup> Rajab *et al.* stated a positive impact on the acceptance of online education by both students and teachers.<sup>[13]</sup> A number of studies showed positive learner perceptions.<sup>[20,21]</sup>

On the other hand, lack of face-to-face interaction was a major disadvantage in teacher's point of view. Other

disadvantage was difficulty in demonstrating practical classes and students did not find it as good assessment tool. A study from Gujarat, India reported difficulty in taking attendance, proxy attendance by students, and unable to find students causing disruption in online class as perceived disadvantages.<sup>[9]</sup>

Many teachers have emphasized the irreplaceable value of attending class in-person, lauding the real-time feedback and back and forth that develop in class that was hard to replicate in online forums.<sup>[19]</sup> E-learning has its strengths and weaknesses. A major challenge is to learn this skill to the fullest which can help learner to access the richness of the medium. Overall impression of online teaching was average regarding teacher's point of view and they also suggested that online teaching cannot replace conventional teaching but it can be supplemented in future.

### Limitation and recommendation

The study had certain limitations. The study was conducted in a limited time period and the qualitative evaluation in the form of open-ended questions was lacking. The addition of focus group discussion involving teachers and students could have added more perspectives. The present conducted study recommends to conduct at least one-third of didactic lectures online after the pandemic has ended as it gives students liberty to attend lectures with comfort of their home. However, practical classes should continue in physical mode. Furthermore, barriers to online teaching such as internet connectivity, familiarity to online teaching modes and capacity building of teachers is required. Uniformity in curriculum is also required as different medical institutions and universities make their own teaching schedules.

### Conclusion

The present study was intended to find out the perspectives of both students and teaching faculty. Both teachers and students had a mixed response regarding online teaching. Difficulty to understand and no prior training were major lacunae cited by teachers and the taught. India, being a developing country seems managed to cope with the COVID-19 catastrophe in terms of medical education. However, more needs to be done to supplement the existent teaching pattern and preparedness of teaching faculty by incorporating online assignments and assessment methods, strengthening digital infrastructure in medical schools, and training support for teachers.

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### Conflicts of interest

There are no conflicts of interest.

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