

## PERCEIVED CHALLENGES OF MEDICAL EDUCATION AND USING E-LEARNING TO MEET THEM DURING COVID-19 PANDEMIC- A CROSS-SECTIONAL STUDY AMONGST FIRST-YEAR STUDENTS 'OF A MEDICAL COLLEGE IN EASTERN INDIA

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### Abstract

**Background:** COVID-19 pandemic had an unprecedented effect on the teaching-curriculum, with a rapid transition in the mode-of-teaching. The study aimed to find the first-year students' perspectives on the challenges of medical education and use of technology to meet them during the outbreak. **Materials and Methods:** A cross-sectional descriptive study, amongst first-year medical undergraduates, using a researcher-made, Google-form with questions on demographics, challenges to medical-education, advantages on using technology and their usage-patterns were done after ethics approval. All data was coded, tabulated and analyzed using EpiInfo software (Version 3.4.2.1) and expressed using mean, standard deviation, frequency and chi-square test (test of association); with p-value less than 0.05 as statistically-significant. **Result:** The total number of the students of the batch was 150. On the date of data collection 132 were present, 119 consented and submitted the Google-form; the response-rate was 91%. Their mean-age was 19.55± 0.95 years; 60.50% were females. Around 63% of the students believed that the "rapidly changing technology" was one of the challenges of medical-education. About 69.41 % of them felt that "use of technology could help in providing a safe, controlled environment of learning". 90.75% used medical apps daily, 66.37% of them for 1-5 hours and 15.97% more than five-hours. **Conclusion:** The student's perspective on challenges to medical-education, were "the rapidly changing technology", "the changing societal expectations"; they felt that technology could help learn better. The findings helped improve the quality of medical-education in our institute and in future help policy-makers think of need-based inclusion of E-learning in the medical-curriculum.

## INTRODUCTION

Medical education has undergone a change over the years, moving towards a competency-based curriculum; from the traditional teacher-centric teaching it has moved towards a learner-centric model that puts learners in control of their own learning. These changing needs and challenges in medical education over the years, have led to the introduction and use of technology and e-learning

informally into the medical curriculum. E-learning, is the use of internet technologies to enhance knowledge, performance and deliver a broad array of solutions. E-learning can be used by medical educators to improve the efficiency and effectiveness of educational interventions in the face of the social, scientific, and pedagogical challenges. It has gained popularity in the past decade; however, its use is highly variable among medical schools, both within the countries and in-between countries and so also in

developed and developing countries.<sup>[1]</sup> E-learning technologies offer learners control over content, learning sequence, pace of learning, time, and often media, allowing them to tailor their experiences to meet their personal learning objectives; with the added advantage of being able to reach out across time and space barriers.<sup>[2]</sup> Little is known about the current use of e-learning in medical education in the Indian scenario.<sup>[2-4]</sup>

The COVID-19 pandemic had an unprecedented effect on the teaching curriculum, with a rapid transition in the mode of teaching, compelling every educational institution to switch from face-to-face classes onto online-teaching methods; with this being the only way forward to continue medical education during the lock-down. The National Medical Council (NMC) of India at that time had not included E-learning as part of its medical undergraduate program, in a structured format.<sup>[3]</sup> Each college came up with innovations to catch-up with this transition. With the prevailing pandemic, the students were exposed to a new platform of virtual online teaching in the current curriculum. Use of this mode of teaching, being a new experience for the students, the study was planned, to find out their views, experiences and challenges faced.

The study had the objectives to find out the perception, experiences and challenges faced in using technology in medical education amongst the first-year medical students, and the usage pattern of e-resources during COVID-19 pandemic by them.

## MATERIALS AND METHODS

Using a cross-sectional study design, the study was done at a teaching hospital in Bhubaneswar, among the first year Bachelor of Medicine, Bachelor of Surgery (MBBS) students (2019 admitted batch), during the first phase of the pandemic in the month of April 2020. At the initial phase of shutdown of colleges, the first-year students were sent back home and the online classes were first initiated among them. Hence they were chosen for the study. All students present on the day of data collection (during an online class) and consenting to be a part of the study were included. The students absent on the day (of online class) of data collection were excluded. As per the study protocol and the inclusion criteria all students attending the online class were briefed about the study objectives, on how to fill the Google questionnaire and then sent the link of the questionnaire. We had kept the questionnaire anonymous to get honest responses, as the students' identity was not required to be filled in. The total number of the students of the batch was 150. On the scheduled date of data collection 132 were present. Hundred nineteen consented to be a part of the study and submitted the Google form, making 119 the total sample size. A convenience sampling method was used for the study.

Data was collected through an online, researcher-made, self-administered Google questionnaire having sections on- first part consisted of demographic details like age and sex; second part on perception about challenges in medical education, third part on educational advantages of technology and fourth part on the usage pattern of technology and e-resources by students during COVID-19 pandemic. Questionnaire used was researcher-made after a thorough literature search.<sup>[1-8]</sup> The content validity of the questionnaire was checked by 3 subject experts. Due to the ongoing pandemic and unavailability of students in campus, the study tool could not be piloted and validated.

All data collected was coded, tabulated and analyzed using Google form, excel format and Epi Info Software (Version 3.4.2.1). Univariate analysis was performed and all numerical data was expressed using descriptive statistics as mean, standard deviation, frequency and percentage. Comparison between the two categorical variables was done by Chi – square test. A p-value of less than 0.05 was considered as statistically significant

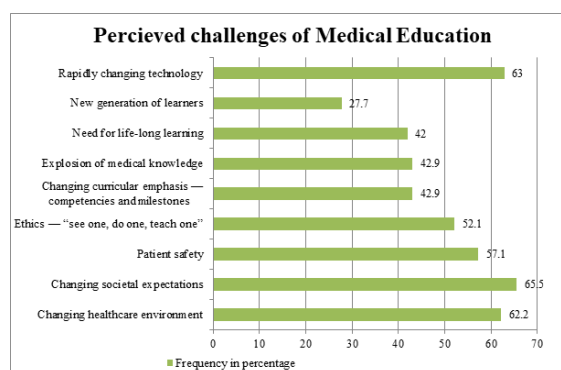
**Ethics:** The purpose and procedures of the study were explained to the students before they participated in the study. Informed consent was obtained electronically via the Google form, which had the consenting statement first, and those who agreed were able to go the next section of the questionnaire. Approval for this study, was obtained from the Institutional Ethics Committee, vide letter number XXXX/XXXX/IEC/258/ 2020.

### Operational Definitions

“Younger doctors: those doctors less than 60 years of age”

“Older doctors: those doctors more than 60 years of age”

## RESULTS



**Figure 1: Perceived “Challenges of Medical Education” of study participants [N=119]\***

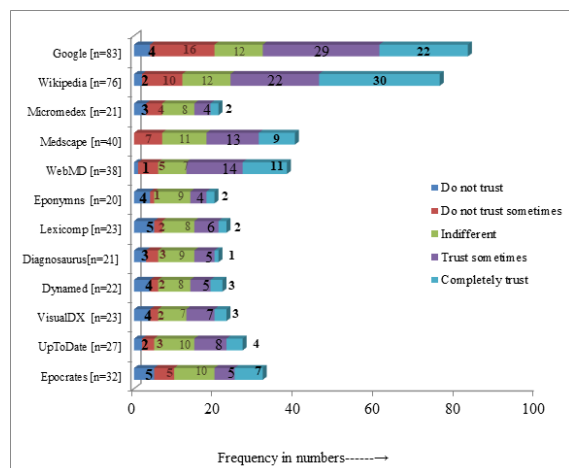
\*multiple responses

In this study among the 150 first-year medical students of the 2019 admitted MBBS batch to find out their “Perception in using technology to meet the challenges of medical education” during the COVID-19 pandemic, on the scheduled date of data collection 132 were present. Hundred nineteen consented to be

a part of the study and submitted the Google form, the response rate was 91%.

The mean age of the study participants was 19.55±0.95 SD years (range 18-22 years); 72(60.50%) were females, 46 (38.66%) males and one student preferred not to disclose the gender.

The current “challenges of Medical Education” were answered by all the 119 respondents [Figure 1].



**Figure 2: Medical apps and websites used by the students based on trusting the information [n=108]**

Around 63% believed the “rapidly changing technology” was a challenge of Medical Education. Their views on the “educational advantages of using technology in medical field” have been presented in [Table 1].

About 68.91 % of the students felt that “use of could help in providing a safe, controlled environment of learning”; a difference was seen in their views among male and female students (65.28% females and 76.09 % males felt so).

When asked on what e-resources students used, 108 (90.75%) students said they used medical apps, 106

(89.1%) students said they used textbooks, around 31.9% referred journal articles and 94(79%) used websites. Among those 90.75% students who used medical apps, all used it on a regular basis daily. Around 66.37% of the students used these apps for one to five hours, and 15.97% more than five hours; 9.24% of them did not use any medical app. Figure 2 shows the level of trust of the students on the basis of the apps they used.

Around 18.5% agreed that information obtained from medical apps was “more reliable” than information obtained from a textbook; while 53.8% said it was “same reliability” and 30.3% said it was “less reliable”.

Among them 10.9% used these apps comfortably, while 6.7 % were very uncomfortable; rest said that they were neither comfortable, nor uncomfortable. Around 17.6% strongly agreed, 54.6 % agreed, while 1.7 % disagreed that medical apps enhanced their knowledge as a medical student.

About 73.9 % students agreed that the use of technology in medical education “should be to support learning “, 56.3 % felt “it should not be a replacement for face-to-face learning”, 48.7% believed that “educators must still focus on the principles of teaching, not on the specific technologies”, while 52.9 % said that “technologies are just one tool in the educational toolbox” and 62.2% “the task of medical educators is to use these new technologies effectively to transform learning into a more collaborative, personalized, and empowering experience”

Around 81.5 % of the participants felt that “younger doctors were more comfortable using mobile technologies to access knowledge” than the older age group. They felt older doctors had a harder time adapting to new technologies.

**Table 1: “Educational Advantages of using Technology in medical field” [N=118]\***

	Advantages of Technology in medical education	Students [n=118](%)		p-value
		Males (n=46)	Females(n=72)	
i	Safe, controlled environment of learning (n=82)	35(76.09)	47(65.28)	0.29
ii	Enhanced, realistic visualization (n=79)	30(65.22)	49(68.06)	0.92
iii	Authentic contexts for learning and assessment (n=48)	19(41.30)	29(40.28)	0.92
iv	Documentation of learner behavior and outcomes (n=53)	22(47.83)	31(43.06)	0.75
v	Instruction tailored to individual or group needs (n=33)	14(30.43)	19(26.39)	0.79
vi	Learner control of the educational experience (n=39)	16(34.78)	23(31.94)	0.92
vii	Repetition and deliberate practice (n=55)	23(50.00)	32(44.44)	0.69
viii	Enhance perceptual variation and improve skill coordination (n=62)	19(41.30)	43(59.72)	0.08
ix	Standardization of instruction and assessment (n=52)	21(45.65)	31(43.06)	0.92

## DISCUSSION

COVID-19 pandemic led to the institute expediting the creation of an online platform for classes. With

the initiation of online classes, the first year medical students of the 2019 MBBS admission batch gave a feedback on the difficulties faced; keeping in view their needs to be addressed the study was planned to

find out their “Perception in using technology to meet the challenges of medical education” during the COVID- 19. The mean age of the study participants was  $19.55 \pm 0.95$  SD years (range 18-22 years), 60.50% were females. Around 63% believed the “rapidly changing technology” was a challenge of Medical Education. A review article by Cordato JD et al., also states the same that “In medical education, the COVID-19 epidemic led to the adoption of novel teaching and learning strategies, and academic institutions expedited the creation of an online learning environment. A crucial tactic for maintaining medical education during the COVID-19 pandemic was the use of online learning”.<sup>[5]</sup> These findings support the current study findings in the context of adapting to online mode of teaching as an alternative during the ongoing pandemic. These findings can help in initiating a hybrid mode in the regular teaching curriculum as an option in the future years.

Changing societal expectations (65.5%) and changing healthcare environment (62.2%) were listed as the other two most common challenges to medical education by the students. Simulation technology can prove to be a great example in addressing this context. It can greatly enhance the practical training of aspiring doctors by giving them the opportunity to practice skills frequently. This technological advancement allows direct manipulation in real-life situations, without involving the patients.<sup>[6]</sup>

Another form of technology that can help the students in their pursuit of medical education is various online resources. In the present study, 108 (90.75%) students said they used medical apps, 106 (89.1%) students said they used textbooks, around 31.9% referred journal articles and 94(79%) used websites. 90.75% used medical apps on a regular basis daily. Among the medical apps used, the most trusted were WebMed (65.79%), Medscape(55%) and Up To Date (44.44%). In a study conducted in United States, UpToDate (78%) and Epocrates (61%) were the most commonly used and trusted apps amongst medical students.<sup>[7]</sup> In another study conducted in Sri Lanka, the most commonly used modalities for learning were notes on paper material, e-books, and textbooks.<sup>[8]</sup> In a study conducted in Pakistan, the most popular categories of apps among the students were medical knowledge and reference apps such as Medscape and UpToDate.<sup>[9]</sup> The varied usage of such apps could be due to the access and prevalent practices of these countries.

The majority of the students (53.8%) in this study agreed that information obtained from medical apps was of equal reliability as the information obtained from a textbook and 30.3% said it was “less reliable”, while a minority of 18.5 % students said it was “more reliable”. These findings are in similar lines as the findings of a study conducted in United States where, 61% students believed that apps were as reliable as textbooks and only 23% believed that medical apps were more reliable than textbooks.<sup>[7]</sup>

Among the students in the present study, 10.9% used these apps comfortably, while 6.7 % were very uncomfortable; rest said that they were neither comfortable, nor uncomfortable. Majority of the students (67%) reported to use these apps for one to five hours, and 15.97% used these for more than five hours. Similar findings were seen in a study conducted in Iraq, where 44 % students used online learning and participated in virtual group activities on average for 0-3 hours per day and 32% students spent 3-6 hours per day.<sup>[10]</sup> These findings were also similar to the findings in a study conducted in New Delhi, where 75.4% were spending between one-four hours/day on online learning and 12.5% students spent > 4 hours/day.<sup>[11]</sup>

Most of the students participating in the present study (72.2%) agreed or strongly agreed, that medical apps enhanced their knowledge as a medical student. Similar findings were reported in a study conducted in the United States where 90% participants agreed or strongly agreed that medical apps enhance clinical knowledge.<sup>[7]</sup>

This study reflects that 73.9 % students agreed that the use of technology in medical education “should be to support learning “. This is similar to the findings in a study conducted in Uganda where 75% students preferred a blended method of teaching delivery (both e-learning and conventional classroom lectures).<sup>[12]</sup>

More than half of the study participants (56.3 %) felt “technology should not be a replacement for face-to face learning”. Nearly half of them (48.7%) believed that “educators must still focus on the principles of teaching, not on the specific technologies”, while 52.9 % said that “technologies are just one tool in the educational toolbox” and 62.2% “the task of medical educators is to use these new technologies effectively to transform learning into a more collaborative, personalized, and empowering experience”. In a study conducted in Iraq, 66% students reported to have had an inferior knowledge gain through online learning as compared to face to face classes.<sup>[10]</sup> In a study conducted in Haryana, 11.3% students claimed that, in person lectures offered more opportunities for interaction with lecturers compared to online sessions. The majority of students expressed discomfort with online teachings, arguing that it should only be used as an adjunct to face-to-face classes. They were also not interested in continuing these online classes post the COVID-19 pandemic.<sup>[13]</sup> In a study conducted in Saudi Arabia most of the study respondents preferred combining online with face-to-face instruction. 27% of medical students reported negative experiences with online learning during the COVID-19 pandemic. They believed that online education was not suitable for medical students.<sup>[14]</sup> In another study conducted in the United Kingdom, 75.99 % students felt that online teaching had not successfully replaced the clinical teaching they received via direct patient contact and 82.17% felt they cannot learn practical clinical skills through online teaching. This shows that clinical skills remain



a pertinent barrier to online teaching of medical students.<sup>[15]</sup>

Around 81.5 % of the participants felt that “younger doctors were more comfortable using mobile technologies to access knowledge” than the older age group. They felt older doctors had a harder time adapting to new technologies.

In an effort to stop the spread of COVID 19, medical institutions had been compelled to halt on-campus classes. E-learning, which gives medical students access to an online interactive learning environment, was the ideal option in those circumstances. E-learning has been used for more than 20 years at many academic institutions in the developed countries. All around the world, however, traditional classroom-based instruction is the predominant style of instruction. A lot of adjustments must be done while moving towards e-learning in resource-constrained nations in order to ensure that the e-learning is conducted as correctly and effectively as possible.<sup>[16]</sup>

**Limitations:** Given that the study responses were collected by online questionnaire, there may be a voluntary response bias of participants. Due to the ongoing pandemic other medical colleges could not be contacted and a single-centre, using convenience sampling was done. Hence the population is unlikely to be representative of all medical students. Due to sampling bias, the sample may not be representative of the entire population of India. Although the content validity of the questionnaire was checked by 3 subject experts, due to the ongoing pandemic and unavailability of students in campus, the study tool could not be piloted and validated. Because the study was conducted through a web-based medium, it was likely to be filled out by technologically inclined medical students. Hence the response rate was not 100 percent.

Despite these limitations, the data obtained from our convenience sample provides baseline data for future research.

## CONCLUSION

The study findings on the student's perspective on challenges to medical education were the rapidly changing technology, the changing societal expectations and the healthcare environment. They felt that technology could help learn better and majority believed that medical apps were as reliable as textbooks. The students' were able to use the medical apps with ease and found it reliable. Through these study findings, the merits of incorporating online teaching methods and resources were highlighted, which helped improve the quality of medical education in our institute. Online teaching enabled the continuation of medical education in those unprecedented times. Future research on innovations in using e-learning in medical sciences can have a benefit if ably used. A hybrid environment of traditional methods and novel technological tools

can emerge in readiness for future pandemics that allows better learning and could help policy-makers think of need-based inclusion of E-learning in the medical curriculum.

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