

Problems and Prospects of Online Mode of Medical Education During COVID-19 Pandemic: A Student – Teacher Perceptive

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Abstract

Introduction: Consequent upon continued nationwide lockdown to check the spread of COVID -19 pandemic, online teaching and learning has emerged as a new mode to continue the regular educational programs in India. It is vital to assess the perception of this new method by various stakeholders of educational sector.

Objectives: The objectives included identification of the problems and benefits felt by medical students and college teachers about online classes and to assess its effectiveness on attendance and academic performance of students.

Methods: The cross-sectional study was conducted during March-October 2021 among 150 first MBBS students admitted in 2020 in a medical college at Udaipur, Rajasthan. The participants who gave informed consent and attended three online and offline monthly tests were included and the rest were excluded. The quantitative techniques included frequency tables, mean, standard deviation and 't- test'.

Results: Among 100 respondents, 48% were male and 52% were female. The major problems faced by students included lack of space at home to attend class (71%), interrupted internet connectivity (42%), missing interaction with stakeholders (>70%) and mismatch in theory and practicals (69%). The benefits included homemade food, family care, risk minimization of COVID-19 and regular parental monitoring. The major advantages felt by teachers included continued teaching (90.90%) and saving time (100%) in taking attendance in online mode. The average attendance for online classes was significantly higher over offline classes ($p < 0.0001$), whereas the average retention of knowledge level as evidenced by average marks was significantly lower for online class tests compared to offline class tests ($p < 0.0001$).

Conclusion: The higher attendance does not reveal higher knowledge retention during online mode of classes.

Keywords: COVID-19, Faculty members, Online class, Students

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Introduction

In general, human life and the education sector was severely affected throughout the world due to the sudden outbreak of the pandemic COVID-19 during early 2020. Worldwide approximately 1.3 billion learners were not able to attend schools or universities while about 320 million learners were adversely affected in India due to the nationwide lockdown imposed to ensure social distancing norm as a potential means to minimize the risk of its community spread [1]. The UNESCO estimated that about 73.8% of the enrolled learners get affected by April 2020 in 186 countries [2,3]. India had no option but to keep closed all the education institutions to minimize the spread of the virus on one hand and to save the precious life of children and youth on the other hand. Consequently, the country has been facing the great challenge to maintain the quality standards and quantity issues in education sector with the repeated lockdown since March 2020 followed by conditional unlock process and second wave since early 2021.

The Ministry of Human Resource Development (MHRD) came out with the proposal to share various free digital e-learning platforms such as National Repository of Open Educational, SWAYAM Prabha, Study Web for Active Young Expiring Minds (SWAYAM), DIKSHA portal, e-Pathshala and National Programme on Technology Enhanced Learning to continue the learning at various stages of education.[4].

As an alternative to the campus mode of education, the correspondence and distance mode of learning was in vogue since mid-

1800s at various parts of the world which was later on adopted by India also. However, the online mode of learning for students and teaching for teachers has been altogether a new venture in India, though it was prevalent in some parts of the world [5]. In 2010, the Sloan Consortium found 17% increase in number of online students from the years before, beating the 12% increase from the previous year [6]. The Computer Assisted Language Learning (CALL) was a step in using online technology along with traditional classroom learning [7,8].

It is important to point out here that from 2019 onwards, the Competency Based Medical Education has been implemented by the National Medical Commission (NMC) for the new batch 2019 throughout India [9]. But the emergence of COVID-19 from March 2020 in India hampered its actual implementation and the teaching was to be shifted to online mode. The COVID-19 enforced the educational activities across the globe to cancel the traditional chalk and talk methodology and change to the online teaching/learning [10-12]. This sudden transition of teaching methods from offline to online classes made students and faculties in a dilemma. The ongoing online classes are now turned out towards the question of learning quality [13].

The sudden shift from traditional method of teaching to online mode has posed several problems to the students, teachers, parents and other stake holders of education at all stages. The present study is an attempt to assess the insight and perception on problems and benefits felt about online learning experiences and knowledge

retention by the students in medical education system.

Objectives:

The specific objectives of the study are:

1. To identify the problems and benefits felt by medical students on online classes during pandemic period,
2. To assess the effectiveness of online classes in terms of attendance and academic performance and
3. To enlist the teacher's perception and feedback on online classes.

Material and Methods:

The cross sectional survey was conducted for a period of 8 months (March 2021 to October 2021), among 150 first year MBBS students admitted in 2020 in one of the medical colleges in Udaipur, Rajasthan. During this period the students were exposed to both online and offline mode of learning. The first year students were selected for the study as they were the most vulnerable group as both the area of study and modes of teaching were quite new to them. Those students were included in the study who gave informed consent to participate in the study and who attended three online and offline monthly tests. The chronic absentees and those who attended less than three monthly tests were excluded from the study. Thus the final number of respondents was only 100 first year MBBS students. The faculty members from various departments teaching first year MBBS students in the study were enrolled to provide feedback on online classes. The ethical permission was obtained from the Institutional Ethics Committee of the college vide letter no. STU/PIMS/IEC/2021/45 dated 18/03/2021.

The general profile of students and their family, the availability of digital gadgets at home, the problems faced, and advantages felt, satisfaction level of students about online classes were collected on a pre-

validated semi-structured questionnaire. The actual class attendance for three months each for online as well as offline classes were collected from academic department of the college. Instead of normal subjective assessment prevalent in medical education, Multiple Choice Questions (MCQs) based subjective assessment was followed in view of feasibility under online tests. The marks obtained by students in MCQs based monthly class tests during online and offline class periods were also obtained from the academic department.

The average attendance of students for equal number of online and offline Community Medicine classes (10) were calculated. Similarly, the average marks of MCQs tests conducted during online classes and offline classes in Community Medicine were calculated for those students participated in the study. The satisfaction level of various aspects of study was assessed through Likert scale by grading on a seven-point scale which are as follows 1. Very strongly disagree, 2. Strongly disagree, 3. Disagree, 4. Neutral, 5. Agree, 6. Strongly agree and 7. Very strongly agree.

Statistical analysis:

The problems and benefits of online classes was analyzed using frequency table. The mean, Standard Deviation (SD) and Coefficient of Variation (CV) of monthly attendance and marks obtained in class tests were worked out and tested for statistical significance based on the mean values using 't- test'.

Results:

Among the 150 students, only 100 students attended three online and offline tests and the remaining 50 students were excluded from the study as they did not fulfill the inclusion criteria.

Table 1: General profile of respondents (n=100)

| Particulars | | Frequency (%) |
|---|---------------|---------------|
| Gender | Male | 48 (48.00) |
| | Female | 52 (52.00) |
| Place of stay | Rural | 18 (18.00) |
| | Urban | 82 (82.00) |
| Number of digital gadgets per household | One | 01 (1.00) |
| | Two | 14 (14.00) |
| | Three | 11 (11.00) |
| | Four | 15 (15.00) |
| | Five | 17 (17.00) |
| | More than 5 | 42 (42.00) |
| Families in which family members worked from home | Zero | 03 (3.00) |
| | One | 49 (49.00) |
| | Two | 28 (28.00) |
| | Three or more | 20 (20.00) |
| Families with children attending online classes | One | 53 (53.00) |
| | Two | 27 (27.00) |
| | Three or more | 20 (20.00) |
| Households bought new digital devices due to online classes | | 12 (12.00) |

Out of 100 respondents of the study, 48 were male and 52 were female. Only 18 students were from rural area and 82 were from urban area. While there was one family with only one digital gadget, 42 families owned 5 or more gadgets per family. In 49 families, one family member

was working from home and in 20 families 3 or more family members worked from home. In as many as 53 families one child was attending online classes and in 20 families 3 or more children were attending online classes. Nearly 12 families bought new digital devices for attending online classes. [Table 1]

Table 2: Problems (disadvantages) encountered during online classes by students

| Type of problems | Frequency (%) |
|---|---------------|
| a. Resource related | |
| Lack of e-resources at home | 10 (10.00) |
| Internet/Connectivity problem | 42 (42.00) |
| Power cut problem | 34 (34.00) |
| Space/independent room to attend classes | 71 (71.00) |
| Upgradation of data package to meet online class requirements | 57 (57.00) |
| b. Operational difficulties | |
| Operational difficulties in using online platform/system | 39 (39.00) |
| Clarity of voice of the teacher | 53 (53.00) |
| Clarity of pictures (PPTs) | 52 (52.00) |
| Lack of technical support at home | 41 (41.00) |
| c. Academic issues | |
| Interaction with teacher missed | 75 (75.00) |
| Interaction with friends missed | 76 (76.00) |

| | |
|---|------------|
| Miss-match of theory with practical classes and cases | 69 (69.00) |
| Extra-curricular activities missed | 72 (72.00) |
| d. Social and health issues | |
| Health issues such as backache, headache, eye strain etc. due to attending online classes for longer duration | 67 (67.00) |
| Disturbance in maintaining regular daily routine | 59 (59.00) |
| Overall monotonous social life | 69 (69.00) |

The problems felt by students were grouped as resource related, operational difficulties, academic issues, social and health problems. Among the problems related to resource needs to attend online classes from home, lack of independent room to attend class was reported by 71% students, followed by internet connectivity problem by 42% and power cut problem by 34% students. Among operational problems, more than 50% students reported lack of

clarity of teacher's voice and pictures in PPTs. The academic disadvantages of online classes included missing of interaction with teachers and friends, mismatch in theory and practical classes and missing of extra-curricular activities as reported by about three fourth of the respondents. The health-related problems were faced by 67% of students and 59% had problems in maintaining the regular daily routines. [Table 2]

Table 3: Advantages of online learning

| a. Academic related | Frequency (%) |
|---|----------------------|
| Focussed studies | 35 (35.00) |
| Parental monitoring | 88 (88.00) |
| Continuity in learning during lockdown period | 68 (68.00) |
| Acquainted with online learning mode | 74 (74.00) |
| Minimum academic loss during lockdown period | 67 (67.00) |
| Scope to record teaching materials for future use | 77 (77.00) |
| Alternative mode of learning under pandemic situation | 90 (90.00) |
| b. Social and health related | |
| Homemade food and family care | 99 (99.00) |
| Reduced risk from COVID-19 infection | 84 (84.00) |
| Long duration gets togetherness of family members | 92 (92.00) |

The advantages of online classes were grouped as academic related and social and health related. The academic related advantages of online classes reported by the respondents included having an alternative mode of learning (90%), parental monitoring (88%), scope to record teaching material for future use (77%), acquaintance

with online mode of learning (74%) and others. The social benefits realized by the students included regular consumption of homemade food (99%), long duration togetherness of family members (92%) and reduced risk from COVID-19 infection (84%). [Table 3]

Table 4: Satisfaction level among students about online learning (n=100)

| Statements | Average score (Mean ±SD) | Satisfaction level of respondents | | | | | | |
|--|--------------------------|-----------------------------------|----|----|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Focused learning without any discontinuity | 3.85±1.54 | 04 | 18 | 19 | 28 | 18 | 05 | 08 |
| Parental monitoring | 5.68±1.53 | 04 | 01 | 03 | 09 | 23 | 18 | 42 |
| Homemade food and care | 6.83±0.53 | 00 | 00 | 00 | 01 | 04 | 06 | 89 |
| COVID-19 risk averted | 6.17±1.33 | 01 | 02 | 03 | 04 | 16 | 11 | 63 |
| Gained additional knowledge on usage of e-learning resources and associated services | 4.84±1.59 | 06 | 01 | 09 | 23 | 28 | 14 | 19 |
| Effective interaction with teacher | 3.57±1.64 | 15 | 10 | 22 | 27 | 13 | 08 | 05 |
| Frequent academic discussion with friends | 3.54±1.52 | 11 | 12 | 27 | 26 | 15 | 04 | 05 |
| Theory practical combination | 3.41±1.64 | 20 | 05 | 25 | 30 | 09 | 06 | 05 |
| Missed college environment and extracurricular activities | 5.55±1.94 | 06 | 06 | 06 | 08 | 09 | 13 | 52 |

The higher agreement level was observed for aspects (positive and negative) like homemade food and care (6.83/7), aversion of COVID-19 risks (6.17/7), parental monitoring in studies (5.68/7) and missing

of college environment and extra-curricular activities (5.55/7) on the 7 point Likert scale. The acquaintance with online mode of learning gained the satisfaction score of 4.84/7. [Table 4]

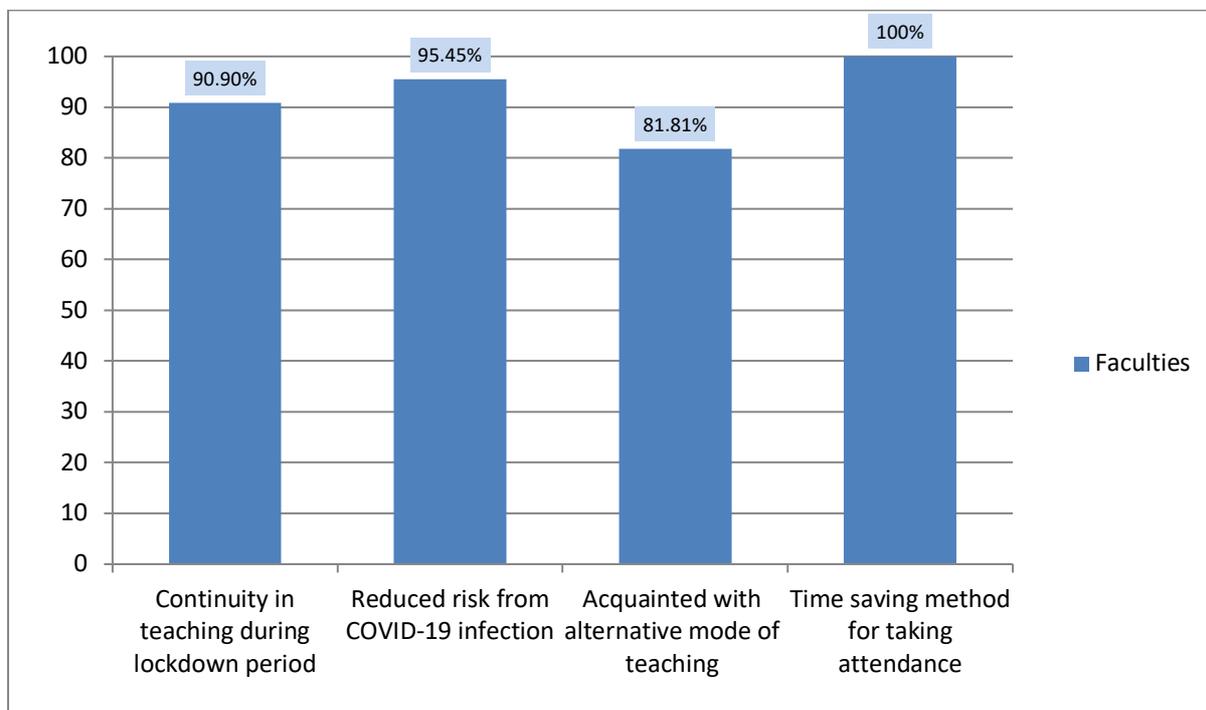


Figure 1: Faculties perception on advantages about online teaching during pandemic (n=22)

In this study, 22 faculty members from various departments teaching first year MBBS students were enrolled in the study on a voluntary basis. The majority of participated faculty members felt that the online teaching as a promising option in terms of continuity in teaching during

situation like lockdown period (90.90%), reduced risk of COVID-19 infection (95.45%) and alternative mode of teaching (81.81%). All participated faculty members unanimously agreed that online mode of teaching saved the time for taking attendance of students. [Figure 1]

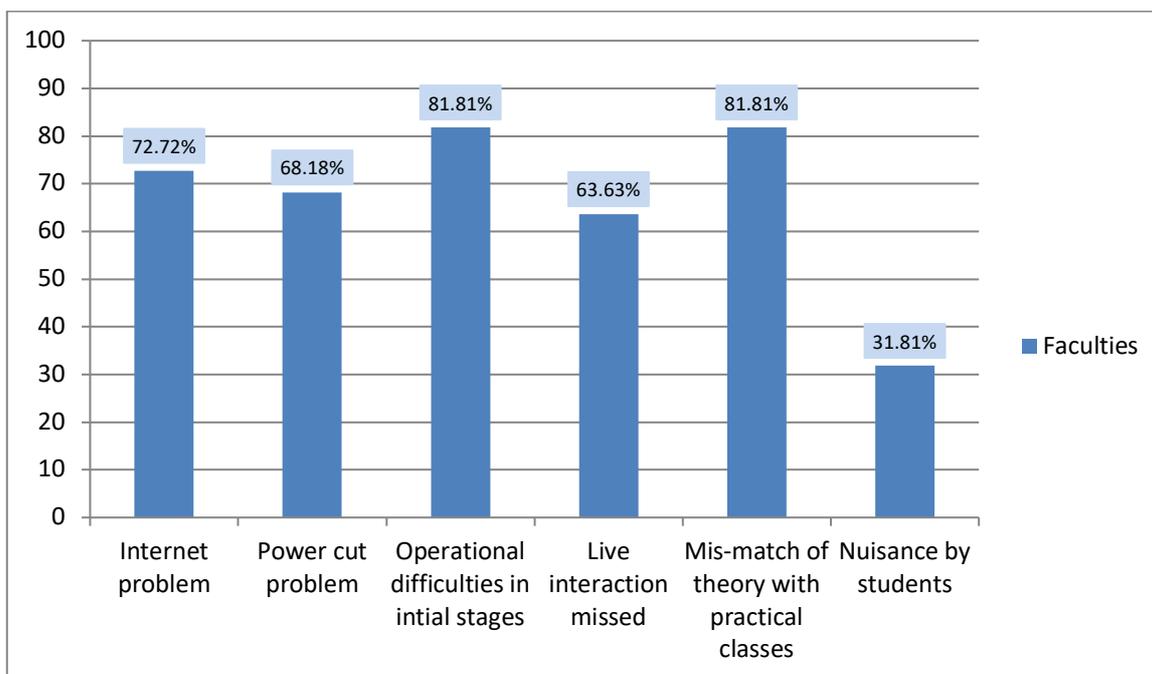


Figure 2: Faculty perception on problems about online teaching during pandemic (n=22)

Among the problems faced, operational difficulties and mismatch of theory with practical were felt by 81.81% of the faculty

members. Few faculty members (31.81%) experienced nuisances by students even in online classes. [Figure 2}]

Table 5: Comparison of attendance and marks of the students during online and offline sessions

| Mode of teaching | Attendance | | p-value |
|----------------------|----------------|-------|--------------------------------|
| | (Mean ± SD) | CV | |
| Online (10 classes) | 9.77 ± 1.40 | 14.32 | < 0.0001, t =10.684, SE= 0.188 |
| Offline (10 classes) | 7.76 ± 1.83 | 23.58 | |
| Mode of Teaching | Marks obtained | | p-value |
| | (Mean ± SD) | CV | |
| Online (30 Marks) | 12.31 ± 3.76 | 30.54 | < 0.0001, t =24.009, SE= 0.461 |
| Offline (30 Marks) | 23.39 ± 4.22 | 18.04 | |

As far as class attendance was concerned, the average attendance in online classes was higher over that in campus based offline classes and the difference was found statistically significant ($p < 0.0001$). The average marks in MCQs based class test was lower for online tests compared to that for offline tests of similar nature and the difference was statistically significant ($p < 0.0001$). The higher attendance in online classes does not imply higher retention of knowledge as evident from significantly lower marks obtained in online tests. [Table 5]

Thus, the online classes are not a perfect substitute for offline classes in medical education from the point of view of knowledge retention. It can only be a means of continuing medical education during situations like COVID-19 pandemic.

Discussion:

In the present study there were 48.00% male students and 52.00% female students. In a study conducted by Muthuprasad et al. in India on online education there were 56.03% females and 43.97% males which is comparable to the present study [14]. In a study conducted by Acharjya B et al. it is observed that 70.80% of the respondents were male and 29.10% were female [3]. In the current study, majorities 82.00% of the students were from urban area and only 18.00% students were from rural area. Also, the study conducted by Muthuprasad et al. showed that majority of the respondents 54.40% were belonging to urban background and the remaining 45.60% were from rural areas [14]. In another study by Naik GL et al. in India 90.00% of the participants was from urban areas [15]. So, it is expected that the participants from urban area have relatively better facilities for online learning.

In the present study, 42.00% families were having sufficient number of digital devices per family to attend online classes. But the study done by Zboun JS et al. in Palestine showed that there was insufficient number

of digital gadgets per households to attend online classes from home [16].

The major problems reported by participants of the present study included internet connectivity problem (42.00%) and power cut problem (34.00%). A study by Naik GL et al. also reported that 60.00% of the students faced issues related to internet access and power supply [15]. In a study done by Zboun JS et al. 90.00% respondents reported poor internet connection which is remarkably high when compared to the current study [16]. The study by Rawal M also reported interrupted internet connectivity problem in online learning and teaching [1]. This could be a major difficulty in teaching and learning by online mode of education.

About 3/4th (75.00%) of the students reported that the interaction with teachers and friends was missing due to distance learning in the present study. Similar findings were reported in a study done by Zboun JS et al. in which 70.00% of the students pointed out that there was interaction problem between students and the teachers in online learning [16]. The study done by Pandit D et al. reported that 33.65% students who attended online courses found lack of interactivity with their peers and teachers [17]. The studies done by Brooks SK et al. in London and Almendingen K et al. among students in Norway also reported lack of in-person contacts with classmates was a big challenge due to online learning [18,19].

About 69.00% students in the present study reported mismatch in theory and practical in online mode of classes. In a study done by Naik GL et al. found that 91.53% of the students agreed that learning practicals by online mode was a difficult task [15]. In the present study 72.00% students reported that extra-curricular activity was missed. In a study done by Almendingen K et al. nearly 81.00% students experienced lack of social contact with peers [19].

The health issues such as backache, headache, eye strain etc. were felt by 67.00% students due to attending online classes for longer duration. The studies done by Dhawan S reported the health-related issues such as stress, fear, anxiety, depression and insomnia due to online learning among the students [20]. Further it was evidenced by Naik GL et al. that it may disturb mental stability of the students [15]. Due to online learning overall, monotonous social life was reported by 69.00% of the learners. It was well supported by a study by Dhawan S in which student revealed online teaching to be boring and unengaging [20].

Around 77.00% of the learners found that online learning was a good way to record teaching material for future use. This finding was matching with that of the study done by Zboun JS et al. in which nearly 85.00% of the students agreed that the attended online class can be viewed again whenever required in the future by collecting the material [16]. The online learning due to COVID-19 gave a chance for about 92.00% of the learners to stay along with the family members and having homemade food by almost all the respondents. Regarding more time with family members, similar findings were reported in a study done by Barun T among graduate students [21]. In the present study about 74.00% students could get well acquainted with online mode of learning and Almendingen K et al. also reported that 71.00% of the students could develop digital competence and interest in online learning [19].

The average Likert scale score for focussed learning without discontinuity was 3.85 with SD of 1.54 in the present study. The findings by Zboun JS et al. pointed out that the preference for online classes was 3.33 with SD of 1.33 which explained the focussed learning by students [16]. Further, the gain of additional knowledge about online learning with mean of about 4.84 and SD of 1.59 in the present study which is

comparable to the study by Zboun JS et al. in which there was a mean score of 3.54 with SD of 1.15 [16]. In a study done by Naik GL et al. 70.00% participants were not satisfied with online learning [15].

In online teaching, operational difficulties and mismatch of theory with practical were felt by 81.81% of the faculty members. The study by Zalat MM et al. in a university of Taiwan also reported similar findings in which 71.6% university faculty members had difficulty in taking practical classes in online mode [22]. Difficulty in teaching practical classes via online was also reported by Langford M et al in Norway [23].

About 63.63% teachers said that the live interaction with students was missed, 68.18% reported power cut problem and 72.72% had internet and connectivity problems during the classes. But the study done by Zalat MM et al. concluded that 24.3% staff members missed face to face interaction with students, 32.1% reported technical problems and 40.0% university staff members reported unstable internet connectivity issues [22].

In the present study, the class attendance was on higher side in online method of learning when compared to offline method of learning and the difference was found to be statistically significant which may be due to consistent parental monitoring at home. The average marks of monthly tests for knowledge retention was found to be significantly lower for online period compared to similar type of tests conducted during offline class period. In contrast to the present study Paul J et al. in United States reported that there was no significant difference in performance between online and face to face learning among students with respect to class rank [5]. In both the studies by Muthuprasad T et al. and Almendingen K et al. it was found that 70.00% and 56.00% of the study participants preferred objective questions in online examination. [14,19].

Conclusion:

The online virtual classes are not a perfect substitute for physically attended lecture classes in medical education. Online classes can only be a stop gap arrangement for a limited period to maintain continuity in learning. The required teacher- taught interactions, the interface of theory with practical classes, hospital visits, etc. were not possible through online classes and the higher rate of attendance of students in online classes does not imply higher rate of knowledge retention.

Recommendations:

- In order to make online classes more effective and interesting, faculties may send the content material to the students well-in advance before starting the online class to overcome the clarity issues.
- Online classes can only be a stop gap arrangement in learning and teaching in medical education in conditions like COVID-19 pandemic to maintain continuity in learning.

Limitation:

- Only fresh batch of a single college could be included in the study in view of operational difficulty.

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