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Online Teaching-Learning During COVID-19 Pandemic: Perceptions of Faculty and Medical Students of a Teaching Hospital in Kolkata

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Abstract

Introduction: The COVID-19 pandemic had severely hampered education system, affecting nearly 1.6 billion students globally. The uncertainty about the duration of this pandemic and social distancing measures have triggered the use of online methods of teaching-learning activity. This study aimed at assessing perceptions of faculties and students of a teaching hospital of Kolkata, regarding online mode of teaching during the pandemic.

Materials and methods: A descriptive study with convergent parallel mixed-methods design was conducted among 645 undergraduate medical students and 4 faculties of a teaching hospital in Kolkata, from 2020-2022. A questionnaire and an in-depth interview guide were used to obtain data.

Results: About 68.1% undergraduate medical students were between 21 - 23 years of age. Only 29% had attended online classes before COVID-19 pandemic. The most common mode of conducting online theory examination was real time face to face viva (65.7%). Almost half (50.6%) had 'satisfactory perception' towards online teaching. Students of MBBS 2017 batch, attending online classes for 1 or 2 days per week, use of mobile phone for attending classes, poor interaction with teachers during online classes, had significantly higher odds of having unsatisfactory perception respectively.

Conclusion: Uncertainty about the duration of the COVID-19 pandemic warranted prompt attention towards continuity of medical education. Thus, online learning had become a key component in medical education curriculum during the pandemic.

1. Introduction

The Corona Virus Disease (COVID-19) was reported for the first time in the city of Wuhan, Hubei Province, China, December 2019. In India, the first case was reported from Kerala on January 30, 2020, which was followed by a sharp up rise of cases of COVID-19 in the wholecountry [1]. The World Health Organization (WHO) declared COVID-19 outbreak as a pandemic on 11th March 2020, which raised global concern and panic among all the people [2].

The novel severe acute respiratory syndrome corona virus (SARS CoV-2) virus has affected every aspect of human life immensely, such as economy, entertainment, travel, government policies, education including schools, universities and medical education [4,5]. It is essential for every medical student to learn patient interviewing and physical examination skills along with communication with the patients thoroughly, and this cannot be effectively achieved through online mode of teaching and learning. Such skills and knowledge cannot be learnt only through medical text books. Coming in close contact with a COVID-19 infected patient or serving as a vector, medical students are at a higher risk of exposure and spread of this contagious disease among their classmates, faculties or family members [6]. The uncertainty about the duration of this pandemic and social distancing measures had triggered the use of online methods of teaching and learning, which had become the need of the hour [7]. Online learning uses a virtual platform, where advanced technology-based learning approaches are used to deliver lectures. It is a highly flexible education method that fits into any schedule emphasizing on the concept of *"Anytime/Anywhere"*. It has become very convenient for the students to attend classes from anywhere as it was easily accessible. The educational institutions imported different online teaching platforms like Zoom, Google Meet, Google classroom, Microsoft teams etc. [8].

Online mode of teaching requires various electronic gadgets like smart phones/ tablets/ laptops/ computer and properly available internet facilities. The availability of smart phones in India per person is less as compared to other developed countries. Since majority of Indian population falls under middle income and low-income families, so, affording smart phones for continuity of education of children becomes difficult for Indian parents. Also, there is less internet availability in remote areas [9,10]. During the peak phase of the pandemic when India witnessed nationwide lockdown, all educational institutions including medical colleges were strictly instructed to shut down by the Government of India [10].

However, certain challenges surfaced in terms of online mode of education, like inability to focus on screens for long hours, technology issues, network problems, communication with teachers, a feeling of isolation and increased screen time which can lead to health issues [11]. Many students do not have access to laptops, or consistent high-speed internet at their homes [12]. With this background and rationale, this study was conducted to assess the perceptions of faculty members and undergraduate medical students of IPGME&R regarding online- teaching learning activity during the COVID-19 pandemic.

2. Materials and Methods

2.1 Study type, design and study settings

A descriptive study with a cross-sectional, retrospective study design, and a convergent parallel mixed-methods approach was carried out at Institute of Post Graduate Medical Education and Research (IPGME&R), Kolkata.

2.2 Study period and duration

The study was conducted for a duration of approximately 2 years (from August 2020 to October 2022, i.e., 26 months).

2.3 Study participants, inclusion and exclusion criteria

- For the quantitative arm, the undergraduate medical students of session 2017-2018, session2018-2019, session 2019-20120 and session 2020-2021of Institute of Post GraduateEducation and Research (I.P.G.M.E&R), Kolkata were included. These students were attending online classes through personal electronic devices which included mainly

smartphones, tablets and laptops. However, students absent during the period of data collection and non-consenting students were excluded from the study.

For the qualitative arm, one faculty member from each phase of MBBS was selected for in-depth-interview by simple random sampling and thus four such interviews were conducted. The faculty members used institutional as well as their personal devices to conduct the online classes which included laptops, desktops, i-pads or smart phones.

2.4 Sample size and sampling technique

- For the quantitative strand a total 645 students [121 (batch 2017-2018) + 146 (batch 2018-2019) + 181 (batch 2019-2020) + 197 (batch 2020-2021)] were included.
- **For qualitative arm,** in-depth-interviews with 4 faculty members (one faculty member each from department of Community Medicine, Emergency Medicine, Otorhinolaryngology and Anatomy respectively) were done. All the in-depth interviews were audio-recorded after obtaining prior informed consent from the faculty members.

Sampling technique: For the quantitative part, complete enumeration method was employed while for the qualitative part, purposive sampling technique was done.

Study tools and study technique: The quantitative study tool was a pre-designed and pre-tested structured questionnaire. After extensive review of literature, it was designed by a team of public health experts including a professor of Community Medicine. It was prepared in English. The questionnaire was then pre-tested among 20 randomly selected undergraduate medical students for its validity and reliability. After pretesting, some minor modifications were made. The content validity was checked using content validity index (CVI) which was 0.77 and Cronbach's alpha was calculated to assess the reliability of the questionnaire (0.71). obtained from two experts from Community Medicine. For conducting in-depth interview with the faculty members, in-depth interview guide was used which was prepared under supervision of Guide and validated by experts. The in-depth interview guide contained three domains- i) Perceptions of faculty members on online teaching-learning activity, ii) Challenges faced in taking online classes, iii) Possible solutions suggested to overcome the challenges.

For data collection, questionnaire was self-administered to the students ensuring anonymity and confidentiality through Google forms. Only those students who gave electronic consent were able to access the questionnaire. In depth interview with four faculty members from each phase was conducted at their respective departments. Each interview lasted for about 20 minutes.

Study variables: The dependent variables for this study were- i) Perception of undergraduate medical students regarding online teaching-learningactivity during COVID-19 pandemic, ii) Perception of faculty towards online-teaching activity, iii) Challenges faced by the students, iv) Challenges faced by the faculty. The Independent variables were- i) Socio-demographic characteristics of the students, ii) Quality of online learning.

All statements were positive statements and scored as (*strongly agree*=5, *agree*=4, *neutral*=3, *disagree*=2, *strongly disagree*=1), except two statements, i.e. number 4 and 14 were negative statements and scored reversely (*strongly agree*=1, *agree*=2, *neutral*=3, *disagree*=4, *strongly disagree*=5). Perception was categorized as follows: '***satisfactory perception'-*** perception score attained ≥ median of total score, '***unsatisfactory perception'-*** perception score<median of total score.

Statistical analysis: Descriptive Statistics were used to summarize the data. Categorical data was represented as Number (%) and continuous data was presented as Mean (± SD), Median (IQR) and Range in tables and figures. Perception was measured on a 5-point Likert scale (ranging from strongly agree to strongly disagree). As these tests came statistically significant ($p<0.05$), the distribution of the scores was not normal. Thus, distribution-free tests or non-parametric tests such as Kruskal Wallis test, and univariable binary logistic regression were performed. Kruskal Wallis test (non-parametric ANOVA) was performed to observe any statistically significant difference in distribution between scores of perceptions across categories of year of admission. To find the specific factors associated with unsatisfactory perception, univariable binary logistic regression was carried out. Data was checked for multicollinearity (VIF<10) and variables with p-value of less than 0.05 at 95% CI were considered statistically significant.

Ethical considerations: Approval from the Institutional Ethics Committee was obtained as per letter with Memo No. **IPGME&R/IEC/2021/051, dated 04.02.2021**. All the participants were explained about the nature and purpose of the study including that this study will be used for academic purposes only. They were ensured about their anonymity and confidentiality. Informed electronic consent were from them taken prior to data collection.

3. Results

3.1 Sociodemographic characteristics

About 68.1% undergraduate medical students were in the age group 21 to 23 years and 69% of the students were males. Highest population of the undergraduate medical students (30.5%) was admitted in the year 2020. Nearly two third (62.3%) undergraduate medical students were currentlyresiding at the hostel. 69.5% of the students belonged to upper socio-economic status (ie., Class-I) according to Modified BG Prasad Scale, updated 2021.

3.2 Online class experiences

More than 80% of the undergraduate students were attending online classes. About 62.0% of the students disagreed on the statement that online classes should be continued even after regular physical classes start. More than half of the students (52.2%) spent 5 days or more per week in attending online classes. Nearly 48% spent average 1 hour attending online classes in a day. All of the medical students (100%) have used Google meet as online platform and almost 89% used mobile phones for attending classes. More than half of them (56%) attended average 50%-80% of the online classes per week. Most of them (90.8%) faced assessments through real time synchronous mode (face to face viva voce) during online classes. Nearly 88% rated the interaction with teacher during online classes as poorer than physical teaching-learning. Nearly 49% of them spent Rs. 301- Rs. 400 ononline classes per month. Most common mode of conducting online theory examination was real time synchronous face to face viva (65.7%), followed by uploading of written answer sheet (64.5%). Most of the students (80.9%) disagreed to the statement that they were satisfied attending practical classes online. About 55.1% of the students disagreed on the statement that learning objectives are met by attending online classes. More than half of the medical students (55.2%) did not feel confidentabout the topic taught after attending the online theory classes and around one-third (31.8%) could not comment. More than three-fourth of the students (76%) did not feel confident in the skills taught after attending online practical classes, with a showing a lowest satisfaction index of 2.2 and more than half of the students (53%) were not satisfied by attending online classes (SI=13.2) (TABLE 1).

TABLE 1. **Distribution of the study participants according to their responses to statements on perception towards online teaching-learning facilities (n=645).**

Statements	**Agree** **Number (%)**	**Neutral** **Number (%)**	**Disagreement** **Number (%)**	***Satisfaction*** ***Index (%)***
1. I feel satisfied in appearing online examination	84 (13.0)	186 (28.8)	375 (58.1)	13.0
2. Duration of online classes is adequate	283 (43.9)	277 (42.9)	85 (13.2)	43.9
3. Online classes are interesting	82 (12.7)	239 (37.1)	324 (50.2)	12.7
4. Online classes are stressful	286 (44.3)	253 (39.2)	106 (16.4)	44.3
5. Online classes should be continued even after regularphysical classes start	99 (15.3)	146 (22.6)	400 (62.0)	15.3
6. My learning objectives are met by attending onlineclasses	82 (12.7)	207 (32.1)	356 (55.2)	12.7
7. I feel confident on the topic taught after attending theonline theory classes	84 (13.0)	205 (31.8)	356 (55.2)	13.0
8. I feel confident in the skills taught after attending online practical classes	14 (2.2)	141 (21.9)	490 (76.0)	2.2
9. Overall, I feel satisfied by attending online classes	85 (13.2)	218 (33.8)	342 (53.0)	13.2

In univariate regression, students admitted in the year 2017, belonging to a family where the head of family was a semi-professional, who attended online classes for 1 or 2 days in a week, used mobile phone for attending online classes, had poorer interaction with teachers during online classes and preferred duration of each online class being 30 minutes had significantly higher odds of having unsatisfactory perception (TABLE 2).

TABLE 2. **Univariable binary logistic regression showing association of unsatisfactory perception with socio-demographic variables (n=645).**

Variables	Categories	Number	OR (95% CI)	P-value
Age-group	18-20 21-23 24-26	55 220 45	0.577 (0.327-1.018) 0.759 (0.468-1.230) Ref	0.057 0.263
Gender	Male Female	228 92	1.183 (0.846-1.655) Ref	0.327
Year of admission	2017 2018 2019 2020	75 75 75 95	1.751 (1.104-2.777) 1.134 (0.739-1.741) 0.760 (0.506-1.141) Ref	**0.017** 0.564 0.186
Religion	Hindu Muslim Others (Buddhist and Christian)	250 64 6	0.602 (1.168-2.157) 0.970 (0.258-3.638) Ref	0.435 0.964
Caste	General Other backward class Scheduled casteScheduled tribe	198 53 59 10	0.792 (0.315-1.988) 1.590 (0.582-4.347) 0.870 (0.330-2.294) Ref	0.620 0.366 0.779
Permanent residence	Within Kolkata Outside Kolkata	103 217	1.184 (0.846-1.657) Ref	0.324
Current residence	Hostel Own house Rented house	207 104 9	3.303 (1.520-7.176) 3.172 (1.427-7.054) Ref	**0.003** **0.005**
Location of house	Urban Rural	202 118	0.666 (0.478-0.928) Ref	**0.016**
Type of family	Nuclear Joint	233 87	0.534 (0.364-0.782) Ref	**0.001**
Occupation of HoF	Professional Semi-professional Skilled	71 79 93	1.475 (0.814-2.674) 3.241 (1.726-6.085) 1.055 (0.600-1.855)	0.200 **<0.001** 0.852

3.3 Challenges faced by the undergraduate medical students

More than three-fifth of the students (65.7%) had faced challenge(s) in attending online classes. Most commonly reported challenges reported by the students in attending online classes were network issues (51.9%), communication with teachers (26.7%), continuous use of mobile phones, causing eye problem (18.6%), power fluctuations (13%), over loading of classes (9.9%), difficulty in using technology tools (7.1%), noisy environment (3.5%) and time management (2.6%) (FIG 1).

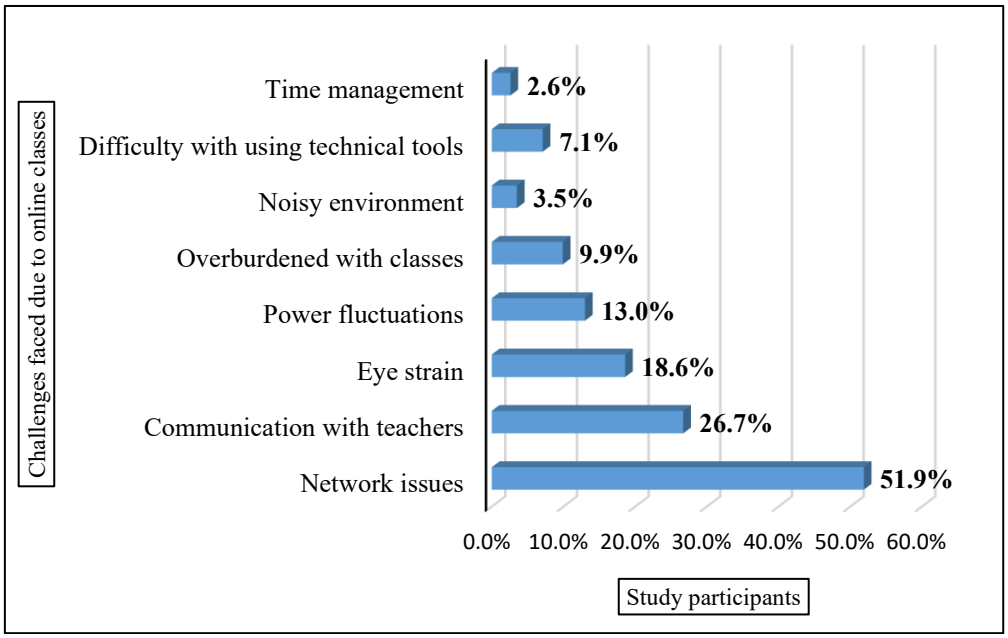

FIG. 1. **Horizontal bar diagram showing distribution of study participants according to their responses on challenges faced by the students with online teaching-learning classes (n_1=424)*.**

(*multiple responses)

3.4 Possible solutions adapted to overcome the challenges

Among the students who faced challenge(s), 5% of them used eye medications for the eye problem caused by continuous used of mobile. About 5.9% of them reached the teachers via *WhatsApp* messages/e-mails/calls regarding their doubts when there was communication problem. About 4.5% of the students skipped the classes when they faced over loading of classes. 6.8% of the students skipped the classes when they faced the problem with power fluctuation. About 20.7% of the students were trying to compromise with the network issue and about 6.4% of the students learnt how to use technology tools from internet. About 1.4% of the students skipped classes when they faced difficulty in time management and about 1.4% of them searched for quiet places for attending online classes.

3.5 Perceptions of faculty members on online teaching-learning activity:

Findings from the in-depth interviews showed that some faculty members felt that online classes are not interactive, not feasible for teaching procedural skills, however most of the faculty members felt that online classes should be continued even after pandemic as hybrid mode, along with traditional offline classes. From the in-depth interviews a total of four broad themes on perceptions emerged. These werelack of interaction, feasibility of skill teaching, conduction of assessment and future of online classes after pandemic (TABLE 3).

TABLE 3. **Thematic analysis of in-depth interviews conducted with the faculty members (n=4).**

Themes	Codes	Verbatims
Perception of the faculties		
1. Technical problems	Poor audio/video quality	*"Sometimes technical problems like audio quality poor or video qualitypoor…"*
	Connectivity problems	*There was "…very poor connectivity…"*
2. Difficulty to engage students	Lack of concentration	*"…they just turned on the computer, butthey don't attend the class…"* *"…they are not actually listening to whatwe have to say…"*
	Lack of motivation	*"…in physical environment if we findstudent sleeping or yawning, I call hisattention and he wakes up and that is notpossible in an online environment"*
	Unavailability of propergadgets	*"…not everybody has android phone norcomputer for attending classes…"*
Challenges faced by the faculties		
1.Lack of interaction	Inability of students to concentrate	*"Online classes are not so interactive because students cannot concentrate…"*
	Difficult to have attention of students	*"Lack of interaction is due to lack of attention from the students"*
2. Feasibility of skill teaching	Difficult to teach procedural skills	*" As far as actual hand on procedural skills is concerned, online teaching is a serious disadvantage.."*
	Workplace based teaching not possible	*"..workplace based clinical skills cannot be taught through online classes.."*
3. Conduction of assessment	Skill assessment difficult in online mode	*"…when we are going to assess somebody's skill directly, there is definitely an edge in an offline*

		format…"
	Only short questions/MCQscan be used through online surveys	*"…Google questions (questions in the Google form), quiz and puzzles…"* *"…online quiz, MCQs, short answers, summary writing and Google form…"*
Possible solutions to overcome the challenges		
1. Institution support	Better connectivity to beensured by institution	*"…improve the connectivity; there should be proper internet in the hostel…"*
	Better platform from the institution	*"…we can invest in better technology to build up online class platform with better equipments…"*
	Provision of gadegts	*"They may provide us POV camera and TV"*
2. Adaptation of new mode of teaching by faculty	Sensitization session for faculty members	*"….it would be helpful if there is sensitization session for faculty members in using technology tools…"*
	Understanding what is required during online teaching	*"…a talk in an offline medium, I may use wonderful slide colors, but in online medium, these are not required, it has to be just focused"*

3.6 Challenges faced by the faculty members in taking online classes

Findings from the in-depth interviews showed that some faculty members faced technical problems whereas some of them faced lack of attention among students which made it difficultfor them to use online platform for teaching. From the in-depth interviews a total of three broad themes on challenges emerged. These were technical problems, difficult to engage students and lack of orientation of faculty (TABLE 3).

3.7 Possible solutions to overcome the challenges faced by the faculties:

The possible solutions suggested by the faculty members to overcome the challenges were better connectivity to be ensured by the institution, better platform from the institution, use of blended learning and motivation of students and faculty. From the

in-depth interviews a total of four broad themes on solutions emerged. These were institutional support, methods of student engagement, financial support from government and adaptation to the new mode of teaching by faculty (TABLE 3).

4. Discussion

In this study, less than one-third of the students (29%) had attended online classes before the COVID-19 pandemic, whereas in a study done by Panchal V et al., [13] about 75.1% students had previous experiences in e-learning and 41.8% of the respondents had little or no online learning/teaching experiences before.

In a web based survey study conducted by Debnath M et al. [14] among the students from different departments of Medical and Allied health sciences from different states of India, most of the universities and colleges used the Google platform (like Google classroom, Google duo, etc.) (419 students i.e. 52.6%) as their principal application for online classes followed by Zoom application (267 students i.e. 33.5%), Others (106 students i.e. 13.3%) and Edmodo application (5 students i.e. 0.6%); whereas in the current study, the most common online platform used was Google meet (100% of the students used), followed by Zoom (88.0%) and Microsoft Team (84.8%).

In the present study, 50.4% undergraduate medical students had satisfactory perceptionsregarding online teaching-learning activity. About 30.50% of the medical students hadsatisfactory perceptions on e-learning in the study conducted by Ansar F *et al.* [15] in Pakistan,whereas in the study done by Singh R *et al.* [16] in Nepal, only 5.4% of the medical students. The study conducted by Sharma N *et al.* [20] showed that 73.93 % students were enjoyingonline learning only to some extent and 63.98 % students felt that online class is not equallyeffective as face-to-face teaching. Whereas, in the current the study, only 12.7 were interestedin online classes and 55.2% students felt that learning objectives are not met by attendingonline classes.

Another study was done by Sharma N *et al.* [17] and this study showed that the students had disturbance during online classes as internet disturbance, electricity problem, almost three-fourth of the student felt external disturbance and health issues like headache and eye strain. When comparing with other studies, the challenges faced by the students in the study done by Al-Balas M *et al.* [18] were poor internet coverage, limitation in internet data packages, lackingsuitable devices, variation in educational platforms and about 7.4% of the students did not face challenge attending online classes. In the study done by Khan AM *et al.* [19], around 62% - 80% students were satisfied with online practical teaching, whereas in the current study, 80.9% were not satisfied in attending practical class online. A study done by Pokryszko-Dragan A *et al.* [20] revealed that 24.8% students felt online examinations were less stressful than traditional ones, while in our study only 13.0% were satisfied in appearing online examinations. Whereas, in the study conducted by Kumari A *et al.* [21], the majority of students experienced network issues, one-fifth have experienced audio not clear issues, and a few, less than ten percent have experienced host server down issues and session ends abruptly. So, the common challenges we could see from here with ourstudy were internet issue, electricity problem and eye problem. Most of the studies did not mention the possible solutions adapted by the students to overcome the challenges faced.

Findings from in-depth interviews showed that some of the faculty members felt that onlineclasses are not interactive, not feasible for teaching procedural skills; however, most of thefaculty members felt that online classes should be continued even after the pandemic ashybrid mode, along with offline classes. From the in-depth interviews, a total of four broad themes

on perceptions emerged. These were lack of interaction, feasible of skill teaching, conduction of assessment and future of online classes after pandemic. The faculty members pointed out that online classes are not so interactive because students are not able to concentrate and it is difficult to have students' attention. Some of the faculty members also perceived that lack of technical knowledge of faculty make the class not interactive.

From the in-depth interview, broadly 4 themes on solutions emerged. These were Institutionalsupport, methods of student engagement, financial support from government, and adaptationto the new mode of teaching by faculty. The faculty members suggested that better connectivity to be ensured by the institution and there should be better platform from institution. Some faculty members suggested that use of blended learning for undergraduate level could be helpful. They also suggested that motivation of students and faculty and counseling of students and sensitization sessions of new mode of teaching for faculty should be conducted. Whereas in the study done by Mukhtar K *et al.* [22] they reduction in cognitive load and increased interactivities during online teaching. They have suggested ways to start online Case Based Learning. They also suggested that there should be revision class along with psychomotor hands-on teaching after the COVID-19 pandemic is under control.

In a study conducted by Maheshwari N *et al.* [23] the result showed that only 38% of the faculty believed that they were able to generate in the topic being taught and good connection with the students during online classes was possible only for 8% of the faculty. In Joshi PK *et al.* [24] study, about 95% of the faculty members expressed that face-to-face teaching is better than online teaching; however more than 50% faculty felt that there was motivation and interest among the students in attending online classes.

The faculty members felt that skill assessment is difficult and only short questions like MCQs and online viva can be conducted through online mode. In Majumdar A *et al.* [25] study also, most of the teachers felt that assessment through online mode is difficult. And in Bhat NP *et al.* [26] study, some teachers mentioned different methods which can be followed during online mode like OSPE/OSCE, video demonstration, etc. Most of the faculty members in our study felt that online classes should be continued even after the pandemic, but not replacing offline classes and that it should be in hybrid mode, that is, online classes along with offline classes.

5. Strengths and Limitations

The current study is one of the first comprehensive cross-sectional studies to assess the perceptions of both students and faculty members regarding online classes during the COVID-19 pandemic in India. This study had a robust methodology including large sample size, complete enumeration method and proper use of inferential statistics. Qualitative component helped to identify the perceptions; challenges faced by the faculty in taking online classes and also elicited suitable solutions suggested by them. The study would help to design various online/blended courses for health professionals in the future as the perceptions, challenges and solutions regarding online classes have been unearthed.

However, the study was conducted in a single institute involving only the undergraduate medical students and a small sample size of faculty. A study in multi-institutional could have led tomore generalizable results. A self-administered questionnaire was used to collect information from the students, whichmight have led to respondent bias and social desirability bias.

6. Conclusion and Recommendations

Students need to be oriented to this mode of teaching as post pandemic hybrid mode of teaching will only became a reality. So, time should be allotted in the academic calendar of students for orientation, training and solving challenges faced by students during online classes. Training sessions for faculty of all departments across all designations should be arranged at regular intervals by Medical Education Unit (MEU) of the institution. Also, the faculties should have a platform to share their experience and challenges with the MEU.

7. Conflict of Interest

There were no conflicts of interest.

8. Financial Support and Sponsorship

None declared.

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