European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 09, 2022

Original Research Article

E-learning during COVID-19 pandemic in Northern India: How well have we faced the challenge?

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Abstract

Objective: Ample research has been published lately exploring the strengths and weaknesses of online teaching in medical education but very few have reported the students' perception towards this shift. The current study was designed to evaluate the perception of medical undergraduates in Northern India of online teaching and their readiness and limitations towards its adoption. The knowledge summarized henceforth would help in identifying potential areas of improvement leading to an upgradation in the quality of online teaching and better medical education.

Material and Methods: A cross-sectional online survey in the form of a pre-validated self-administered Google form questionnaire consisting of 23 questions was carried out for a duration of two months. All medical undergraduate students (>18 years) studying in various academic years in three largest medical colleges in Jaipur, Rajasthan, willing to be a part of the study were invited to participate.

Results: After initiation of e-teaching, an enhancement in learning and knowledge was reported by around one-third respondents. 21.15% students were satisfied with e-learning, 27% recommended that e-learning methods should not be used at all and 44% suggested that e-learning methods may be regularly used in future.

Conclusion: Online teaching comes with its own set of merits and demerits. The students have provided a very mixed response to its utility. However, most agree that when imparted efficiently, it may prove to be an asset in imparting better medical education.

Keywords: E-teaching, medical education, medical undergraduates, online teaching-learning

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Introduction

Medical education is crucial in the shaping of a medical practitioner. It includes not only imparting an academic qualification but involves an all-round development too. The three domains of medical education namely, cognitive, psychomotor and affective, are the building blocks of this vast course. While cognitive domain includes advanced and applied medical knowledge, the psychomotor component deals with clinical and management skills and use of technology in healthcare. Affective domain involves inculcation of values like being noble, communicative, universal, collaborative, managerial and spiritual. Modern medical education hinges on the equilibrium of these three domains to produce holistically groomed, all-round doctors, ready to serve in the field of medicine.

COVID 19, caused by a novel mutant of coronavirus, SARS-CoV-2, emerged as a global pandemic in the early 2020 and continued to show peaks and nadir of cases even until the end of 2021. Since its emergence, many countries have been adversely affected and India has been no exception. On March 24, 2020, the Indian Government called for a 21-day nationwide lockdown to avert the rise of the first wave of pandemic in India. India's 1.3 billion citizens were ordered to stay at home, unless inevitable. Following these guidelines, all academic institutions were closed at the onset of the pandemic and remained closed for nearly 2 years. It is worthwhile mentioning here that when it comes to acquiring *SARS-CoV-2* infection, medical students are at a far greater risk compared to students from other disciplines. The budding generation of medical students has not been upbeat about this idea of staying back home during the most productive and exciting days of their lives. Furthermore, decline in non-COVID in-patients or out-patients during the pandemic resulted in lack of clinical exposure and attainment of clinical skills during clinical postings. The current scenario of education seems largely fragmented and unfocussed [1]. In order to make up for the losses incurred due to absence of physical training, educational institutions of all kinds have taken up teleteaching in the form of online classes [2].

There are several conflicting views regarding this replacement of in person classes with online platforms. While being a necessity for controlling transmission and surging infection among students, it seriously limits the wide arena of medical education [3]. Several reviews have been published lately exploring the strengths and weaknesses of online teaching in medical education but very few have reported the medical undergraduate's perception towards this shift.

The current study was thus designed to evaluate the perception of medical undergraduates of various medical colleges in Jaipur regarding online teaching by conducting a web-based questionnaire survey. Besides this, the readiness and limitations of medical undergraduates towards adoption of online teaching methods was also evaluated. The knowledge summarized henceforth would help in identifying potential areas of improvement leading to an upgrade in the quality of medical education.

Material and Methods

A cross-sectional online survey in the form of a pre-validated self-administered Google form questionnaire was carried out for a duration of two months from August 2020-October 2020. Participation in the study was voluntary. All medical undergraduate students (>18 years) studying in various academic years (first, second, final year part 1 and part 2) in three medical colleges in Jaipur, Rajasthan namely Mahatma Gandhi Medical College and Hospital, RUHS College of Medical Sciences, and National Institute of Medical Sciences were invited to participate in the study. A link to Google form was sent to the study participants through email addresses obtained from the college database. An informed consent document consisting of the participant information sheet and informed consent form was included in the beginning of the Google form questionnaire and only those participants who gave informed consent were allowed further access to the questionnaire.

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Convenient sampling technique was followed for the study. Approximately 600-700 students are enrolled in the medical undergraduate course at MGMC&H, RUHS-CMS, and NIMS. Therefore, approximately 700 + 600+ 600 = 1900 students were approached, out of which all those who fulfiled the inclusion and exclusion criteria were enrolled.

The structured questionnaire consisted of 23 questions including 06 questions on socio-demographic data, 03 on academic challenges faced by the study participants during COVID pandemic, 04 on e-teaching methods incorporated by the medical colleges, 08 on perception of study participants about e-learning and 02 were open ended questions on suggestions and recommendations for advancement of e-learning in medical education. For face and content validity, the questionnaire was pre-tested with 10 respondents after review by the experts.

The study followed the ICMR ethical guidelines for the conduct of biomedical research in human participants and the principles of the Declaration of Helsinki. Data was collected anonymously with no identifiers and strict confidentiality was maintained throughout the study.

Statistical analysis: Microsoft Excel version 2016 (MS Excel 2016) was used for statistical analysis. Descriptive statistics such as frequency and percentage were used for calculation.

Results

A total of 747 responses were received via the study link. For the conduct of e-teaching, the platforms used by the medical institutes included Google Meet (48.2%), Zoom (3.8%), Moodle (42.6%), Impartus (2.4%), and Cisco Webex meeting (3.1%).

Table 1 details the socio-demographic description of the study participants.

Table 2 presents the academic challenges faced by the study participants during the initial days of lockdown when the educational institutes were closed, and online teaching had not yet been initiated.

Table 1: Socio-demographic description of study participants (N=747)

Variables	Frequency	Percent
Gender		
Male	359	48.06
Female	384	51.41
Prefer not to say	4	0.54
Age (in years)		
18-20	348	46.59
20-25	384	51.41
25- 30	15	2.0
Academic year		
MBBS 1st	237	31.73
MBBS 2nd	177	23.69
MBBS 3rd	167	22.36
MBBS 4th	166	22.22
Level of computer literacy		
No skills	61	8.27
Basic skills	380	51.49
Intermediate skill	260	35.23
Advanced skills	37	5.01
Device used to access e-learning platform		
Smartphone	632	73.23
Computer	37	4.29
Laptop	152	17.61
Tablet	41	4.75
Others	1	0.12
Source of internet connection		
Mobile Hotspot 3G/ 4G	269	36.01

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Broadband	119	15.93
Dial-Up	3	0.40
SIM card internet	347	46.45
Dongle	9	1.20

Table 2: Description of academic challenges faced by the study participants before the initiation of e-teaching during lockdown

Variables	Frequency	Percent
During the period between the start of lockdown due to COVID-19 pandemic and initiation of e-teaching by your institution,		
How would you grade your self-management of time for learning at home?		
Excellent	57	7.63
Good	203	27.18
Average	350	46.85
Bad	137	18.34
What were the issues that had bothered you as a student?		
Course could not be completed due to loss of scheduled lectures	218	13.74
Loss of attendance	234	14.74
Delayed/suspended examinations	169	10.65
Loss of clinical postings	357	22.50
Deviation from academic routine	385	24.26
All have bothered me equally	193	12.16
Other	31	1.95

Table 3 provides the details of various methods and tools used by the medical institutes for e-teaching.
Table 4 describes the perception of study participants on these e-learning methods.
The difficulties faced by the participants during their e-learning sessions are described in Figure 1.
Figures 2 provides a summary of responses on the use of e-learning methods in future after the end of lockdown.

Table 3: Description of e-teaching methods incorporated by the medical colleges

Variables	Frequency	Percent
Does your e-learning teaching module incorporate video or other rich media?		
Yes	413	55.29
No	334	44.71
Does your e-learning teaching module integrate tests and assignments?		
Always	124	16.60
Usually	345	46.18
Rarely	173	23.16
Never	105	14.06
On an average how much of your time is being invested in the e-learning platform?		
Less than 1 hour	141	18.88
1-2 hours	190	25.44
2-3 hours	205	27.44
3-4 hours	140	18.74
4-5 hours	48	6.43
More than 5 hours	23	3.08

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Table 4: Perception of study participants on e-learning methods (N=747)

Variables	Frequency	Percent
What was the level of your acquaintance with the e-learning platforms preceding their use by your institution?		
No previous knowledge or experience	184	24.63
Have previous knowledge but no experience	422	56.49
Have previous knowledge and experience	108	14.46
Frequent previous exposure to such platforms	33	4.42
Do you think that you're learning and knowledge has been enhanced with the e-learning system?		
Yes	237	31.73
No	258	34.54
I am not sure	252	33.73
Do you find e-learning more interactive than conventional teaching methods?		
Yes	126	16.87
No	505	67.60
Equal	116	15.53
What is the level of your satisfaction with e-learning?		
Satisfied	158	21.15
Neutral	335	44.58
Not satisfied	254	34
In which of the following areas has e-teaching helped you during lockdown due to COVID-19 pandemic?		
Better time management for learning	161	8.32
No or minimal academic loss	190	9.82
No or minimal attendance loss	287	14.83
Reduced boredom of lockdown	237	12.25
Motivation towards academic learning	239	12.35
Optimism about future	138	7.13
Being able to connect with colleagues at one point	165	8.53
Reducing social networking time	109	5.63
Satisfaction of parents	254	13.13
It was not helpful to me in any way	155	8.01
Which of the following best describes your experience of e-learning as compared to the previous conventional teaching?		
Better	150	20.08
About the same	286	32.29
Worse	242	32.40
Much worse	69	9.24

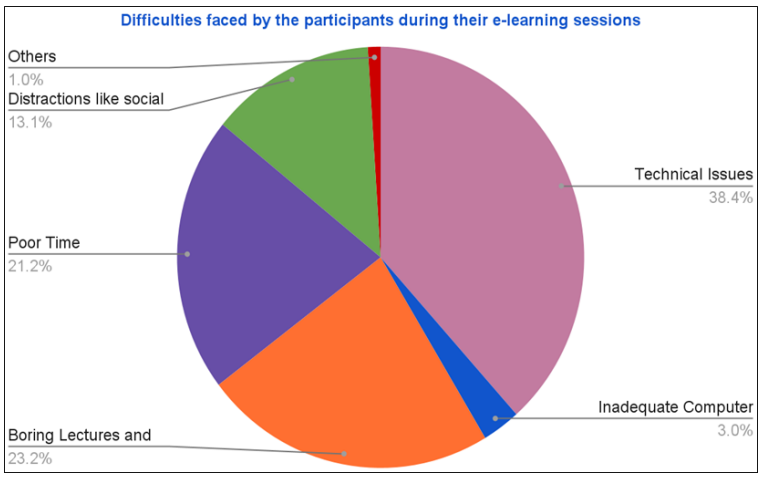

Fig 1: Description of difficulties faced by the participants during their e-learning sessions

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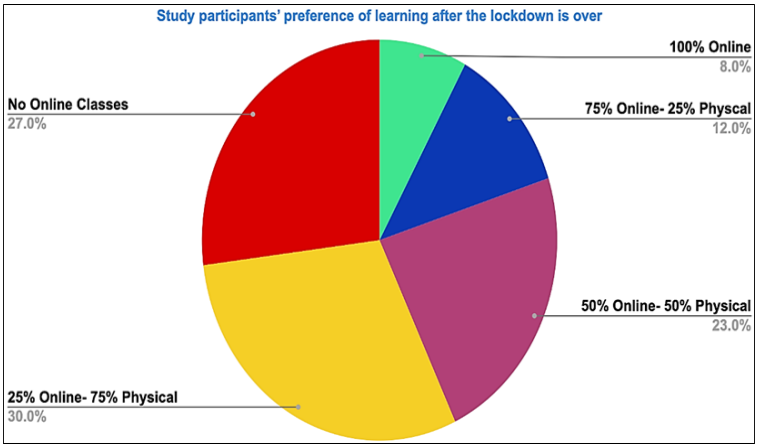

Fig 2: Description of study participants' preference of learning after the lockdown is over

Discussion

The current study was undertaken to evaluate the perception of medical undergraduates on online learning during the COVID-19 pandemic and their readiness and limitations towards adoption of such methods.

The present study highlights that in the absence of any teaching initiatives by medical institutes, the majority of students had difficulty in time-management and self-study. The absence of any teaching during the initial few days of the lockdown had triggered various concerns among the students like loss of scheduled lectures, attendance, loss of clinical postings and an unpredictable delayed examination schedule. Isoufi *et al.* [4] had likewise reported that majority students felt that their study potential was wasted due to the closure of medical institutes consequent to COVID-19 pandemic.

The introduction of online training and virtual clinical experience by medical institutions was intended to provide a plausible solution to these concerns. Approximately one third of students reported an enhancement in learning and knowledge following initiation of e-teaching. Nearly half of the students reported their experience of e-learning to be either similar or even better when compared to the earlier conventional teaching methods.

Various challenges have also been reported by the students in recent studies. These include inadequate infrastructure and resources, poor computer skills, the psychological impact of the transition from on-campus medical college learning to home environments, and the limited mentoring relationship between faculty and students [5-8]. A recent study also indicates that an adequate infrastructure is a prerequisite for a successful e-learning session [9]. The authors speculate that socio-economic background of the students influencing availability of such facilities might have an important role in their level of satisfaction with e-learning.

In the current study, mobile phones were used by the majority of students for attending the e-learning sessions. Completion of assignments and quizzes were found to be difficult to perform on a mobile handset, especially in the absence of basic computer skills. Further visibility of the e-content shared by the faculty in the form of power point, pdf, or video is always better on a larger screen of a laptop or similar device as compared to a mobile phone. These may have been major discouraging factors towards a good learning experience by the students.

An uninterrupted and good speed internet connection is as important as a good learning content for an enriching e-learning session. Grossly, a broadband connection may be considered a preferred source of internet connection as compared with mobile hotspots or mobile 3G/4G connection. Since, on an average 3-5 hours of teaching sessions each day were conducted by the medical institutes, a limited data pack is another limitation. In the present study, merely 15.9% students used a broadband connection, and this could be an important decisive factor in the poor acceptance of the e-learning methods. Poor internet connection has

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been reported to negatively impact the student's attitude towards e-learning by Abbasi *et al*. [10] and Aghakhani *et al*. also [11].

There have been significant changes in the field of medical education in India since the introduction of new curriculum based medical education (CBME) in the year 2019. In the earlier version, there was no emphasis on achieving even the basic computer skills leaving the Indian medical graduates grappling with the various facets of online medical education introduced during the covid 19 pandemic. Needless to say, students who had access to personal laptop/computer and were proficient in computer skills fared better during the initial part of the pandemic surge. In the present study, nearly half of the students had basic computer skills that included the ability to use basic formatting, editing and printing functions while 8.3% had absolutely no computer skills. Likewise, lsoufi *et al*. [4] reported in their study that 47.5% students were very good or proficient in using electronic devices. Further, only 19% of the students in the present study had any previous knowledge and exposure of the e-learning platforms being used while 81.0% were having little or no knowledge. Rajab *et al*. [8] have reported in their study that 37.4% of medical students had little or no online teaching/learning experience.

Overall, when asked to describe the difficulties faced during e-learning in the present study, 23% mentioned lectures to be boring and study environments at home to be inappropriate. One-third of students mentioned facing several technical issues like poor network connectivity and streaming speed. Around 13% participants admitted to getting distracted by social networking and similar activities during an e-learning session. Online teaching-learning requires a lot of motivation and attention. An interactive lecture has always been the backbone of a good learning session. In the present study, lack of interaction during e-teaching was reported by most students. The authors hereby suggest that various assessment tools be used during e-teaching to both interact with the learners and assess their skills [12], few worth mentioning being chat rooms, discussion forums [3], multiple choice questions and mini-quizzes [13].

On the issue of whether or not to continue online mode of teaching in the post pandemic period, nearly one-third felt that e-learning methods should not be used at all in medical education. On an optimistic note, the remaining majority recommended a combination of online and offline teaching. Similar findings were observed in a study by Rajab *et al*. [8] in which 62.5% of the respondents preferred combining online with traditional face-to-face instruction while 25.5% preferred traditional face-to-face instruction. In the present study, 44.0% agreed that e-learning methods may be regularly used in future for imparting medical education.

In response to the open ended question on suggestions for overcoming the common e-learning challenges, majority felt that live video lectures should be used instead of powerpoint slides. In case of use of powerpoint presentations, they should be less exhaustive. Videos on clinical examination skills should be incorporated in the presentation and more assignments (group and individual) and quizzes should be given. Many also felt that sharing of recorded lectures on groups would be helpful. Other suggestions included use of more user friendly platforms that allowed feedback for each class, provide adequate time gap between lectures and have a transparent system of attendance. When asked about measures to improve and advance e-learning in health education, the consensus was to conduct online theory lectures while practical classes and clinical postings that need hands-on experience should be taken in the offline mode.

The Covid-19 pandemic has led to digital evolution of medical education to various degrees. Though it is difficult to envision medical education being entirely online, it might still offer some advantage over conventional learning like the convenience of having time and place flexibility [14-17]. There are however, few areas where bedside teaching is completely irreplaceable. It would be highly pragmatic if medical schools, educators, and the students realize the importance of online education, identify the barriers and work on streamlining solutions for ensuring meaningful education.

To the best of our knowledge, ours is the first study from this geographical area to address

this crucial issue. The strength of the study lies in the fact that it is a multicentric survey involving three major medical institutions of the city and views of medical students from all academic years have been included. The study was however done during the initial phase of the pandemic when all students were grappling with the technicalities of the online teaching-learning system. This may have resulted in an under assessment of merits of the same. A survey done later would have probably revealed a better acceptance of the system.

Conclusion

The online teaching adopted by various medical institutes was an attempt to keep the students at par with their subjects even during the lockdown. It, however, came with its own set of merits and demerits. The students have provided a very mixed response to its current utility and potential use in future. However, most agree that when imparted efficiently, it may prove to be an asset in imparting medical education. The authors suggest that even when the medical education system returns to its conventional in-person form, some elements of online education may still be inculcated in the curriculum. They can be a useful adjunct to conventional medical education system.

Acknowledgement

We sincerely thank the contribution of all the undergraduate students of the three medical colleges namely, Mahatma Gandhi Medical College and Hospital, RUHS-CMS, and NIMS Medical College, Jaipur (Raj.) for participating in this study and providing their unbiased response.

Funding sources

No funding was involved in the study.

Conflict of Interest

The authors declare no conflict of interest.

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