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Original Article

Ophthalmology Section

Impact of Lockdown due to COVID-19 Pandemic on Undergraduate Ophthalmology Teaching: Students' and Teachers' Perspective

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ABSTRACT

Introduction: Coronavirus Disease-2019 (COVID-19) pandemic has forced the union government to close the educational institutions. The medical teaching had to go digital. Digital learning has advantages but not without limitations and challenges.

Aim: To analyse the impact of lockdown due to COVID-19 pandemic on undergraduate ophthalmology teaching and learning and explore the perception of faculty and students regarding its advantages, limitations and recommendations.

Materials and Methods: This cross-sectional survey was conducted among ophthalmology faculty and pre final year students from six government and 11 private medical colleges through online Google questionnaire which was initially validated by three faculty and 10 students had Cronbach's value-0.70. Based on the pilot study, the questionnaire was modified. Valid responses were entered in data sheets and Statistical Package for the Social Sciences (SPSS) version 24.0 was used to analyse the data. Chi-square test was used to find out the association between symptoms post online classes and duration of online classes and gender of the students. The p-values <0.05 were considered significant.

Results: Approximately, 1500 students and 65 faculty were approached online. Out of which there were 1015 respondents, 967 valid responses were considered for analysis (929 students and 38 faculty). More than 70% of the students used mobile phone for attending online classes. Zoom (≈40%) and Google meet (≈30%) were the commonly used applications. A total of 79.3% of medical students and 84.2% of faculty disagreed to continue with online classes after the pandemic. Lack of face-to-face interaction, practical demonstration and on-campus life, connectivity issues and eye symptoms post online classes were the major disadvantages. Availability of gadgets, internet connectivity and self-discipline were the major challenges faced. The ocular symptoms were marginally more in females (p-value >0.05) and in those with extended duration of attending online classes (p-value <0.05). Post online lectures, none of the faculty had non-ocular symptoms. In comparison to the medical students, 78.9% of the faculty (30/38) always maintained proper screen position whereas 64.4% of students (598/929) did not always maintain proper screen position.

Conclusion: According to this study, learners preferred less duration of online classes, improvement in e-teaching quality with interactive lectures and demonstration. Teachers preferred improved infrastructure and network connectivity. This study gives an insight of students and teachers mentality towards the online ophthalmology classes.

Keywords: Coronavirus disease-2019, Medical education, Ocular symptoms, Online learning

INTRODUCTION

The COVID-19 outbreak has forced the government to close all educational institutions which necessitated choosing new platforms and inculcating novel strategies. Conduction of online classes was the immediate and effective strategy. Attending classroom lectures, clinical classes, conferences on online platforms are more likely to be the norm for the near future. The teachers have to conduct classes through live video conferencing using different apps like Zoom, Microsoft Teams, Google meet etc., [1]. Digital learning has advantages as there are no physical boundaries [2]. It is cost-effective and students get to learn in the confines of their comfort zone [2]. However, digital learning is not without its limitations and challenges since face-to-face interaction is usually perceived as the best form of communication as compared to remote learning [2]. Online learning relies on the reliable power supply and internet connectivity. Those residing in metro and big cities are comparatively well equipped with digital infrastructure as compared to their peers in small towns and cities. Despite the internet being an easier medium of reach, a substantial population is still deprived of it or has limited access to it. Online gaming and social media might distract the students while attending online classes.

Eyestrain from digital classes is a major health concern leading to asthenopia and headache [3]. Positioning of the screen close to the eyes may lead to excessive effort on eye muscles [3]. Also, dry eyes due to infrequent blinking and increased screen time may cause redness, watering and eye pain [3]. The challenges faced by teachers are passive students and inability to stay connected with the students. Both the faculty and the medical students are still in the process of getting familiar with the newer teaching methodology. It is important to find out the attitude towards this virtual approach of teaching and learning among faculty and students. It would be interesting to know, whether the learners prefer modifications, or rather prefer conventional learning. Only a few studies have been conducted on online teaching among ophthalmology residents, faculties and under graduate students [4-6].

However, these studies included limited participants and did not study the ocular and non ocular symptoms following the online classes. Therefore, a study was needed which included more variables and large number of under graduate students studying ophthalmology and ophthalmology teachers from various government and private medical colleges. Therefore, the present study was aimed to analyse the impact of online teaching during lockdown among faculty and students and their perception on online teaching regarding its advantages, limitations and recommendations.

MATERIALS AND METHODS

This cross-sectional study was a questionnaire based online survey conducted at Chettinad Academy of Research and Education, Chennai, Tamil Nadu, India, after obtaining Institutional Ethics Committee approval vide letter number-152/IHEC/August 2020.

The target populations were ophthalmology faculty and pre final year students from 17 different medical colleges from Tamil Nadu, Pondicherry, Kerala and Maharashtra, which included 11 private colleges and six government medical colleges which were randomly selected. The study was conducted in the month of September 2020 i.e., after six months of online classes. A total of 1500 students and 65 faculty were included in this study using snowball sampling.

The questionnaire was developed in english language using Google forms. The questions included inquiries into participants' experiences on online learning and teaching sessions during the lockdown (March 2020 to December 2020). Some of the previous studies were referred to finalise the list of questions to be included [4,5].

Study Procedure

Three faculty (professors) and 10 students were invited, as a part of the questionnaire validation process to pilot-test the initial survey draft. The survey was modified based on their feedback. The questionnaire had a Cronbach's value of 0.70. To launch the survey, an introductory email was sent along with the survey's web link to the target population. Later two follow-up e-mail reminders were sent to the same groups. The questionnaire had 29 items for students and 27 for faculty. In the questionnaire, six items covered demographics, two items to determine the gadgets of choice used for learning and most commonly used online learning platform, one each to determine number of months attending online ophthalmology classes, maintenance of proper screen position, type of refractive error, preferred method of online assessment, on having any ocular/non ocular symptoms post online classes, whether lack of physical activity due to lockdown has affected the academic performance and whether the participants had tested positive for COVID-19 during the six months of lockdown period, twelve items determined participants' perception towards e-learning. Two questions were asked on whether the participants would like to attend/conduct classroom lectures/clinical postings if permitted by authorities. For teachers, three student centred questions were omitted and a question was added on the conduct of students during the online classes. The Likert scale [7] was used for five items to obtain the participants' attitude, six were yes/no questions and the rest were Multiple Choice Questions (MCQ). Participants were allowed to select multiple options for some questions when applicable.

STATISTICAL ANALYSIS

The SPSS version 24.0 was used to analyse the collected data. Chi-square test was used to find the association between symptoms post online classes w.r.t gender and duration of online classes. The p-value <0.05 was considered as statistically significant.

RESULTS

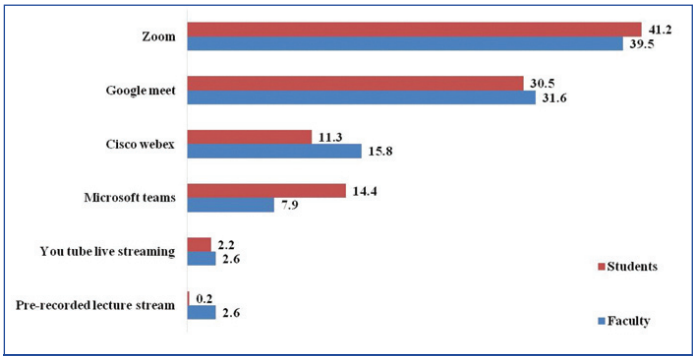
A total of 1565 individuals from 17 different medical colleges were approached and 1015 had responded to the survey. Out of 967 valid responses which were considered for analysis, 96% (929) were from pre final year medical students and 3.9% (38) from faculty who taught ophthalmology. The distribution of the study respondents (N=967) based on gender and institution is given in [Table/Fig-1].

All students were in the age group of 20-22 years. Around 42% of faculty were in the age group of 36-45, 23.7% in 25-35 age group, 15.8% in 56-65 age group, 13.2% in 46-55 age group and 5.2% were above 65 years of age.

	Female	Male	Government college	Private college
Students	361 (38.9%)	568 (61.1%)	335 (36.06%)	594 (63.94%)
Faculty	21 (55.26%)	17 (44.74%)	13 (34.24%)	25 (65.79%)

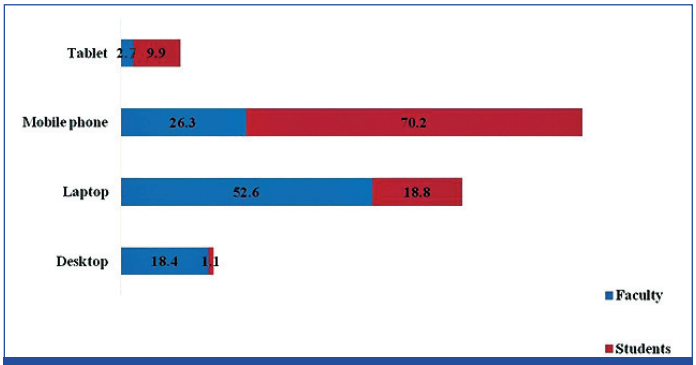
[Table/Fig-1]: Distribution of the study respondents (N=967) based on gender and institution.

Zoom was the most commonly used online platform among faculty and medical students followed by Google meet. Around 41.2% of students (382/929) and 39.5% of faculty (15/38) used Zoom whereas around 30.5% students and 31.6% faculty used Google meet. Rest of them used Cisco Webex, Microsoft Teams, You tube etc., [Table/Fig-2].



[Table/Fig-2]: Commonly used online platform.
Few students had selected other platforms in negligible numbers (less than 0.1%). Hence they were omitted

Laptops were used by 52.6% of faculty (20/38) and mobile phones were used by 70.2% of students (652/929). Desktops and tablets were the other gadgets used [Table/Fig-3].



[Table/Fig-3]: Commonly used gadgets.

Though 50.4% of medical students and 95% of faculty agreed that conducting online classes is a good alternative to classroom lectures in the current scenario, 79.3% of medical students and 84.2% of faculty disagreed to continue with online classes after the pandemic. Eight hundred and forty students (90.4%) preferred that study materials be shared prior to the online classes and 771 (83%) preferred that recorded online lectures to be shared after respective online classes. Twenty six faculty (68.4%) preferred that study materials be shared prior to the online classes and 17 (44.7%) preferred that recorded online lectures to be shared after respective online classes.

Opportunity to continue learning and teaching during the lockdown was cited as the major advantage of online teaching [Table/Fig-4].

Students (n=929)		Faculty (n=38)	
Ease of access	406	Ease of access	22
Opportunity to interact with teachers	150	Opportunity to interact with students	8
Continue learning without attending college	780	Continue learning without attending college	20
Others (Having good attendance percentage)	277	Others (pandemic situation)	21
Others (None)	64	Others (Less peer diversion)	1

[Table/Fig-4]: Advantages of online classes (Multiple options could be selected).

Absence of practical demonstration and physical examination of patients were the major disadvantages faced during online classes [Table/Fig-5]. Internet connectivity was the major challenge faced by 79.9% of students (742/929) and 94.7% of faculty (36/38). Other major challenges faced by students were lack of self motivation and discipline (398/929) and interaction with faculty (186/929) and inability to concentrate (118/929) [Table/Fig-6].

Students (n=929)		Faculty (n=38)	
Lack of face to face interaction with teachers	471	Lack of face to face interaction with teachers	30
Absence of practical demonstration	791	Absence of practical demonstration	32
Absence of physical examination of patients	778	Absence of physical examination of patients	24
Lack of group discussion	382	Lack of group discussion	17
Online student feedback is limited	113	Online student feedback is limited	13
Missing out on-campus life	604	Others (cannot rely on attendance)	12

[Table/Fig-5]: Disadvantages of online classes (Multiple options could be selected).

Students (n=929)		Faculty (n=38)	
Internet connectivity	742	Internet connectivity	36
Availability of gadgets	268	Availability of gadgets	17
Self motivation and self discipline	398	Self motivation and self discipline	12
Others (Interaction with faculty)	186	Others (Interaction with students)	20
Others (Inability to concentrate)	118		
Others (support from faculty)	77		
Others (Electricity shutdown)	80		
Others (None)	55		

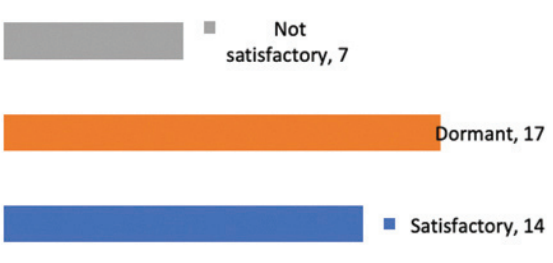
[Table/Fig-6]: Challenges faced during online classes.

Among the study population 58.9% of medical students (548/929) and 31.5% of faculty (12/38) had refractive errors. Myopia was the common refractive error among students and faculty. Ten faculty members had presbyopia [Table/Fig-7].

Refractive error	Students (n=929)	Faculty (n=38)
No refractive error	381	16
Myopia	441	8
Myopic astigmatism	78	4
Hyperopia	23	
Hyperopic astigmatism	3	
Amblyopia	3	
Presbyopia	-	10

[Table/Fig-7]: Refractive status of the study participants.

Around 45% of faculty observed that the students were inactive/dormant during online classes whereas 36.8% found the students' conduct to be satisfactory and 18.4% found the conduct to be unsatisfactory [Table/Fig-8].



[Table/Fig-8]: Perception of faculty regarding conduct of students during online teaching classes.

Contrary to medical students, 78.9% of the faculty (30/38) always maintained proper screen position. A 64.4% of students (598/929) did not always maintain proper screen position [Table/Fig-9].

Maintain screen position	Faculty	Students
Always	30 (78.9%)	331 (35.6%)
Sometimes	8 (21.1%)	461 (49.6%)
Rarely	0	100 (10.8%)
Never	0	37 (4%)

[Table/Fig-9]: Maintenance of proper positioning of screen during online class.

Eye strain and headache were the major symptoms reported by 51.7% and 46.4% of students, respectively. Around 23% of students reported ocular discomfort, 17.8% reported dryness and 16.9% reported watering whereas only 20.7% of students reported nil ocular symptoms. Around 24% of faculty reported eyestrain, 10.5% reported dryness and 2.6% reported headache. Around 63% of faculty did not report any ocular symptoms. Tiredness (38.4%) was the most common non ocular symptom reported by students followed by neck and shoulder pain (20.8%) and bodyache and stress (12.8%). None of the faculty had reported any non ocular symptoms [Table/Fig-10].

Students		Faculty	
Ocular symptoms			
Eye strain	480 (51.7%)	Eye strain	9 (23.7%)
Dryness	165 (17.8%)	Dryness	4 (10.5%)
Headache	431 (46.4%)	Headache	1 (2.6%)
Watering	157 (16.9%)		
Redness	87 (9.3%)		
Others (Ocular discomfort)	215 (23.1%)		
None	192 (20.7%)	None	24 (63.2%)
Non-ocular symptoms			
Tiredness	357 (38.4%)	NIL	
Neck and shoulder pain	193 (20.8%)		
Bodyache and stress	119 (12.8%)		

[Table/Fig-10]: Ocular and non-ocular symptoms among faculty and medical students.

Around 55% of faculty and 62.2% of students had involved themselves in online classes for 4-6 months. Around 20% students had crossed six months [Table/Fig-11].

Duration of online classes	Faculty	Students
2-4 months	7 (18.4%)	151 (16.25%)
4-6 months	21 (55.3%)	578 (62.2%)
Less than 2 months	4 (10.5%)	9 (0.9.%)
More than 6 months	6 (15.8%)	191 (20.6%)

[Table/Fig-11]: Duration of online classes attended/conducted by the participants.

Females reported more ocular symptoms than males with no statistical significance (p-value >0.05) [Table/Fig 12]. Exclusive ocular symptoms were predominant among the participants followed by both ocular and non ocular symptoms. The ocular symptoms were more among students who had attended online classes for

Gender	Symptoms				Total	Chi-square value	p-value
	Ocular	Non ocular	Both ocular and non ocular	None			
Female	267 (47%)	49 (8.6%)	131 (23%)	121 (21.3%)	568	0.518	0.9
Male	167 (46.3%)	30 (8.3%)	80 (22.2%)	84 (23.3%)	361		
Total	434	79	211	205	929		

[Table/Fig-12]: Gender and symptoms post online classes in students (n=929).

more than four months with statistical significance (p-value=0.045) [Table/Fig-13].

Duration of online classes	Symptoms				Total	Chi-square value	p-value
	Ocular	Non ocular	Both ocular and non-ocular	None			
Less than 2 months	8 (88.9%)	0	1 (11.1%)	0	9	17.25	0.045*
2-4 months	73 (48.3%)	14 (9.3%)	25 (16.6%)	39 (25.8%)	151		
4-6 months	280 (48.4%)	47 (8.1%)	133 (23%)	118 (20.4%)	578		
More than 6 months	73 (38.2%)	18 (9.4%)	52 (27.2%)	48 (25.1%)	191		
Total	434	79	211	205	929		

[Table/Fig-13]: Duration of online classes and symptoms of students (n=929).

Power Point based lecture was the most preferred method of teaching among medical students (20.5%) and faculty (76.3%) [Table/Fig-14].

Preferred method of teaching	Students (n=929)	Faculty (n=38)
Case based demonstration	106 (11.4%)	1 (2.6%)
Interactive lecture with innovative ideas like conducting quiz	108 (11.6%)	7 (18.4%)
Power point based lecture	190 (20.5%)	29 (76.3%)
Video based lecture	89 (9.6%)	1 (2.6%)
Others (Offline face to face interaction)	117 (12.6%)	
Others (Video lectures with white board)	137 (14.7%)	
Others (Private lectures)	6 (0.6%)	

[Table/Fig-14]: Preferred method of teaching among medical students and faculty. n=753 for students

Live viva was the most preferred method of assessment among faculty (55.3%) whereas students preferred MCQs (34.9%) followed by live viva (15.5%) and written exam at home (9%). Eleven percent of students preferred both live viva and MCQs, 5.5 % preferred all the options and 4% preferred no assessment to be done during the pandemic [Table/Fig-15].

Preferred method of online assessment	Students (n=929)	Faculty (n=38)
Multiple choice questions	324 (34.9%)	17 (44.7%)
Live viva	144 (15.5%)	21 (55.3%)
Written examination at home	84 (9%)	
Others (Both live viva and MCQ)	102 (11%)	
Others (No assessment)	37 (4%)	
Others (All of the above)	51 (5.5%)	

[Table/Fig-15]: Preferred method of online assessment. n=742 for students

Almost all study participants preferred the duration of online classes to be less than one hour. Around 61% of medical students agreed that lack of physical activity due to lockdown has affected their academic performance.

When questioned about the break from online classes, 57.8% students and 47.4% faculty preferred 2-3 days break in every two months, 25.4% students and 36.8% faculty preferred weekly off, 12.9% students and 13.2% faculty preferred 4-7 days break in every four months and 3.9% students and 2.6% faculty preferred 10 days break in every six months [Table/Fig-16].

Preferred break for online classes	Students	Faculty
2-3 days off every two months	537	18
4-7 days off every four months	120	5
10 days off every six months	36	1
No break needed (weekly off is enough)	236	14

[Table/Fig-16]: Preferred break for online classes.

Though 50.4% medical students agreed that conducting online classes is a good alternative to classroom lectures in the current scenario, most of them (79.3% of medical students and 84.2% of faculty) disagreed to continue with online classes even after the pandemic. To our surprise, more number of students wanted to come to college for theory (58.6%) and practical classes (61.8%) despite the current situation. In spite of being instructed not to attend college during the pandemic, 34 (3.7%) were students tested positive for COVID-19.

DISCUSSION

During this COVID-19 lockdown online education has suddenly become an academic norm [1]. Until March 2020, no one knew that India would have to embrace a dramatic transition towards digital learning. Digital learning has definite advantages but not without drawbacks [1]. Present study has explored the attitude of the learners and teachers towards online teaching. Though the sample size of teachers was small, probably this is the first study with larger sample size of students.

In present study 70.2% of students used mobile phones for attending classes, similar to a study conducted by Roberts N and Rees M [8] among university students attending lectures, which observed 45% of the students used mobile phones. Various studies including those done by Martinez IG et al., and Murphy A et al., have found that students preferred using mobile phones over other devices to attend online classes [9,10].

When this study was conducted, more than 50% of students and faculty had attended online classes for 4-6 months. This duration would prolong as the pandemic gets extended. Participants were questioned on symptoms post online classes. The symptoms were grouped into ocular, non ocular, both ocular and non ocular and no symptoms. Females reported marginally more symptoms post online classes, however there was no statistical significance between the gender and the symptoms (p-value >0.05). The symptoms were predominantly ocular among the participants. This study observed an increasing trend in the presence of both ocular and non ocular symptoms as the participants attended online classes for more number of months. Statistical significance was noted between the duration and the symptoms post online classes (p-value <0.05) Ocular and non ocular symptoms can be minimised by following the standard guidelines [11-14]. According to the United States occupational safety and health administration, the preferred viewing distance of the monitor is at least 20 inches away placed in front at or below the eye level [11]. In smaller screens the letters size may be increased. The letters may distort due to excessive tilting of monitor and also their form gets altered by affecting the contrast [12]. The monitor should not be tilted and must always be placed perpendicular to the line of sight [13,14]. Usage of mobile phones for longer durations might lead to eye strain [15] which would result in disinterest in learning. Most of the symptoms could be minimised with proper positioning of the screen [14], as the faculty in this study who always maintained the screen position reported less/nil symptoms. The study participants preferred the duration of online classes to be less than one hour. Attention span could be improved by reducing the time of the online lectures and by adding interactivity [16].

The participants' feedback regarding their e-learning experience during the pandemic was solicited in the study survey. Around 79% of medical students and 84.2% of faculty disagreed to continue with online classes after the pandemic.

Poor connectivity and availability of gadgets were the major drawbacks during online classes which were in agreement with a short survey conducted by Sud R et al., [5]. In present study, around 45% of the faculty felt that students were inactive/ dormant during classes when compared with conventional face to face teaching. For effective learning the students and teachers interaction along with the social support are the essential ingredients [17]. Collaborative learning would make students interactive and involve themselves in the learning process [17]. With all the drawbacks, online teaching still holds the relevance particularly in current pandemic situation. Recent meta-analysis has observed that online teaching is not less effective than offline classes and beneficial for undergraduate teaching [18].

In present study, 3.7% students were tested positive for COVID-19 during the 2020 lockdown; this number could have gone higher if they had visited the college. Decision to close, partially close or open colleges should be guided by a risk-based approach, to maximise the learning, health of the students and teachers and prevent the spread of COVID-19 in the community [19,20].

According to a previous research conducted in Indonesia, medical students were considered to be, or at least can act as additional intermediate vectors for COVID-19 transmission [21]. There is also an apprehension among health professionals that students who might use Personal Protective Equipments (PPE) which is always limited in number/availability might further add additional burden on teaching/treating physicians. Considering all of these conditions, teaching medical education in clinical settings alone does not justify these horrifying risks [22-24]. Based on what is learned from this study, further modifications should be made to provide students and faculty with the safest environment possible.

Limitation(s)

The sample size of faculty was small in present study; a larger sample size of faculty would have given more definitive perception among them. Owing to current lockdown, eye examination could not be performed because of which authors couldn't quantify the ocular complaints stated by the participants.

Recommendation(s)

Authors would like to recommend courses empowered with interactive videos, creation of opportunities for student- instructor communication, implementation of virtual reality, ease to navigate learning management system to find course materials, discussions, assessments and records. Teachers are expected to obtain and provide regular feedback on students' performance.

From ophthalmologist perspective authors would like to suggest the following recommendations: Choosing a suitable monitor and an appropriate position and distance to reduce eye strain. And also to follow 20-20-20 rule popularised by Anshel J [25] (20 minutes of screen time- look at 20 feet away distance- for 20 seconds) to prevent computer vision syndrome [26,27]. Regular eye checkups for early detection of refractive errors and other ocular ailments are needed, which may affect the academic performance of the students.

CONCLUSION(S)

The use of digital technology in teaching has still not been adapted by the medical students. Rather than e-learning the students are inclined more towards conventional face to face method of teaching. Necessary measures should to be taken for improving e-teaching quality by the authorities and faculty for the enhanced students learning. This study gives an insight of students and teachers mentality towards the online classes.

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