

Impact of COVID-19 on Indian optometrists: A student, educator, and practitioner's perspective

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Purpose: The optometry profession has experienced massive changes amid lockdown in COVID 19 pandemic. This study gauges the impact of COVID-19 on optometry education and practices in India. **Methods:** The impact of COVID-19 among key stakeholders of Indian optometry that included educators, students, and practitioners was surveyed. The content validity of the survey tool was achieved through a focused group discussion with experts. **Results:** Of the 1408 responses, 118 were educators, 845 were students and 445 were practitioners. Post COVID-19 lock-down, a high percentage of students (96%) and educators (94%) were now using online mode of education to learn and teach. The blended learning methods were reported to be used by 81% of educators. Practical skills were the most difficult to teach by educators and to learn by students. Almost a third of the students were concerned about their internships and job opportunities amid the pandemic. Practitioners felt confident in performing routine eye examinations with personal protective equipment (PPE). Telemedicine was found to be adopted by 55% of the private practitioners and 49% of the eye hospitals. **Conclusion:** The COVID-19 pandemic has provided an opportunity to reform Indian optometry education through blended learning methods. Optometry practices changed and adapted instantly to the new hygiene norms that have raised the standard of care provided to patients. Telemedicine emerged as a mode of providing care by optometrists. Overall, all key stakeholders of optometry in India were found to have adapted well to the sudden changes due to COVID 19 pandemic.

Key words: COVID-19, optometry education, optometry educators, optometry practitioners, optometry students, pandemic impact

In its battle to combat the COVID-19 outbreak, the Indian government had announced a nationwide lockdown and social distancing guideline in March 2020. This sudden but essential change has impacted all parts of society including the clinical/academic optometry fraternity across India.^[1-4] Amidst COVID-19 scenario, there is an apprehension to visit clinical facilities, due to the fear associated with this highly contagious and potentially lethal disease.^[5,6] Similarly, educators and students too have moved from class-room education to online education.^[1]

Delivering essential and comprehensive eye-care services has become a challenge in the current pandemic. As a result, tele-eye-health has gained popularity and momentum like never before.^[7] While several clinical aspects are suitable for telemedicine, many exceptions need in-person consultation.^[8-12] For optometry, some of these exceptions include prescribing spectacles, contact-lenses, low-vision aids, or performing the ocular diagnostic procedures.^[13] The tele-eye-health and online education seem to help in bridging this gap both in the

health-care delivery system and the educational sector,^[14-17] the difficulty faced by educators and students in the field of optometry is in teaching hands-on tutorials and learning the practical skills.^[1,7] A review of the socio-economic implications of the pandemic identified, "Education" as one of the most affected service provisions sectors.^[8]

The 2019 *World Health Organization (WHO) World Report on Vision*^[18] recommended increasing the availability of eye-care services for counteracting the increasing prevalence of preventable visual impairment around the world. The burden of avoidable blindness and vision impairment on the health-care system in India is significant, with world's highest number of people with blindness.^[19] Considering that optometry forms a major human resource as a primary eye-care profession, to address these questions, this study aimed to investigate the impact of COVID-19 lockdown on online education, financial implications, job opportunities, and changes in practice patterns for the educators, students

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and practitioners. The results are intended to recognize if any policy changes would be required in each category to overcome the impact of the pandemic.

Methods

A cross-sectional survey was administered through Google Forms during the lockdown in India (June–July 2020). To get responses from practitioners, educators, and students of optometry a special survey form was developed for each of these groups. After reading the purpose of the study, participants who provided online consent were then auto-directed to the survey. No personal information or any clinical procedure were performed in-person or online for the participants.

Survey development

The tools for the surveys were developed by a team of eight members who represented practitioners ($n = 3$), educators ($n = 3$), and scientists ($n = 2$) with at least five years of a clinical or academic experience and/or at least four publications in peer-reviewed journals that are related to optometry. The content validity was carried out through a focused group discussion that resulted in the final versions of survey.

Each participant first had to select their primary role, and then were directed to the relevant survey. The survey had few common questions related to demographics such as sex, highest degree obtained, and type of institution/practice. The educator and student surveys had 20 questions each that included, 2 open-ended questions, 4 Likert scales, 1 mixed question, 13 closed ended and 2 open, 4 Likert scale, 14 closed-ended questions, respectively. A set of 28 questions were developed for practitioner survey out of which 4 questions were open-ended, 2 were mixed, and 22 were closed-ended questions.

Data collection and management

The survey was sent out to approximately 4500 optometrists and 2000 students. The collected data was organized, any double entry deleted. The optometry students (739) out of which first year (151), second year (193), third year (230), and fourth year (165) could choose their academic year. This was important as the fourth-year students typically spend the majority of their time practicing clinical skills under supervision, unlike the earlier years.

Analysis

The collected responses were exported by Microsoft Excel and coded. The coded data were imported in SPSS (IBM Corp. 2011) for analysis. To test if there was a relationship between the two categorical variables, a Chi-square test of independence was used where $P < 0.05$ was considered significant. To understand the inter-dependencies between various variables a cross-relation analysis (contingency table or cross tab) was performed.

Results

We received response from 1408 optometrists, of those 845 (60%) were students, 445 (31.6%) were practitioners and 118 (8.4%) were educators [Table 1].

Student cross-relation

Teaching methods used in online education, difficulties in online-teaching by students and educators, and the impact

on jobs, financial difficulties among students are shown in percentages in Fig. 1.

Overall, about 70% of the students felt “neutral” (38.4%) or “comfortable to most comfortable” (30.9%) in coping with the lockdown with the remaining 30% reported that it was “difficult to most difficult”. About 40-60% of the students from different academic years, in optometry reported that sufficient information was provided related to training and skills required to use online educational platform by their educators. Both the undergraduate (63.9%) and postgraduate students (70.9%) preferred “live classes” and a small percentage from both the groups preferred pre-recorded classes (19.1% and 8.1%, respectively) ($P = 0.02$). Majority students before internship i.e., first year (94.8%), second year (96.6%) and third year (93.6%) availed online mode of classes in comparison to the fourth-year students (89.5%) ($P = 0.02$). “Limited clinical interaction” was reported by 24.9%, 28.5%, 31.2% and 46.2% by first- and second-, third- and fourth-year students, respectively. There was significant variation in the response on the difficulty aspect of learning post lockdown bases on the current year of study of the student ($P < 0.001$).

Zoom cloud meeting was the most commonly used platform (80%) for online classes by students, followed by Google meet (36%) and Google Classroom (26%) while Microsoft Teams was the least reported at just 1% [Fig. 2].

For change in the pattern of education to online, the third- and fourth-year students had higher positive affirmative responses (33.8% and 39.8% respectively) as compared to the other years (first year [26%] and second year [28.5%]) ($P < 0.018$). Of the final year students 70.8% reported difficulty in the internship. Similarly final year students (68.4%) felt that the job opportunities would be impacted post-COVID-19. The students from other academic years responded with “Maybe” for these questions.

More than half of the students (53.3%) reported having difficulty in paying the fees. Students were willing to participate to tackle the COVID-19 situation, (54%) students were willing to help through online awareness and (40.1%) students in field participation.

Educator cross-relation

A high percentage (77%) of the educators (part-time/full-time teaching, professors and scientists) preferred the synchronous online mode of classes and only a 4% preferred the pre-recorded classes. The practical hands-on teaching was the most difficult subject to be taught online (70%–84% for all type of educators) ($P = 0.405$). Of those involved in online-teaching, 84.1% reported using blended learning methods.

Majority educators felt that the “online” mode of teaching is the future of education delivery (67.7%). Similar to students, majority of the educators (74%) too used Zoom-cloud meeting for online classes [Fig. 2].

Likert responses on handling lockdown with respect to education, interaction in online classes, and online-teaching compared to traditional methods are illustrated in Fig. 3. A larger percentage of educators (44%) responded “Fair” to how they handled lock-down as compared to only 25% students. Interaction in online classes was graded “Fair” by 41% educators compared to 23% students. Also 38% educators

Table 1: Demographic details of optometry students, educators and practitioners are presented in percentages

		Students	Educators	Practitioners
Gender	<i>n</i>	845	118	445
	Female (%)	68	59	38
	Male (%)	32	41	62
Degree pursuing/Highest degree	Diploma in Optometry (%)	2	2	24
	Bachelors in Optometry (%)	87.5	13	59
	Masters in Optometry (%)	10	73	16
	Ph.D. in Optometry (%)	0.5	12	1
Job profile	Lectures (%)	NA*	46	NA
	Assistant/Associate professor/Professors (%)	NA	51	NA
	Scientist (%)	NA	3	NA
	Employed at Hospital/Institution (%)	NA	NA	62
	Independent practice (%)	NA	NA	38

*NA=Not Applicable

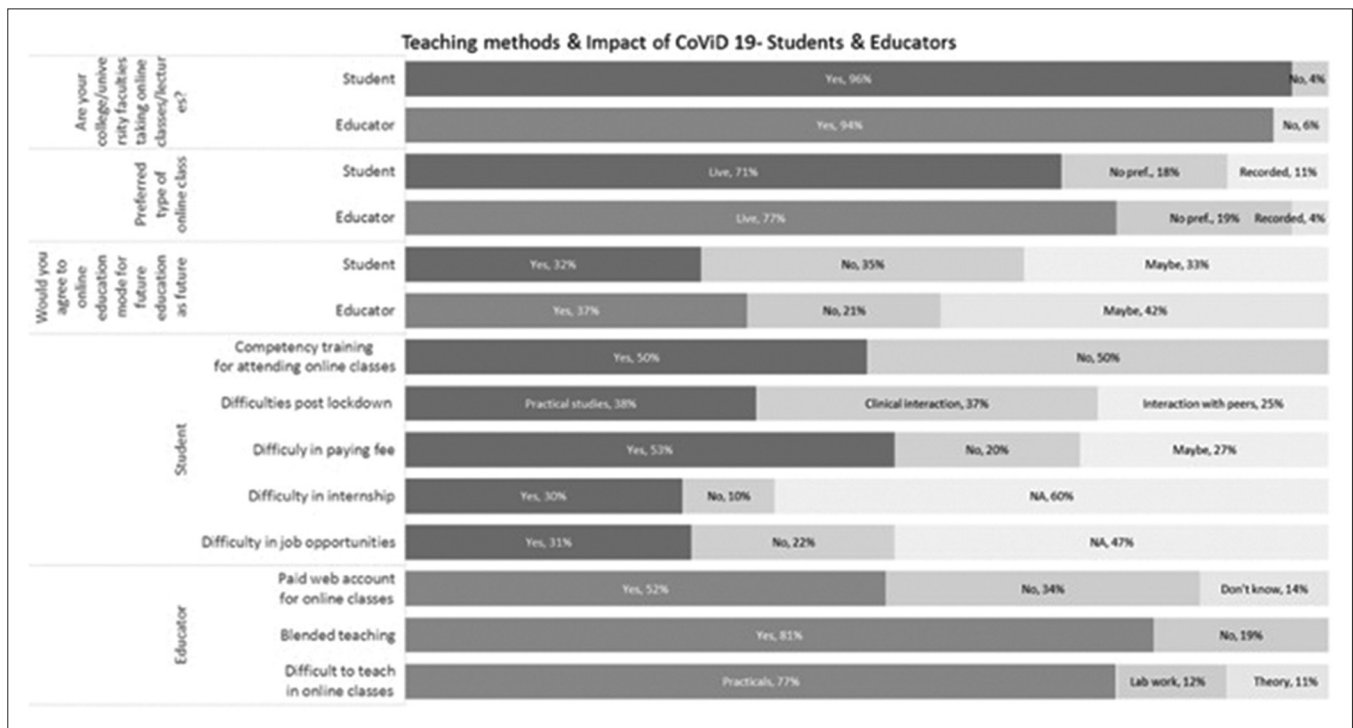


Figure 1: Distribution of responses received regarding the teaching methods used in online education, difficulties in online-teaching, by students and educators and impact on jobs, financial difficulties among students

responded that they handled the change from traditional teaching to online-teaching as “Fair” in comparison to only 21% students.

Practitioner cross-relation

Employee and employer difficulties in receiving and paying salaries, financial difficulties, change in practice guidelines, and use of PPEs in practice are shown in percentages [Figs. 4 and 5].

The majority of independent practitioners had invested in PPEs with only 31% who worked in organizational settings such as the hospital were provided PPEs by the employers (62.5% relying on the hospital administration to provide the PPEs ($P < 0.001$)).

The COVID-19 precautionary guidelines issued by Government of India were followed by everyone, for both hospitals (97.8%) and independent practitioners (100%).

Employers from hospitals were requesting self-declaration (69.3%) from the patients as recommended by the government, but only 48.8% of independent practitioners were requesting the same ($P < 0.001$).

Optometrists took equal measure in displaying awareness materials and in emphasizing preventive measures to patients (72%, $P = 0.84$ and 92%, $P = 0.62$, respectively).

When asked if they have noticed losing the quality of display frame due to repeated sanitization, 40.5% of independent practitioners responded “yes” confirming that the quality of the frame was deteriorating with repeated cleaning against only 11.9% from hospitals setup ($P < 0.001$).

Both the employees, from hospital and independent practitioners were comfortable performing retinoscopy (58.1% and 62.5%, $P = 0.65$) as well as slit lamp examination (58.1% and

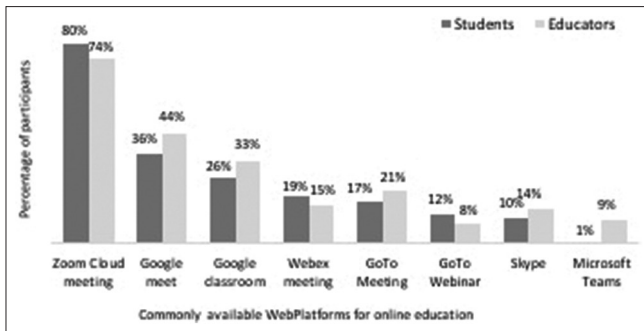


Figure 2: Reported percentage distribution of various web platforms used for online classes by students and educators

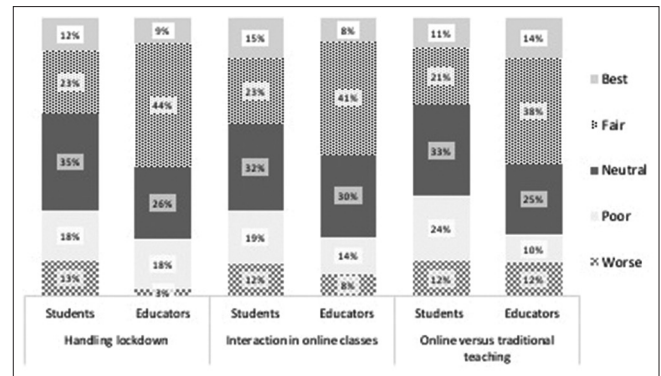


Figure 3: Percentage distribution of Likert scale responses on handling lockdown with respect to education, interaction in online classes, online-teaching compared to traditional methods

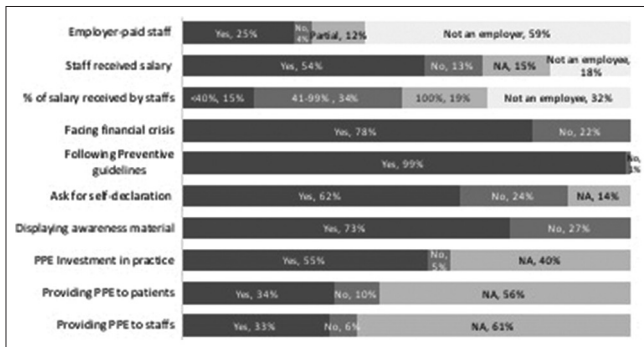


Figure 4: Employee and employer difficulties in receiving and paying salaries, financial difficulties, change in practice guidelines, and use of PPEs in practice

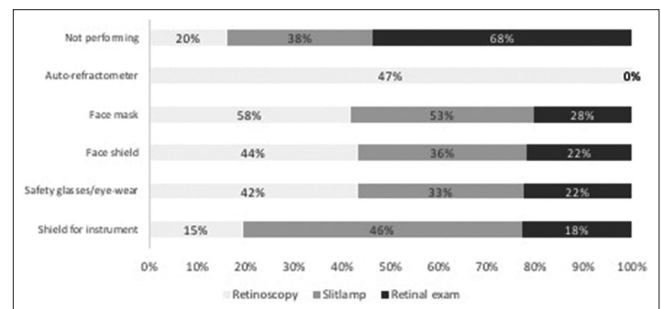


Figure 5: Percentage distribution of responses received about personal protective equipment (PPEs) used during eye examination by eye-care practitioners

62.5%, $P=0.35$). A response of “not comfortable” on performing retinal examination was noted from the employees of hospitals and independent practitioners (41.5% and 52.4%, $P = 0.07$, respectively). Since the lock-down announcement, only 56% of employees from hospitals were prescribing contact-lenses compared to the 70.8% of independent practitioners ($P = 0.02$). The provision of tele-consultation was reported by 49.1% of employees from hospitals and 55.4% of independent practitioners ($P = 0.65$).

Discussion

This study provides an understanding of the comprehensive impact the COVID-19 pandemic has had on optometry students, educators, and practitioners in India. The educator who impart their knowledge, the students who are in the process of learning, and the practitioners who have been putting their skills in practice, have been affected in different ways.

Education - Student and educators

Surveys in April-2020 investigated the impact of COVID-19 on academic activities in optometry training.^[1] A majority of optometry educators in India (94%) had switched to e-learning mode, with most teaching-and-learning and assessment carried out using video conferencing tools, dedicated educational portals, and social media applications. During the COVID-19, there was a significant increase in the use of all e-learning alternatives.^[20-22] Earlier study had shown that the COVID-19 has played the role of a “constructive disruptor” in optometry education in India.^[1] This disruption has provided an opportunity for restructuring the present conventional, classroom-based educational system.^[1]

A worldwide survey into ophthalmology-related (<https://www.mohfw.gov.in/pdf/GuidelineforEyeCare.pdf>) education concluded that the pandemic may change traditional teaching practices and provide new educational opportunities.

There was a slight but significant difference observed between the students from 1st to 3rd year compared to the final year students when responding to comfort in adapting and coping with changes in education delivery from classroom (hands-on clinical) to e-learning. The difference could be attributed to the internship in fourth year mainly focuses on clinical hands-on learning. While we saw a difference in opinion between students from first to third years and the final-year students about job opportunities post-pandemic, all students were seen to have willingly accepted the change towards the online mode of education.

Online delivery of a standardized optometry curriculum coupled with imparting good clinical skills, could help to improve standards of teaching and increase the number of skilled practitioners around the world. This could be the norm of the future as both students and the educators have preferred online education as a method to impart theory knowledge [Fig. 1]. To make this effective, the educational institutes would now have to move to a dedicated learning platform. The current study found that the subscription for a dedicated university account was lacking [Fig. 2].

The online learning experience is significantly different from that of traditional classroom learning and hence it would

seem only natural to identify the specific skills required for not only using the platform available for e-learning but also the salient features of e-learning.^[23,24] We demonstrated that, only 50% of the students are taught the skills required to attend online educational classes [Fig. 1]. The need for promptly including the new technologies for ophthalmic education has been highlighted by Ferrara *et al.*^[25] Imparting skills needed to attend or teach online education classes for both students and educators, if made compulsory in all institutes, will increase the success of online platforms and will ensure good quality educational delivery.

Imparting clinical knowledge is the challenge that health care educators around the world are facing due to the lockdown.^[15,16,26,27] Similarly we found that both students and educators did express their difficulty in learning and imparting practical skills respectively online [Fig. 1].

Practitioner

All independent as well as hospital-based practitioners were following the necessary precautionary guidelines while greeting, examining as well as while performing procedures like retinoscopy and slit lamp examination for patients [Fig. 5]. Comprehensive eye examination requires the optometrist to come in close proximity with the patient; therefore, it was good to know that the general rules pertaining to the pandemic are followed across the groups. The employers and institutes had played an important role by investing in the PPEs and creating awareness among employees and patients to maintain the safety standards. It is to be noted that the contact-lenses were prescribed by the independent as well as hospital-based setup with safety measures emphasized to the patient. The incorporation of tele-consultation among hospitals as well as independent practitioner is encouraging, particularly when it is likely to be adapted in future to deliver quality eye-care services to regions that are not readily accessible. The authors believe that the adaptation of tele-consultation by independent practitioners will go a long way in ensuring increased accessibility to eye-care services, which brings out the need for proper regulation of Optometry as a profession to implicate the policy regarding tele-consultation.

Practitioners often need patients and/or customers to touch and feel the spectacles frames before buying. After the customers have tried the frames, the frame is sanitized before putting back on display. Independent practitioners are worried about losing frame quality due to repeated cleaning which will be a loss on their investment compared to employees in the hospital who do not get affected financially if there is a reduction in frame quality.

Tracking of tele-consultation and access to patient information from electronic records were found to be effective in-patient management during COVID-19.^[28] In our study, tele-consultation was seen to be accepted by both independent practitioners as well as hospitals. The duration of COVID-19 pandemic and related social changes was the perfect platform to have tested the acceptance and effectiveness of tele-consultation, and optometrists in India seem to have experienced it.

Self-declaration of signs and symptoms from the visitors who could be patients or customers was well obtained by hospitals compared to the independent clinicians. This can

be explained as hospitals followed the guidelines published by the Indian Ophthalmology Society^[29] whereas optometry, a non-regulated profession in India, the guidelines published were not a compulsion.^[30]

Financial

The student group reported that the COVID-19 pandemic had impacted the job opportunities for them, expectedly the students close to completion (4th year students) responded strongly to this question. This result is alarming, particularly because the socio-economic impact of the pandemic would be seen in year 2020, it is stipulated that the students at the end of their internship would have less job opportunities due to current economic burden. The students need to be made aware that the country needs at least 1,00,000 optometrist and currently we have only 40,000.^[31] and the supply chain for optometrist, namely the universities, not being in sync with the government needs of eye-care may be one of the reasons for the optometrists fearing that there may be no job opportunities.^[32]

We found that the educators were paid their salaries in part or full, depicting that this group was not affected financially as much as the practitioners. The practitioner group (53%), independent or hospital-based, were paid >40% of their typical salary. This being said, 78% of the practitioners reported facing financial crisis during the pandemic period, this can be attributed to decreased volume of patients especially in independent practices, coupled with staff salaries (as seen in the survey) and rent for the premises.

Overall we have found that educational institutions have risen to the challenge of "lockdown" by swiftly shifting to online platforms. While students closer to completion are worried about the unpredictable circumstances ahead of them, this really warrants policy changes at the government level, by creating posts for graduate optometrists at the public sector across India. This will also help in reducing the burden on ophthalmologist in the public sector. India needs eye-care professionals and optometry universities need to be in conversation with the government so that graduates can be involved in primary eye-care delivery. The practitioners have adapted to precautionary guidelines to ensure the safety of their staff and patients, but are affected financially due to the pandemic.

COVID-19 lockdown impacted the three groups in the profession of optometry in different ways. Optometry education system, though changed overnight, did not stop. This was a positive response in acceptance of new standards as the future of education. There was a gap noted in the demand and supply of job opportunities for optometrists, this indicates a need of creating awareness and importance for this profession in primary eye-care given the needs as per the worldwide data on primary eye-care needs. There were very few changes noted in the practice pattern, for instance, the use of PPEs for the examination; a precautionary measure and use of tele-consultation in the field of optometry depicting that COVID-19 did not serve as a hurdle in providing eye-care to the patients in need. About 40-52% of optometrists indicated that they were "not comfortable" on performing retinal examination. Given that the questions were asked in relation to the COVID situation, and it can be assumed that the responses are in coherence with the same. However, it is also possible

that the retinal evaluation was not performed even otherwise, the justification/providing information in relation to the same is beyond the scope of this manuscript. While this study provided the current impact of COVID-19 on the optometry fraternity, there are a few limitations in the study: The survey was administered only for one-time and long term effects are unknown. Further studies are warranted to re-administer the same survey after the vaccination drive for COVID-19 is fulfilled to make necessary policy changes if required.

Conclusion

The pandemic has affected the profession of optometry in many ways, however it has also helped the education system to have a giant leap in terms of technology. Optometry practitioners have adapted quickly to the pandemic with necessary precautions. The impact of the pandemic on the competencies of optometry trainees needs to be evaluated.

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Conflicts of interest

There are no conflicts of interest.

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