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An insight into distance e-learning perspectives amongst undergraduate medical students during COVID-19 pandemic

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ABSTRACT

Background

The COVID-19 pandemic required the shutdown of academic institutions and, in India, the suspension of all in-person classes in March 2020. In-person teaching did not resume in Pt. Jawahar Lal Nehru Memorial Medical College, Raipur (Pt JNM Medical College), the institution where this study was conducted, until 21 June 2021. Hence, in order to provide continued delivery of academic teaching, distance e-learning programmes were instigated at the institution. Over the years distance e-learning has emerged to be an effective platform for learning in different educational and governmental studies. However, it can be challenging for students due to limited non-verbal communication, the mode of students' and professors' interactions, accessibility of material and time management. The aim of this study was to evaluate the perspectives of undergraduate medical students towards distance e-learning during Covid-19 pandemic.

Methods

A time-limited, cross sectional observational study was conducted using a self-designed, self-administered web-based questionnaire. The survey was created and administered using an online platform. Students in all years of their undergraduate MBBS medical study at Pt JNM Medical College Raipur were included.

Results

An evenly distributed participation across the four professional years (n=351 in total; 64 from 2016 entry, 58 from 2017 entry, 52 from 2018 entry and 69 from 2019 entry) showed an urban dominated, gender balanced sample with easy access to online classes (76%) and a positive attitude towards online methodologies. The majority of participants (80%) across all groups believed that traditional teaching is not outdated and does not need to be replaced with e-teaching. Online classes were deemed secure by 58% of the students with the quality of e-teaching found satisfactory by 40% of the students. The decreasing student/teacher interaction was a matter of concern to 91% of the participants.

Conclusion

In conclusion, we are at a nascent stage of distance e-learning which needs to grow and modify according to our specific fields and needs. When things return normal after the COVID-19 pandemic, e-learning not be abandoned completely as the students showed a very positive response and attitude towards e-learning.

Keywords: E-learning, COVID-19, Web-based questionnaire, pandemic, medical students

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INTRODUCTION

Coronavirus disease (COVID-19) was declared a pandemic by the WHO on March 11th, 2020.[1] The disease started in Wuhan province, China in late December 2019[2] after which its emergence and spread has led to distressing levels of global mortality and morbidity. India reported its first confirmed case of COVID-19 infection on 30th January 2020, in the State of Kerala.[3] The disease showed a staggering rate of growth and on 24 March 2020, the Government of India ordered an aggressive but vital nation-wide lockdown.[4] As the pandemic itself and the process of reopening from restrictions continues, the educational sector, similar to other sectors, has been hugely affected. Institutions were required to shut down and suspend all classes since March 2020. In-person teaching did not resume in the institution where this study was conducted – Pt. Jawahar Lal Nehru Memorial Medical College, Raipur (Pt JNM Medical College) – until 21 June 2021. In order to provide continued delivery of academic programmes, distance e-learning was initiated in our institution.

Over the years, distance e-learning has emerged to be an effective platform for learning in different educational and governmental studies.[5] However, it can be challenging for students due to limited non-verbal communication, students' and professors' interactions, accessibility of material and time management.[6] Distance education pedagogy has been developed through three generations:

Cognitive-behaviourism (in which new behaviours or changes in behaviour are acquired in response to stimuli, with the student's interest stimulated and informed by stimuli provided by the teacher);

Constructivism (which focusses on creating synchronous and asynchronous interactions between and among students and teachers, in which learning become a joint activity through which students learn from one another as well as from and with the teacher), and

Connectivism (the process of building networks of information, contacts and resources that are applied to real problems).

Each one of these generations is distinguished by technology (generally, the technology available at that time), learning activities, learner and content granularity, evaluation modality, scalability and instructor role.[7] The current situation has forced pedagogies towards greater connectivism.

We, as educators, need to explore and determine medical students' perceptions and satisfaction levels regarding the e-learning methods implemented in medical colleges, to provide empirical evidence in support of e-learning as a tool for modern education. The focus of attention is being changed from teacher-centric to student-centric learning.[8] The student-centric learning needs to be modelled around modern technology, including tablets and smartphones, be user-interface friendly, include video lessons, and allow online interactions, so that students can take interest and initiative in the learning process. Student-centered learning can be achieved by either fully online courses or blended learning courses. [9–11]

Hence, we designed this study to analyze the impact and preference of newly implemented e-learning methods during the COVID 19 pandemic on medical students, in order to assess the appropriateness of such methods for future teaching.

METHODS AND MATERIALS

We conducted this cross sectional, observational, time-based study at Pt. J.N.M. Medical College, Raipur, Chhattisgarh, India. A self-administered web-based questionnaire was developed and delivered to participants using an online platform between 17th and 23th November, 2020. All undergraduate students aged 18–35 years from across the MBBS programme who were willing to participate were included. Any student unwilling to participate was excluded. Ethical clearance was obtained from the institutional ethics committee.

A survey with 24 questions (in English language) was formulated to assess the level of preference for e-learning over traditional teaching and the impact of this on student-teacher interaction. The survey captured student demographics, learning preference,

accessibility and perceptions related to e-learning. The draft questionnaire was validated by 20 selected physicians and faculty members to assess its readability and validity before being pre-testing among selected medical undergraduate students for clarity, significance and acceptability. The final version of the questionnaire was sent to the study participants via WhatsApp or e-mail. The sample size was calculated using the population correction method as follows:

$$N = \frac{XN\,[P(1-P)]}{d^2\,(N-1)+X[P(1-P)]}$$

where n = sample size

X = the table value for chi-square for 1 degree of freedom at the desired confidence level (3.8416)

N = Population size (654)

P = the population proportion (0.50)

d = the degree of accuracy expressed as a precision (0.05)

$n = 242.24 \approx 242$

Using probability proportion sampling (PPS), batches were divided into four groups according to year of admission, with minimum sample sizes required:

Group 1 - 2016 entry; 64 samples
Group 2 - 2017 entry; 58 samples
Group 3 - 2018 entry; 52 samples
Group 4 - 2019 entry; 68 samples

Descriptive analysis was carried out by mean and standard deviation for quantitative variables. Frequency and proportion were used for categorical variables. For between-group comparison, a Z-proportion test was used and a p-value less than 0.05 was considered statistically significant. All analysis was performed using IBM SPSS version 22.0 software and Microsoft Excel 13.0.

RESULTS

We used a reliability test to check the questionnaire validation as per Cronbach Alpha Method. The result of the reliability measure was excellent ($\alpha = 0.991$). In a self-administered questionnaire, that means all the questions in the questionnaire were internally consistent and reliable for assessing the perception of e-learning.

The demographic data showed a reasonably evenly distributed participation across the four professional years (Group 1 – 27% (n=96), Group 2 – 22% (n=76), Group 3 – 27% (n=94), Group 4 – 24% (n=85)) as well as genders (Female – 50% (n=176), Male – 50% (n=175)). The age range was from 18-31 years. The questionnaire responses are shown in table 1.

The sample was predominantly from the urban population (66%, n=231), followed by rural (31% n=108) and tribal (3% n=12) areas. Most of the participants were more comfortable with Hindi which is the main local language (58% n=203) as compared to English (42%, n=148) but the difference was not statistically significant. More than half of the students came from families with 4–5 members (70% n=244), and most (70% n=245) had an annual family income of more than one lakh Indian rupees (approximately $1,350). The internet was easily accessible to 50% (n=174) and only 1% (n=3) had no access at all. A mobile phone was the device through which the internet was most often accessed 87% (n=306), followed by tablet (7% n=25) and laptop (6% n=20).

With regard to the overall perception to e-learning, a positive trend was noted with 60% (n=212) of the students showing a positive response to the online methodologies. Using a proportion test for perception about e-learning between genders, extremely similar responses were noted for positive perceptions (female 60.2%, male 60.0%).

The responses were further broken down as per individual questions and association was assessed. Across all groups, 80% of participants believed that traditional teaching is not outdated and does not need to be replaced with e-teaching. Access to online classes was easy for 76% of the participants. Group 1 recorded a proportionally lower accessibility (15%) to online classes as compared to the other groups (Group 2, 28%, Group 3, 28% and Group 4, 26%). The difference between Group 1 and Group 3 was statistically significant (p=0.035).

Table 1 Questionnaire responses, n=351, Pt JNM Medical College, Raipur, 2020

S. No.	Question	Strongly disagree	Disagree	Agree	Strongly agree
1	Do you believe that traditional teaching is outdated and should be replaced with e-teaching	25% (n=89)	**54%** (n=190)	16% (n=55)	5% (n=17)
2	Access to online classes is easy for all participants	21% (n=75)	**55%** (n=193)	21% (n=73)	3% (n=10)
3	Quality of e-teaching in your institute is satisfactory	18% (n=62)	**42%** (n=149)	38% (n=132)	2% (n=8)
4	E- teaching can be considered as the preferred mode even in future	22% (n=77)	**40%** (n=142)	32% (n=111)	6% (n=21)
5	Online teaching is secure	9% (n=31)	34% (n=118)	**53%** (n=186)	5% (n=16)
6	Online teaching decreases student-teacher interaction	4% (n=13)	6% (n=20)	**49%** (n=173)	41% (n=145)
7	E-learning helps my understanding of a topic better than classroom learning	23% (n=81)	**53%** (n=185)	19% (n=67)	5% (n=18)
8	E- learning has lowered my motivation to learn	5% (n=18)	25% (n=89)	**44%** (n=154)	26% (n=90)
9	It is difficult to concentrate during e-lectures compared to classroom lectures	6% (n=22)	20% (n=71)	**51%** (n=180)	22% (n=78)
10	Access to course materials and lectures should be made available even after traditional teaching resumes	1% (n=4)	5% (n=16)	**60%** (n=212)	34% (n=119)
11	I think that viewing a digital lecture at home as many times as I wish gives me the opportunity to better understand the contents of the lecture and learn at my own pace	4% (n=14)	22% (n=76)	**55%** (n=194)	19% (n=67)
12	I believe that combining digital lectures and class room meetings will provide a better learning experience.	1% (n=4)	8% (n=27)	**56%** (n=196)	35% (n=124)
13	The environment at home is more conducive to learning (better concentration, more comfort, individualized pace) in comparison to classroom-based learning	21% (n=74)	**47%** (n=164)	23% (n=80)	9% (n=33)
14	Getting my questions answered is difficult in this mode of learning	3% (n=9)	19% (n=67)	**65%** (n=227)	14% (n=48)
15	I miss the acquisition of clinical skill	2% (n=8)	3% (n=9)	41% (n=143)	**54%** (n=191)

The quality of e-teaching was found satisfactory by 40% of the students (54% positive responses in Group 2, which was statistically significantly different to Groups 1 (p=0.004), 3 (p=0.024) and 4 (p=0.007). E-teaching was preferred in the future by 38% of the students; this was highest in Group 3 (48%) and Group 4 (46%) and this was statistically significantly different when compared to Group 1 (p=0.002, p=0.003). Male participants (43%) showed a statistically significant (p=0.043) more positive response to this question than females (32%). The reasons for this were beyond the scope of this study.

Online classes were considered to be secure by 58% of the students (47%, 50%, 68% and 68% in Groups 1, 2, 3 and 4 respectively). This was a statistically significant difference between Groups 1 and 3 (p=0.005), Group 1 and 4 (p=0.004), Groups 2 and 3 (0.016) and Group 2 and 4 (p=0.014). The reasons for this were beyond the scope of this study. E-classes were perceived to decrease student teacher interaction by 91% of the participants and only 24% felt that e-learning helped them to understand their topics better than in-classroom learning. 74% found it difficult to concentrate during e-lectures and 70% reported experiencing a lower motivation to learn. Overall, 94% of the students felt that access to course material and lectures should be made available even after traditional teaching resumes (this has been actioned) and 74% thought that viewing a digital lecture at home as many times as they wished gave them the opportunity to better understand the contents of the lecture and to learn at their own pace. Combining digital lectures and classroom meetings was believed to provide better learning experience by 91% of the students; Group 1 (86%) and Group 4 (97%) showed a significant difference in their response (p=0.018). The home environment was found to be most conductive for learning by only 32% of the study population. Getting questions answered was difficult for 78% of the students and the majority (95%) missed the acquisition of clinical skills. Among these, 98% of female students expressed worry about the acquisition of clinical skills, which was statistically significant (p=0.024) compared with male students, of whom 93% expressed worry. Overall 61% of the students showed positive perceptions towards distance e-leaning (57% positive in Group 1, 61% in Group 2, 62% in Group 3 and 62% in Group 4). The intergroup comparison for this response was not statistically significant.

DISCUSSION

The COVID-19 pandemic worldwide has propelled the slowly growing e-learning platform at a fast pace. India is no exception to this. With its strong information technology background, this natural integration of technology and education was waiting to happen and has been very well received. Students residing in rural and tribal areas are at a slight disadvantage as fluctuating mobile networks and wi-fi signals are still a harsh reality in these areas. A previous survey by Uma (2014) [12] also identified problems with unreliable connectivity, cost of data and uncertainty in electrical supply. According to the author, this can be overcome by recording the lectures and providing them to the students through social media platforms or dedicated e-learning software so that access is not limited to live attendance. We agree with the author's conclusion, though in the longer-term, better infrastructure is needed.

In our study, course material in Hindi was marginally preferred over English. Whilst not confounding adroitness in English with intellectual capability, in our opinion English is a better medium for medical education as numerous medical terms used worldwide are in English, giving it a universal appeal and understanding. Other recent studies[13] have assessed medical students for e-learning readiness, willingness to co-operate and to move beyond a predominant reliance on classroom training. Our results show that online classes are deemed secure and comfortable with easy access, are not time bound and provide access to the same material over and over again for better understanding and revisions. Distance e-learning does limit the student-teacher interaction, however. Live online classes were preferred over pre-recorded ones, perhaps due to the former being more engaging and interactive. An Indian study conducted by Lawande et al (2020) recorded 80% of medical undergraduate students in favor of classes being recorded and sent, post a live session.[14] We agree that this is good approach to ensure that the classes missed can be referred back, and that important topics can be reviewed when required. The students' ability to concentrate was also found to be an important factor for determining a productive outcome of the classes, but this lowered over a period of time due to challenges of the home environment and difficulties with self-discipline. A previous study[15] on concentration of medical students showed that student concentration reaches a maximum at 10-15 minutes but fell steadily thereafter. This study suggested the optimum length of an online lecture may be 30 instead of 60 minutes. Motivation for non-live or non-interactive online sessions lowers over

time as queries cannot be answered immediately. This can be handled by shorter lectures and making them available online for later referencing.

In the medical profession, acquisition of clinical skills is of utmost importance. Clinical skills encompass the application of knowledge from books as well as the art of dealing with patients and creating trust. This is the biggest challenge for e-learning. Lawande et al (2020) opined that this gap can be bridged by holding clinical case discussions in a separate interactive class, or integrating these discussions while teaching certain topics, and that this could help increase clinical interest and diagnostic skills. In addition, separate video clips demonstrating basic clinical skills, such as clinical procedures and physical examination skills, could be streamed live or sent pre-recorded. This could be used as a supplementary learning resource to help students master clinical skills. Traditional teaching still topped the popularity chart and was considered irreplaceable for clinical classes. A previous study[16] identified reduced student-student discussions, dependence on emails and internet facilities, and a difficulty in delineating boundaries between home and work as some of the pitfalls of online education that still need to be addressed.

In times to come, with the restarting of traditional classes, we suggest a combined approach as the best practice. Classroom and clinical skills teaching should continue but the lectures should be uploaded to e-learning platforms for recurrent use and revision. Students as well as medical teachers should be taught to conduct interactive e-classes and to use technology to its full potential. A dedicated portal for every university to provide more videos, offline recorded lectures and clinical cases to the students will allow institutions to adapt to this new form of education.

CONCLUSION

In conclusion, we are at a nascent stage of distance e-learning which needs to grow and modify according to our specific fields and needs. In future, when things return to normal, we should not move away from e-learning completely as the students showed a positive response and attitude towards it.

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