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Original Article

Medical education during COVID-19 associated lockdown: Faculty and students' perspective

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ABSTRACT

Background: The lockdown imposed due to novel coronavirus disease 2019 (COVID-19) has resulted in adopting electronic learning (e-learning) as the means of education in various institutions all over India. This study aimed to collect the experiences of faculty and students regarding e-learning in medical colleges during COVID-19 and to analyse the likely perceived benefits and problems to choose blended learning activities after the COVID crisis.

Methods: A survey-based study was conducted among undergraduate students and faculty members in medical colleges of Delhi-NCR.

Result: Two hundred forty-eight medical students and 23 faculty members participated in the study. Two hundred twelve (85.4%) students considered medical education to be severely affected during the lockdown and 219 (88.3%) students found the online classes to be useful. Poor connectivity followed by lack of human interface and poor sound or acoustics were the major hindering factors, whereas convenience and access were reported as important facilitating factors. In the postlockdown phase, 135 (54.4%) students want online classes to be continued in addition to classroom teaching for the cognitive domain, 42 (16.9%) students want it for both cognitive and psychomotor domain and 60 (24.1%) do not want online classes. The majority of the faculty members (65.2%) were in favour of including online teaching modules in routine curriculum and 69.6% suggested a 70%:30% distribution of traditional and online classes after the COVID lockdown.

Conclusion: Implementation of e-learning within the existing curriculum is bound to be challenging; however, it remains the only solution during COVID-19 imposed lockdown for maintaining the chain of learning.

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Introduction

Novel coronavirus disease 2019 (COVID-19) has caused widespread panic and disease globally and in India.[1] In addition to healthcare and economic losses, the lockdown imposed during COVID has adversely affected educational opportunities.[2]

Traditional educational activities use the live experience of a facilitator with the students. This can be in the form of a large group or small group activity for teaching any of the three domains—cognitive, psychomotor or affective.[3] The revised curriculum by Medical Council of India mandates the revision in the traditional teaching-learning methods to include more interactive sessions, small group discussions with use of e-resources.[4] E-learning is a newer concept in education, where electronic media or technology (internet- or non-internet–based) are used for learning. Online learning has been less frequently practiced in medical education in developing countries such as India citing lack of infrastructure, expertise and feasibility.[5] Traditional teaching including using printed material as resource material are identified as cornerstone for learning by most medical students versus internet-based or non-online computer–based learning.[6]

However, e-learning has emerged as the only possible mode of education during COVID crisis for school and college students. Medical education is more challenging and stressful as it involves bedside and soft skills training which cannot get adequately represented through e-learning. We therefore planned this study to assess the students' and faculty's perceptions towards e-learning as a mode of education when widely implemented during the COVID pandemic.

Materials and methods

This was a cross-sectional online survey administered to the undergraduate students and faculty members of medical colleges in Delhi-NCR region shared through social group messaging on WhatsApp to known alliances/students who further circulated it to their contacts. The questionnaire was developed by discussion among 4 undergraduate teachers of different specialities and one senior resident. This was then revised and edited by 2 medical education faculty members. A pretesting was carried out among 10 students. The response was then reviewed by the 2 medical education faculty and the 4 undergraduate teachers together, and the questionnaire was finalized. The study was conducted during the second week of April, 2020 (approximately three weeks after enforcement of complete lockdown in the country). Informed consent was taken from the respondents. The study was approved by the institutional ethics committee.

The participants were provided with a questionnaire through an online Google form to assess their perceptions of online learning during COVID-19 lockdown. There were 22 questions (20 closed questions) in the learners' questionnaire and ten questions (nine closed questions) in the faculty's questionnaire. It consisted of questions on the effect of lockdown on medical education, time spent on online and offline learning, and the various modality of didactic learning used by the students during this phase. It also assessed the time spent by students on the online lectures organized by the college and their experiences, whether they found them useful, duration of each lecture they would prefer and if they had sufficient opportunity to interact with educators and resolve their doubts. The various facilitating and hindering factors during online classes faced by the students were analysed too. The answers to questions pertaining to more time being spent online, online learning being preferred over traditional classroom teaching, were graded on a 5-point scale between strongly disagree, disagree, neutral, agree and strongly agree. The options regarding the various modes of learning used during lockdown and frequency of using them were rated on a 5-point Likert scale, with 1 being never and 5 being very frequently. The questions regarding the various facilitating and hindering factors were graded on a scale of 1–5 with 1 being not helpful/not problematic and 5 being most helpful/most problematic, respectively. Regarding the features preferred during online classes, options ranged from 1-not prefer to 5-strongly recommend. In the faculty questionnaire, experience related to the various features of online learning such as timing, connectivity, logistics, lesson preparation, convenience and access, interest and interaction with students were graded from 1-poor to 5-excellent. A 5-point Likert scale was used to rate the overall experience of an online class, where one was unsatisfactory and five was excellent. The form collected all responses in an anonymous manner without personal identification information like college or city.

Sample size

The sample size was calculated assuming 90.6% students who would use an online tool for learning as per a study (Wynter et al, 2019)[7] The sample size required with an absolute precision of five percent with design effect of one will be 131 students. A convenient sample of 25 faculties was chosen to record the facilitators' perceptions.

Statistical analysis

Data were recorded on a MS excel sheet and analysed using SPSS, version 23. Quantitative data were expressed by mean and standard deviation and significance level of differences between the means were tested by Student's t-test (unpaired). Proportions were compared by chi-square test or Fisher's exact-test. A P value of <0.05 was considered statistically significant.

Results

A total of 248 students of medical colleges from Delhi-NCR region participated in the study. The distribution of students from different batches was as follows: 53 students (21.4%) were from first year, 27 students (10.9%) from second year, 120 students (48.4%) from third year and 48 students (19.4%) from the final year. There were 23 responses from the faculty who had an experience of taking online classes, 13 (56.5%) had more than ten years of teaching experience, 5 (21.7%) teachers had <5 years' experience and 5 had experience between 5 and

10 years. There were 18 (78.3%) teachers from clinical fields, 4 (17.4%) from preclinical and 1 (4.3%) from paraclinical subjects.

Medical education was severely affected during the lockdown according to 212 (85.4%) of the students. A total of 219 (88.3%) students found the online classes to be useful in facilitating education during this period. Table 1 shows the frequency of various modes of learning used by the students during the lockdown period which varied significantly between different batches ($P < 0.05$). A total of 187 students (75.4%) were spending between one-four hours/day on online learning at home, 31 (12.5%) students spent > 4 h whereas, 30 (12.1%) spent <1 h. However, the tendency to spend more time on online learning than offline was reported by only 72 students (29.0%). The opportunity to interact with the educator was sufficient according to 108 (43.5%) students, 74 (29.8%) were neutral, whereas 69 (27.8%) felt it was inadequate. In response to the question of getting their doubts cleared during the online session, 186 (75.0%) answered in affirmation while 62 (25.0%) students felt it was not carried out.

Regarding their own preference on the time that should be invested on online classes per day, 119 students (48.0%) opted for 1–2 h, 88 (35.5%) were willing to spend 2–4 h, 22 (8.9%) preferred < 1hr and only 19 (7.7%) students wanted to give >4 h to online classes. The most preferred duration of each lecture was between thirty minutes and one hour, according to 187 (75.4%), 35 (14.1%) students wanted it to be 1–2 h long and 26 (10.5%) wanted it to be less than 30 min in duration. Online learning was preferable to traditional classroom teaching by 88 (35.4%) students, 107 (43.1%) students did not prefer online teaching over traditional classroom and 53 (21.4%) remained neutral. After the lockdown period, 135 (54.4%) students wanted online classes to be continued in addition to classroom teaching for cognitive domain (lectures), 42 (16.9%) students wanted it for both cognitive (lectures) and psychomotor domain (practical), 11 (4.4%) students suggested using them for only psychomotor domain (practical), whereas 60 (24.1%) students were against having any online classes. Fig. 1 shows the preference of students for the continuation of the online classes after the lockdown.

From the perspective of the faculty members, 15 (65.2%) were interested in including online teaching modules in routine curriculum once classroom teaching restarts, 3 (13%) were against it and 5 (21.7%) remained neutral. Sixteen (69.6%) teachers suggested a 70%:30% distribution of traditional and online classes, 4 (17.4%) wanted it to be equally distributed and 3 (13%) preferred only classroom teaching. Use of online platforms for internal assessments in routine curriculum was recommended by 10 (43.5%) faculty, 4 (17.4%) did not prefer it and the 9 (39.1%) were neutral.

Table 2 shows different features of online sessions which were preferred and recommended by the learners. The option for viewing the content later offline and the inclusion of online videos or live demonstrations in the classes was preferred by most of the students. Poor connectivity was the most

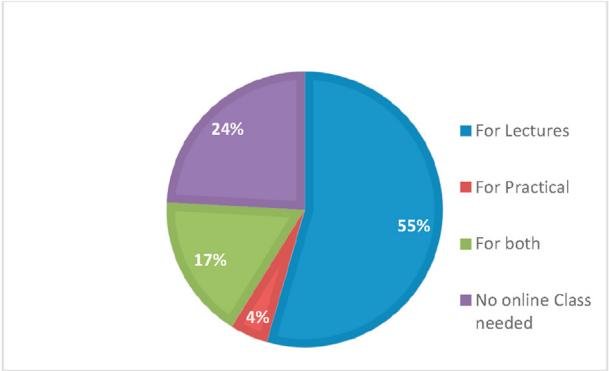

Fig. 1 – Preference for e-learning platform after lockdown would open.

Table 1 – Sources of study material used by students of different batches during lockdown.

Sources of study	MBBS-1st year, (n = 53)	MBBS-2nd year (n = 27)<	MBBS-3rd year Part I, (n = 120)	MBBS-3rd year Part II, (n = 48)
Printed material – books, notes	45 (84.9%)	17 (63.0%)	86 (71.7%)	38 (79.2%)
Online material – self-study	27 (50.9%)	20 (74.1%)	69 (57.5%)	27 (56.3%)
Online material – coaching centres	12 (22.6%)	14 (51.9%)	86 (71.7%)	26 (54.2%)

Table 2 – Features of online sessions preferred by learners.

Characteristics of online session	Not recommend n(%)	Neutral n(%)	Recommend n(%)
Link for additional teaching-learning material	35 (14.1%)	61 (24.6%)	152 (61.3%)
Online videos or live demonstrations	29 (11.7%)	36 (14.5%)	183 (73.8%)
Visual interface of the teacher	39 (15.7%)	78 (31.5%)	131 (52.8%)
Break between two consecutive lectures	24 (9.7%)	45 (18.1%)	179 (72.2%)
Option for questions/ doubts during the lecture	26 (10.5%)	53 (21.4%)	169 (68.1%)
Interactive quiz during the lecture with mandatory responses	78 (31.5%)	64 (25.8%)	106 (42.7%)
Option for feedback about the class after the session	48 (19.4%)	77 (31.0%)	123 (49.6%)
Access platform for online classes in college/library	31 (12.5%)	62 (25.0%)	155 (62.5%)
Option for offline viewing later	11 (4.4%)	32 (12.9%)	205 (82.7%)

Assessed on 5-point Likert scale, where 1,2-meant not recommend, 3-neutral and 4,5-recommend/strongly recommend.

Box 1
Comments from students and faculty

Student responses	Faculty responses
• The thing which we can learn by physical presence in front of patients in the ward and in the classrooms, can't be learnt by our mobile screens and a pair of earphones • Lack of practical exposure (i.e. lack of interaction with patients) would hinder the learning and development of practical skills, which are absolutely essential for correctly diagnosing and treating patients and performing duties as a doctor. • Practical ward rounds can never be compensated for with online lectures.	• It is bridging the gap until we resume regular classes but can never be a 100% substitute to classroom teaching • Online teaching and e-learning is the way forward. • While theoretical teaching can be easily conducted online we must also innovate to adapt clinical teaching for e-learning platforms. • It has been a new learning process for us faculty as well. • Still exploring the platform of online classes and assignments to be able to do the best possible for the students till we return to normal classes. • The students have been very receptive and have accepted online classes.

commonly recorded hindering factor (94, 35.9%), followed by lack of human interface (78, 29.8%) and poor sound or acoustics (71, 27.1%). One hundred seventy-nine (68.3%) found convenience and access as one of the important facilitating factors followed by improved understanding (108, 41.2%) and good presentations (112, 42.7%). One hundred and ninety-one (75.2%) students could solve their doubts during the online class. Majority identified a lack of clinical skills exposure and the opportunity to collaborate with peers as the biggest disadvantage of online classes.

For the overall experience of online class/lecture/webinar (rated on a 5-point Likert scale where one was unsatisfactory and five was excellent), 5 faculty members (21.7%) found the experience to be excellent with a score of five, 7 (30.4%) gave a score of four, 9 (39.1%) gave a score of three and 1 (4.3%) each gave a score of two and 1. Amongst the individual features of online learning, timing and scheduling, connectivity, logistics, lesson preparation, convenience and access for teachers, interest and interaction with students were all rated three by the majority, lesson experience was rated three and four by equal number of participants.

The excerpts from student and faculty responses are shown in Box 1. To make these online classes more efficient, many students suggested online classes to be made into a video library with breakdown of lecture contents into smaller lectures. The provision of additional reading material and discussion points before lectures was desired by several students. To make the class more interactive several suggestions were made in the form of using a common chat box, including the visual interface of the teacher, organising separate doubt solving sessions and use of whiteboard, blackboard, tablets for writing and explaining in place of reading from a PowerPoint presentation. Several students wanted illustrations with the help of a stylus, the usage of applications such as 3D anatomy and playing videos of clinical examination and procedures to make the topics more understandable. Technical difficulties faced by the teachers leading to frequent interruptions during the class were disliked by students with suggestions to train the educators with the help of tutorials before the class. The teachers were satisfied with the participation of the students on the online platform. They were overall appreciative of the role of online learning in facilitating medical education during the pandemic associated lockdown. However, most of them were of the opinion that it should act as an adjunct and not a replacement of traditional classroom teaching in future.

Discussion

Online teaching is a pedagogical tool that has the potential to transform medical education and has proved to be very useful during the standstill brought by COVID lockdown. The present study reports the experiences of medical students and faculty of the Delhi-NCR region regarding online education during this phase. The study also highlights the limitations of the methodology in its present state and suggestions for an improved learning experience.

In our study, most of the students preferred traditional classroom teaching however, a significant number of students (35.4%) chose online learning over traditional classroom teaching. The preference was more for the theory topics than practical ones. A similar study was carried out by Singh et al[8]

who reported traditional classroom being preferred by 106 (50.9%) students and E-classes by only 46 (22.1%) students.

E-learning provides flexibility, convenience to the learner, better platform for sharing information for psychomotor skill, repeatability, improved access of medical information and improved learning experiences. The outlook of medical curriculum may also evolve with digitalisation of medical education using innovative technology. However, there are issues with logistics, supplies, cost, training and validity of information[6] as were also reported in the present survey. According to a study from Pakistan involving 382 MBBS and BDS student, 77.4% students showed negative perception about e-learning, of which 86% students felt e-learning has little impact on their learning.[9] Both students and teachers reported benefits of features such as video calls and group chat with online platform (Microsoft Teams) in improving the interaction with quick adaptability of the students.[10] They however reported poor internet connectivity leading to call dropouts as a limiting factor.[10] The use of GoogleHangouts for teaching students in surgery had the limitation of allowing only 10 students to attend at a time.[11] A combination of Zoom and Microsoft Teams were recommended for educational activities during the pandemic with prior orientation to the online platform, use of visual interface, proper usage of microphones, availability of a person for troubleshooting during live sessions and the role of a moderator to enhance the teaching-learning experience.[12]

A web-based training of orthopaedic residents and fellows during the COVID-19 pandemic found the ability to revisit the digitally recorded session, ease of access to both clinical material and key articles, and the ability to connect individuals of different geographic regions as the beneficial factors of online learning over traditional in-person learning.[13] Another study from Nepal suggested using interactive sessions, quizzes, brainstorming sessions and students giving presentations as some of the methods to improve student participation and attention during the online sessions while slow internet connections, lack of technical knowledge, issues with etiquette with volume controls and video backgrounds as some of the limitations.[14]

E-learning helps in improved understanding of the subjects and skills, the ease of accessibility, flexible timing and the chance to interact better with coparticipants.[15] It may be associated with dissatisfaction amongst the students due to limited interaction with the educator[16] and inadequate chances for solving queries and clarification of concepts for complex topics,[17] as were seen in the present study. Students preferred e-learning as a supplement to the conventional didactic methods rather than a replacement,[18,19] as experienced by the present study group.

The faculty experiences with e-learning have been variable in the past. In a questionnaire-based study, 500 faculty across 35 medical colleges in Korea reported high usefulness and usability of an e-learning platform. However, only 39% of the faculty had incorporated e-learning into their lessons citing reasons of lack of resources, time, awareness and expertise.[20] Another study on 28 medical faculties from Iran reported lacunae in organization, infrastructure, legal-ethical issues such as copyrights and ethical issues as chief barriers to e-learning.[4]

The participants in the present study belonged to Delhi-NCR region; hence results may not be generalized to medical students all over the country. As the participants belonged to different institutes and used different platforms, hardware and software devices and technological tools for attending the classes, there was a lack of homogeneity in evaluating the teaching-learning methods used. The previous exposure of the medical students and faculty members to e-learning was also not checked which has the potential of affecting the perceptions towards online classes during lockdown. However, the experiences and feedback gained from such studies would help in organising a planned introduction of e-learning tool in the curriculum in the future.

The aforementioned examples highlight the student experiences and the foreseen problems with e-learning. It however, remains as the only feasible solution during the COVID crisis and national lockdown for maintaining the chain of learning. The process of implementation of the same within the existing curriculum is bound to have varied challenges. The pandemic however, has helped schools and colleges to innovate e-learning solutions, which will go a long way in revolutionising medical education.

Disclosure of competing interest

The authors have none to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.mjafi.2020.12.008.

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