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Original Research Article

Medical education in the time of pandemic — undergraduate medical students' perspectives after a year of online education during COVID-19 pandemic in central India

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ABSTRACT

Background: Beginning in 2019, the pandemic hampered the pedagogical process in a way unprecedented in history, as a result modern technological advances took centre stage and medical colleges introduced e-classes to continue their academic activities.
Purpose: To study the undergraduate medical students' perspectives towards online medical education programs during the COVID -19 pandemic.
Materials and Methods: A descriptive cross-sectional research was conducted in which MBBS students who had undergone one year of online classes from four different medical colleges of central India. Participated students were administered a validated questionnaire consisting of 24 questions through Google forms.
Results: The data of 426 undergraduate medical students across four medical colleges in Central India was analysed. The percentage of male and female students were 52.8 and 47.2 respectively and the majority who attended online classes lived in urban areas (68.1%). Learning during the pandemic was heavily dependent on online classes (77.7%), which were accessed through smartphones (80%). There was a significant difference seen in time spent on digital education ($p<0.001$). Upon analysing the teaching methods, live tutorials (48.8%) and video tutorials (50.4%) scored high.
Conclusion: The benefits of online education were its flexibility regarding time and pace of learning whereas internet connectivity and lack of interaction were its greatest disadvantages
Though introduced only as a stopgap arrangement to tide over the present crisis, technology enhanced learning is here to stay especially with advent of e-health platforms and teleconsultation.

1. Introduction

The title of this article is with all due respect to Gabriel Garcia Marquez, a Nobel prize winner and author of the book 'Love in the Time of Cholera'. A new Coronavirus, Severe Acute Respiratory Syndrome - Coronavirus-2 (SARS-CoV-2) was detected in 2019 which quickly reached pandemic proportions by early 2020.[1]

The highly contagious nature of the disease had rendered the continuation of lectures and patient-centric clinical teaching, almost impossible.[2–4] Medical colleges had to introduce innovative teaching methods.[5–11]

Hence this study was carried out to evaluate the undergraduate medical students' perspectives after a year of online education during covid -19 pandemic in Central India.

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2. Materials and Methods

This Cross-sectional research was conducted from July to September 2021 after Institutional Ethical Committee approval. The study included 500 undergraduate medical students across four medical colleges of Central India. After written informed consent, all medical students (years I to IV) who had undergone one year of online classes during 2020-21 were included. We excluded interns and residents in this study.

A pre-validated 24-item questionnaire was made using Google Forms™ and circulated using a link, on the students' WhatsApp™ group. The questionnaire was divided into sections, section 1 was related to the demographic details of students. Section 2 consisted of questions on the COVID -19 pandemic and usage of the internet. Section 3 included items to assess students' perceptions regarding online teaching, methods of online teaching, material provided by colleges for lectures and clinical training. Section 4 of the questionnaire was based on sections 1 to 4 of the Dundee Ready Education Environment Measure (DREEM) related to online teaching.[9–11] It consisted of 10 questions, based on a 5-point Likert scale, ranging from strongly disagree to strongly agree.

A final open-ended question regarding students' opinions about the effect of the current pandemic on their career plan was also included in the questionnaire. The questions were prepared and deliberated among a group of 10-15 medical students for validation. Participation was voluntary and to maintain confidentiality questionnaires did not contain any personal data of the participants. To avoid duplication of data, the Google forms were set so as to accept only one response from a single email id. To ensure maximum participation, a reminder was also sent to all the participants.

3. Statistical Analysis

Sample size: To calculate sample size, following formula was used

Sample size = 4 P (100 -P)/ L2

Where P is the percentage of positive perception and L= allowable error (± 5)

Using the above formula, the sample size for our study was 406.

Data was collected and analysed using Microsoft Excel 2016 (v.16.0)™ and Epi info calculator. Demographic data was analysed using frequency and percentage. The Chi-square test was applied to compare two sets of non-parametric data and statistical significance was set at 95% confidence interval, that is at p-value of < 0.05. Students' perceptions ranked on Likert scale was analysed using mean and standard deviation.

4. Results

Medical students (years I-IV M.B.B.S) from four different medical colleges in Central India responded to the 24-item questionnaire using Google Forms.™ The respondents were from both Government and Private run medical colleges. Out of 500, 426 students submitted their responses. The response rate was 85.2%. The demographic details like age, gender, place of residence and the M.B.B.S year of the students are shown in Table 1. Out of 426 responses, 201(47.2%) were male and 225(52.8%) were female medical students. 97(22.8%) students were in I^{st} year, 94(22.1%) in II^{nd} year, 173(40.6%) in III^{rd} year and 62(15.3%) in IV^{th} year of M.B.B.S. Out of 426 respondents, 290 (68.1%) lived in the urban area.

There were 192(45%) Medical students who used mass media for the source of Covid-19 knowledge as compared to 115(27%) who used government information portals and 112(26%) used social media to gain knowledge about the pandemic as shown in Figure 1.

Related to the utilization of device for online education by medical students during the pandemic, 341 (80%) used smartphones ,60(14.1%) used tablets and 25 (5.9%)used laptops to access online education.

Related to the time utilization during lockdown, students were involved in various activities. 331(77.7%) students utilized their time to access e-classes provided by respective colleges, 108 (25.4%) students accessed other e-classes which were not provided by the institute whereas 147(34.5%) utilized their time for exercise and physical fitness and 112 (26.3%) were involved in preparation for post-graduate entrance examination. Time was also spent on taking care of sick family members 79(18.5%) and on online video games 102 (23.9%) as shown in Figure 2.

The average time spent on digital education per day increased from 0-2 hrs (n=329, 75.4%) before pandemic to 3-5 hrs (n=239,56.1%) during pandemic ($p < 0.001$) as shown in Table 2.

Online teaching methods introduced by medical colleges included a combination of Google classroom and live tutorials which were accessed by 355 students (83.3%) and 208 students (48.8%) respectively. Few medical colleges upgraded their existing platform as shown (Figure 3)

The student's preference of online teaching method was evaluated. Video tutorials was the first choice for 215(50.4%) students, followed by live tutorials for 155(36.3%) students(Figure 4). On a question regarding access to medical education during the pandemic, majority 292 (68.5%) of students relied on the e-material provided by their respective colleges, 120 (28.25%) students relied on e-material provided by other institutes within the country, whereas 39.2% depended on YouTube videos by different instructors as well (Figure 5).

Student-teacher interaction during online teaching sessions was through options incorporated in the online

platforms like chat box, raise a hand. However, Students' felt that the majority 283(66.5%) of these sessions were not interactive.

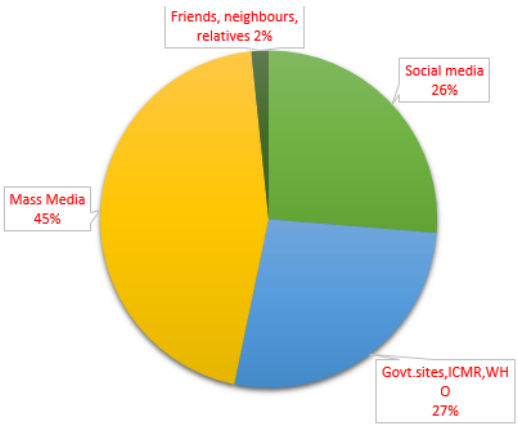

Figure 1: Source of COVID -19 knowledge

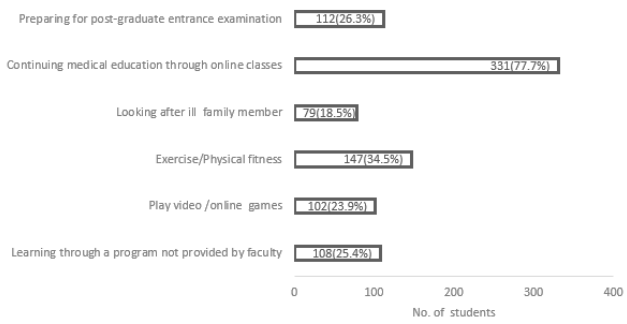

Figure 2: Utilization of time by the students during the lockdown

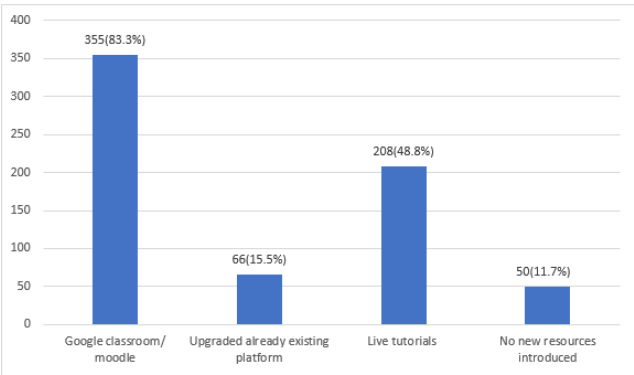

Figure 3: Online teaching method introduced by medical colleges during the lockdown period

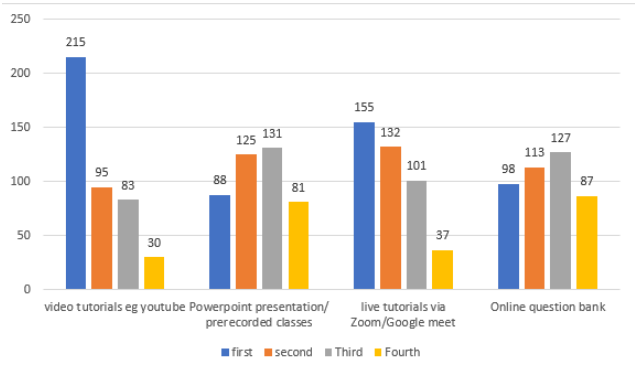

Figure 4: Student's preferences of online teaching methods

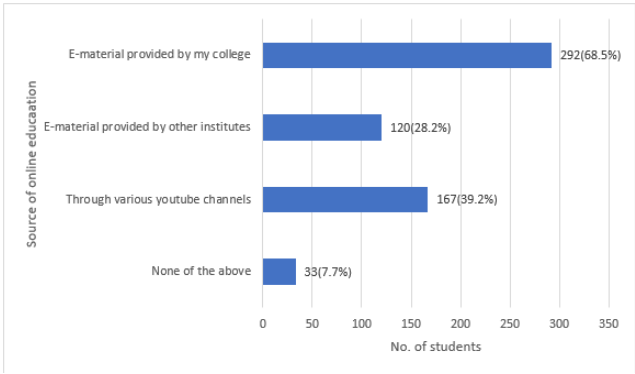

Figure 5: Access to medical education during Covid time

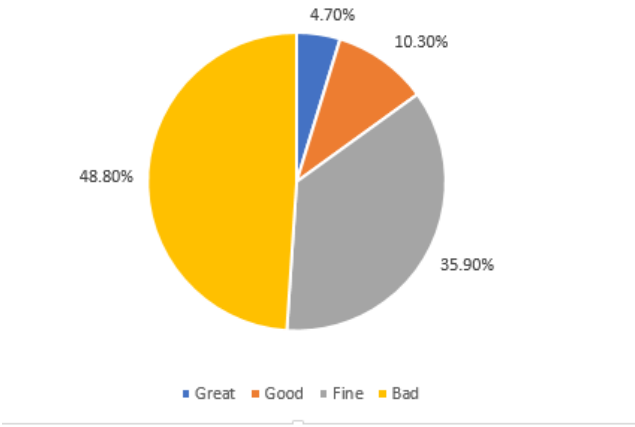

Figure 6: Perception regarding the effectiveness of online clinical skill teaching

Table 1: Demographic details of the study population

Categories	Subcategories	No. of students n(%)
Age (in years)	18-20	128(30)
	21-23	270(63.4)
	>23	28(6.6)
Gender	Male	201(47.2)
	Female	225(52.8)
Year (MBBS)	1^{st}	97(22.8)
	2^{nd}	94(22.1)
	3^{rd}	173(40.6)
	$4th$	62(14.6)
Residence	Urban	290(68.1)
	Rural	71(16.7)
	Semi-urban	65(15.3)

Table 2: Average time spent on digital education before and during the pandemic

No. of hours(per day)	No. of students(Before COVID -19) n(%)	No. of students(During COVID -19)
0-2	321(75.4)	84(19.7)
3-5	90(21.5)	239(56.1)
6-8	15(3.1)	81(190)
>8	0	22(5.20)

Table 3: Student Perception of online learning. Likert scores have been shown as mean ±SD

Statement	Mean	±SD
I find it easy to engage in class	2.96	1.14
I feel able to ask the question I want	2.93	1.27
The teaching is often stimulating	3.01	1.12
The teaching time is put to good use	3.17	1.20
I would like online teaching to be more interactive	3.65	1.26
I feel online teaching is as effective as face to face teaching	2.42	1.41
The teaching is well focussed	2.97	1.20
The teachers are well prepared for their teaching sessions	3.60	1.13
I am confident about passing this year	3.66	1.15
My internet connection was slow and problematic	3.14	1.38

Table 4: Advantages of online medical education as perceived by students

S.No.	Advantages	No. of students N	Percentage %
1.	Ability to learn at own pace	309	72.5
2.	Flexibility	231	54.2
3.	No travel	199	46.7
4.	Interactive	96	22.5
5.	Ability to ask questions	75	17.6

Table 5: Disadvantages of online medical education as perceived by students

S.No.	Disadvantages	No. of students (n)	Percentage(%)
1.	Disruption in internet connectivity	297	69.7
2.	Schedule of classes	203	47.7
3.	Disturbance at home	242	56.8
4.	Lack of devices	152	35.7
5.	Anxiety	118	27.7

4.1. Students' perception of online teaching

Online Learning experiences were ranked by students on a five-point Likert scale: (1) strongly disagree and scale: (5) strongly agree (Table 3). The responses are shown in table 3 as mean and standard deviation.

The main advantage of online teaching as perceived by students is the ability to learn at their own pace 309 (72.5%) and its flexibility 231(54.2%). It saves students precious time as no traveling is required 199 (46.7%) as shown in Table 4. Among the disadvantages of online education is slow internet connectivity 297(69.7%). Family disturbances 242(56.8%), the timing of classes 203(47.7%), lack of devices 152(35.7%), and anxiety 118(27.7%).(Table 5)

The experience of online clinical skill teaching is shown in figure.6, 208(48.8%) students perceived it as bad, 153(35.9%) as fine, 44(10.3%) students perceived it to be good and 20(4.7%) perceived it as great.

5. Discussion

In India before the pandemic, medical education relied heavily on traditional classroom-based teaching methods. During COVID-19 pandemic medical colleges were compelled to move towards digital education. In our study mass media (45%) emerged as a major source of COVID -19 information for the students whereas in study done by Alsoufi A et al.[6] World Health Organization and local official sources were the main source of COVID -19 information 2622(78.3%). Mobile phones were used to access online classes by 342 (80%) of students, which is same as seen in studies done by Alsoufi A et al.[6] 3117(93.1%), Abbasi et al. 76%[11] and Rafi et al. 72.8%.[12]

Our study shows that during this period maximum time was spent on online education and for preparation for the Postgraduate entrance examination. This increase in time spent on online education was significantly higher ($p < 0.001$). This is to be expected and is similar to other studies done in the UK by Dost S et al. ($p<0.05$).[10]

Online teaching methods perceived to be effective by the students in our study were, video tutorials (50%) similar to the study by Dost et al. (27.71%). In our study live classes (36%) were preferred our pre-recorded lectures

(30%) whereas in the study by Rafi et al.[12] in Central Kerala in India, students preferred pre-recorded classes (69.2%) over live classes (33.5%).

Student perception of online teaching was based on 5 points Likert scale. The overall interpretation of data shows that the effectiveness of online teaching compared to offline was dis satisfactory as it scored low on the Likert scale (2.42). Though with a score of 3.6, the teachers were well prepared for classes similar to findings by other studies[10] students found it difficult to engage in class (2.96). The need for interactive teaching was shown by a score of 3.65. This is because student-teacher communication is a very important part of medical education, especially in clicjnical subjects.

The benefits of online teaching as perceived by students are its flexibility 231(54.2%) and ability to adapt according to the student's need and pace of learning 309(72.5%) as seen in other studies.[10,11,13] Some online platforms also have built-in interactive modes which help student-teacher communication. The ease of attending classes without the need for travel 199 (46.7%) and in the comfort of their home is another remarkable feature of online classes.

5.1. Assessment

During the pandemic both theory and practical exams suffered, which had to be postponed. Practical exams in clinical years were taken with virtual patients(65.3%).

5.2. Pandemic and carrier choice

The last open-ended question was about the pandemic and its effect on students' carrier choices. The responses showed that the pandemic has affected the students both mentally and professionally. The violence against doctors seen during the second wave of the pandemic had mentally traumatized some budding doctors. The lack of patient interaction and hands-on training during clinical postings has jeopardized students' ability to make informed choice regarding speciality for post-graduate study.

6. Limitations

This article only intends to get an overall idea of students' perception of exclusive digital education. It does not analyse the merits and demerits of the individual mode of e-learning. Furthermore, the DREEM score applies to the institutional teaching environment, but here it is applied to the online teaching environment. A methodical analysis, on a larger scale about the availability and reach of technology, teachers' training, student requirement and expectation have to be made to understand the effectiveness of digital education.

7. Conclusion

The pandemic forced us to explore new methods of teaching. There is no doubt that online learning helped teachers and students to continue classes during those trying times. Though it showed the reach and extent of digital education, it also brought forth its limitations, especially its suitability in medical education. Modern medical education is competency based, and concern among educators and students is the effectiveness of online education in clinical skill development. The inability to communicate freely with teachers and patients added to the disadvantage of digital education. Internet connectivity remains an issue among all students, especially in rural areas. Though the pandemic is now under control, medical colleges must be prepared for any eventuality. To improve digital education, attention has to be given to students' feedback, and new methods and technological interfaces should be introduced to make clinical teaching interactive and at par with traditional patient-centric teaching. This will also help to prepare our students for future telemedicine and teleconsultation practices.

8. Source of Funding

None.

9. Conflict of Interest

None.

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