

An insight into the altered ophthalmic dynamics during the COVID-19 pandemic

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Purpose: The objective of this survey-based study was to examine the effects of personal protective measures taken at the level of instrument and surgeon during the pandemic on the optics in ophthalmology. **Methods:** The study involved an online questionnaire of 24 questions which was distributed to ophthalmologists practicing in several hospitals, including residents and fellows undergoing training in ophthalmology in India. The responses were collected through an online data collection tool (Google forms). The participants could choose from multiple options provided to them in each question. **Results:** A total of 285 participants out of 296 had used modified methods for examining and performing surgical procedures during the pandemic, while 78.7% (265) of the participants acknowledged having encountered difficulty in interpreting the ocular findings of patients while examining in personal protective equipment. Moreover, 58.7% (198) of our study respondents also reported that there was significant worsening of the quality of ophthalmological examination with pandemic-appropriate measures and 84.8% (286) of our study participants also felt that these measures have significantly added to the time of examination, hence increasing the risk of exposure to both patient and doctor. **Conclusion:** The workplace study has highlighted the crucial aspects of optics in ophthalmology during the pandemic. The protective measures taken during the pandemic have significantly worsened the quality of ophthalmological examination and increased the time taken to perform outpatient department-based and surgical procedures in ophthalmology.

Key words: COVID-19, ophthalmology, optics, pandemic

Ophthalmology is one of the most critically affected fields in medicine by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, and ophthalmologists are among the most prone to contracting the infection.^[1] Ophthalmology examinations are typically different from any other specialty because a number of routine procedures involve proximity to patients' faces.^[2] This can expose the treating surgeon to respiratory droplets from the patients. Studies also discuss that tear fluid might harbor the SARS-CoV-2 virus, with only 5% of patients being symptomatic with conjunctivitis.^[3] Some reports even propose the possibility of conjunctivitis being the first symptom in some coronavirus disease 2019 (COVID-19) patients.^[4] Hence, contact procedures done in ophthalmology clinics, such as gonioscopy, may multiply the risk of transmission of SARS-CoV-2 exponentially.

To curb the spread of COVID-19, the All India Ophthalmological Society (AIOS) issued a set of guidelines for sustainable practice in ophthalmology during the pandemic to its 22,000+ members.^[5] Some of these involved the use of protective breath shields on slit lamp, social distancing in clinic, and utilization of tele-consultation in order to reduce exposure to infection. Several international bodies have also taken similar

steps in order to curb the spread of infection. Ophthalmologists have transformed the way they carry out eye examinations and surgeries in order to deliver optimal ophthalmologic care to patients. This has ensured patient safety while minimizing exposure among eye physicians and trainees.

According to Liu *et al.*,^[6] even high-functioning breath shields should be used with personal protective equipment (PPE) to prevent transmission of infection. Although alternative methods of examination and continuous use of PPE have reduced the risks associated with COVID-19 infection among ophthalmologists, these might have significantly affected the quality of ophthalmologic examination. Most of the adaptations made amidst pandemic have been at the organizational level with no standard guidelines issued by a central body. As a result, various techniques have been employed which ensure safety against the spread of infection, but they might require scrutiny for standards of ophthalmologic examination and surgery. In this article, the authors aim to analyze through a survey-based analysis the challenges faced by ophthalmologists due to the potential effects of PPE on the visibility and optics dynamics of the equipment.

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Methods

The study involved an online survey welcoming ophthalmologists and trainees in ophthalmology to answer questions related to modifications in ophthalmology examination and surgeries during the pandemic. We collected the data through Google forms. An online questionnaire was shared with practicing ophthalmologists – Master of Surgery (MS)/subspecialists, trainees, MS/Diploma in Ophthalmic Medicine and Surgery (DOMS)/Diplomate of National Board (DNB) Ophthalmology and fellows ($N=296$) – between June 30, 2021 and July 19, 2021. The survey comprised 24 questions [Appendix]. The first group of questions covered brief demographics of participants such as age, gender, and the type of hospital they were working in. The second set included questions related to adaptations that have been employed in the outpatient department (OPD) and the challenges involved in performing ophthalmic procedures during the SARS-CoV-2 pandemic. The final section of questions was related to the optical challenges faced while performing lasers and surgical procedures during the pandemic. We conducted the study under the tenets of the Declaration of Helsinki for clinical research. Participation was voluntary, and the complete anonymity of the study participants was ensured. All participants provided informed consent to take part in this study.

Results

The survey was open to practicing ophthalmologists, subspecialists in ophthalmology, trainees, and fellows pursuing training in ophthalmology throughout India. We collected 296 responses through the online survey.

Demographics

The minimum and maximum ages of the participants were 22 and 80 years, respectively, with 42 years being the mean age. Also, 60.8% of the respondents were males, while 39.2% were females.

Among the participants, 141 (47.6%) were general ophthalmologists, 100 (34.1%) were subspecialists, 12 (4.1%)

were fellows, and 42 (14.2%) residents were undergoing training in ophthalmology. Ethical approval from the local institutional committee was taken before conducting the survey.

A majority of 138 respondents were ophthalmologists and trainees from government hospitals, 93 respondents were from private hospitals, while the third largest group of 41 ophthalmologists had a private practice of their own. The remaining 5.1% worked at charitable trust hospitals, army hospitals, and non-profit government organizations.

OPD adaptations during the pandemic

Exactly 96.6% of the total participants had used new methods of ophthalmologic examination in the OPD to curb COVID-19 transmission during the pandemic. These methods involved use of breath shields on slit-lamp and indirect ophthalmoscope, protective goggles worn by surgeon, double face masks with gloves, and various similar protective measures. Of those who had used modified methods for examination of the patient during the pandemic, 81.5% reported difficulty in interpreting the ocular findings with additional protective measures like face shield, slit-lamp mounted shield, protective goggles, and face masks. Table 1 summarizes the response percentage to the questions eliciting the overall effects of PPE on ophthalmological examination.

Our data showed that the study participants had used different levels of personal protection during the pandemic. All our participants had worn an N95 mask while examining the patients. Also, 84% had used an N95-mask with other protective equipment. Different measures taken in addition to N95 mask were three-ply surgical masks, protective goggles, face shield, surgical gown, gloves, double masks, and complete PPE kits. All our participants had made some level of pandemic-adequate personal protection mandatory for patients visiting the OPD. The minimum protective measure enforced upon patients included a face mask/three-ply surgical mask by 100% of our participants. Some participants also used additional protective measures for patients visiting the OPD, such as N95 mask, face shield, and gloves.

Fogging of optics/lenses was a consistent complaint among our participants. Out of 103 double mask wearers, 99 (96.1%) complained of fogging, followed by three-ply mask wearers wherein 87 (91.5%) participants faced the issue of fogging.

Table 1: Effects of PPE on ophthalmological examination during the pandemic

Question	Participant response and percentage	
	Yes	No
Have you incorporated any modifications in ophthalmologic examination in the OPD to curb COVID-19 transmission?	96.6%	3.4%
Have you encountered any difficulty in interpreting the ocular findings of patients while examining in PPE?	78.7%	21.3%
How have these modifications affected your overall quality of examination?	Worsened 58.7%	Unaffected 41.3%
How has the use of PPE affected your time of examination?	Increased 84.8%	Same/no change 15.2%

COVID-19=coronavirus disease 2019, OPD=outpatient department, PPE=personal protective equipment. The table shows responses of our patients to four questions

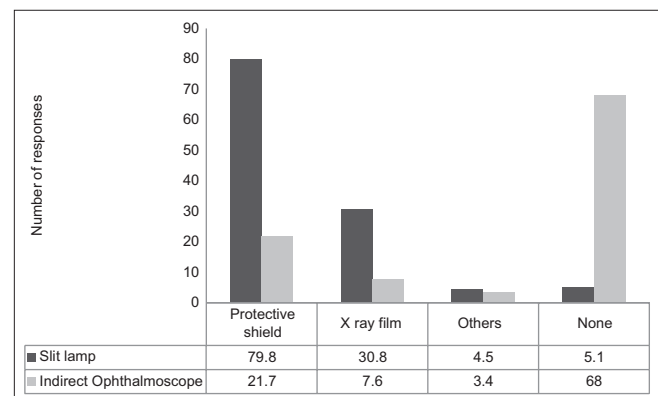


Figure 1: Protective methods used with slit-lamp and indirect ophthalmoscope

Among the single mask users (only N95), 61 (57.5%) faced the issue of fogging, which is least of all the groups.

Ophthalmologic examination during the pandemic

Two hundred and thirty-three (78.7%) participants felt there was difficulty interpreting the ocular findings while examining the patients with modifications introduced at the level of instruments and precautions taken by the surgeon to curb the spread of infection. The authors have identified the eight most common concerns related to the ophthalmologic examination of patients during the pandemic. Our participants could choose from these eight concerns or provide additional feedback. Among the multiple options, fogging of optics/lens being used by the examiner was one of the top concerns faced by 94.9%, followed by unwanted reflections chosen by 56.8% of respondents. The third common issue was difficulty in maintaining focus during the examination (51.7%). Other common responses were difficulty in maneuvering joystick (40.5%), altered stereopsis (27.4%), and distortion of the image perceived (28%). Moreover, 9.1% felt an altered color perception, while 6.1% had difficulty with the image minification or magnification. Only four participants felt there was no difficulty in carrying out the ophthalmologic examination in protective equipment.

Adaptations implemented for instrument-specific examination

As illustrated in Fig. 1, 79.8 % of our respondents had used a protective breath shield mounted on a slit lamp to prevent droplet transmission, while 31% had used X-ray film as a barrier mounted on the slit lamp. Only 5.1% denied using any improvised method for slit-lamp examination.

For indirect ophthalmoscopy, the modifications used were transparent face shields by 21.7% of participants and an X-ray film mounted on it by 7.6% of respondents. The majority (68.6%) did not use any additional protective measure for indirect ophthalmoscopy.

More than half (58.7%) of the participants said that these measures had worsened the quality of routine examination. When asked about the time taken to examine the patient, 84.8% replied that the examination time had increased because of PPE.

Upon asking about the changes in visual field interpretation, three-fourths of the participants felt there was some variation in result interpretation due to face masks worn by patients. The issue faced by our participants in the interpretation of visual fields is shown in Fig. 2 against the number of participants who reported it.

Laser procedures and surgeries during the pandemic

Exactly 65.6% of the participants said they encountered difficulty performing laser procedures/surgeries on patients with additional measures taken during the pandemic. Protective measures similar to OPD were used for operation theaters (OT) as well; 79.9% used an N95 face mask and 47.1% used a three-ply mask only for performing procedures in OT. Among the additional measures were protective goggles (24.6%) and face shields (14%). Fogging of surgeon's glasses and optics of microscope/lens remained the chief concerns, which were chosen by 72.3% of the participants. Several other concerns were highlighted in the survey. Fig. 3 shows the chief concerns reported by our participants while performing lasers/surgeries in PPE.

As demonstrated in Fig. 4, some measures taken by the participants to improve visibility included using a micropore tape over the bridge of nose to prevent fogging (84.4%). Maintenance of ambient room temperature while performing operation was followed by 40.6% of participants. Another 20.3% said they used a dehumidifier.

Discussion

A unique aspect of ophthalmology is the intimate dependence on the clarity of optical media to facilitate the formation of sharp images on the examiner's retina and recognition of minute clinical signs. This demand for impeccable clarity keeps growing as we progress from OPD to laser room to the OT. Until the onset of the COVID-19 pandemic, the chief concerns of researchers, lens makers, and equipment manufacturers were enhancing the standard of optics of various examination lenses and ophthalmic instruments. In today's world, however, the pandemic and the accompanying implementation of compulsory protection usage have introduced an unprecedented factor that has remarkably influenced the overall optical quality of ophthalmic examination.

While personal protection, especially with face masks, has become an integral part of all spheres of life, it required ophthalmology practice to undertake several additional adaptations. The prime reasons for this are the proximity with patients, usually for prolonged durations, and the potential role of the ocular surface in the transmission of COVID-19.^[7]

Thus, there was an abrupt increase in the use of personal protective measures. Hospitals have taken some steps to check the transmission of infection. Various centers have mandated the patients wear face masks while visiting the OPD, and many ophthalmic devices have been modified to attend emergency cases during the pandemic. While these measures have improved overall safety in terms of reduction in transmission of infection, they have contributed to compromising efficacy, predictability, repeatability, and added challenges in the evaluation of ophthalmic examination, OPD procedures, and intraocular surgeries. Multiple optical media like face shields, protective goggles, slit-lamp and indirect ophthalmoscope/direct ophthalmoscope-mounted breath shields, along with other personal protective measures have remodeled the dynamics of optics in ophthalmology.

Our survey has brought into light several crucial aspects of ophthalmology during the pandemic. It calls attention to altered optics in ophthalmology with additional use of protective measures. To the best of our knowledge, this is the first study that highlights the effect of personal protective measures on the quality of ophthalmic examination and the optical challenges faced by ophthalmologists while performing surgeries and laser procedures. Although protective measures are imperative during the pandemic, there are implications for the use of altered methods for routine ophthalmologic examination, which might have significantly affected the overall quality of ophthalmologic care delivered to the patients.

In our study, among 296 participants, 96.6% have used methods suited to the pandemic scenario for patient care, which is in tune with the guidelines passed for standard ophthalmologic care during the pandemic.^[5] Over three-fourths of our study participants felt they had difficulty

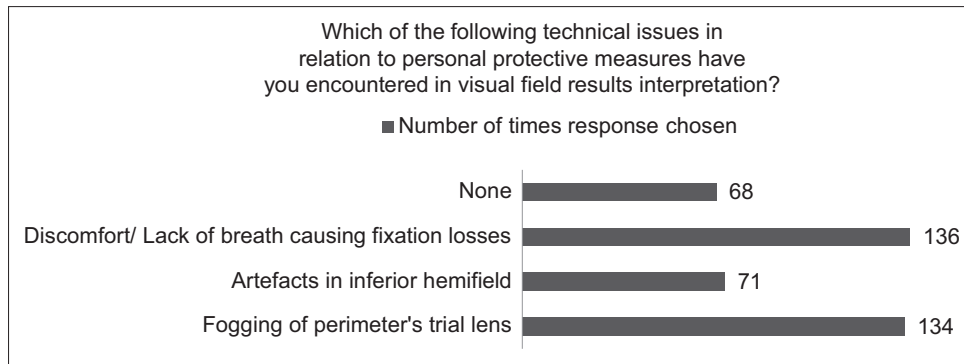


Figure 2: Technical issues faced by participants in Visual Field Analysis interpretation

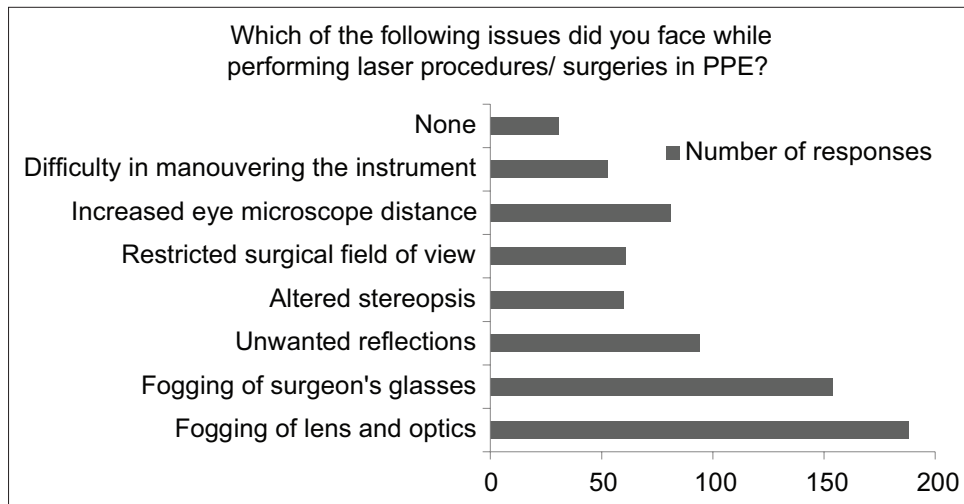


Figure 3: Issues faced by participants while performing laser procedures/surgeries in PPE. PPE = personal protective equipment

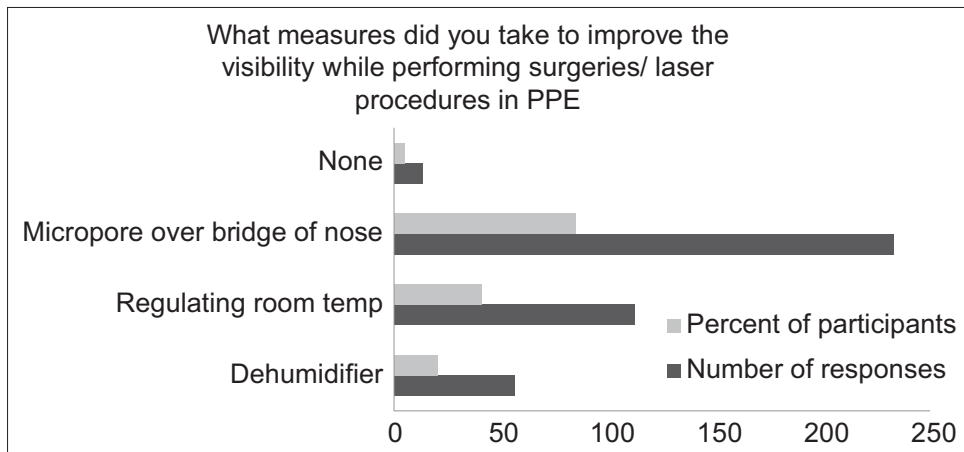


Figure 4: Measures taken by the participants to improve visibility during surgeries/laser procedures during the pandemic. PPE = personal protective equipment

interpreting their findings with the use of newer methods and more than half felt there was a significant worsening of quality of examination with additional personal protective measures taken during the pandemic. Our findings are consistent with the survey conducted by Yánez Benítez *et al.*,^[8] where they have discussed the impact of PPE on surgical performance. Our study also brings out that ophthalmology being a

microsurgical branch with optics playing a crucial role, the effects of PPE could be worse than other surgical branches. The face shields, goggles, along with N95 masks generate fogging, unwanted reflections, and obstruct the surgical field of view affecting the surgeon's overall performance.^[8] Even slightest aberrations in the media or not at par optics are liable to cause misinterpretation of findings and misjudgment

during surgeries. This crucial aspect of ophthalmology remains undiscussed to date.

Slit-lamp-based examination

Slit-lamp biomicroscope is an indispensable instrument in the ophthalmology clinic, which facilitates comprehensive evaluation of ocular structures. It usually requires the examiner to use one hand to operate the joystick and the other to perform various other functions like magnification control, positioning of fixation light, applying filters, and changing slits, type, and angle of illumination. Difficulty in maneuvering the instrument was identified as a concern by 40.5% of the participants as a result of incorporation of the modifications.

While there are reports of improvised breath shields incorporated into ophthalmoscopes (direct and indirect),^[9] this has not been a widely accepted practice with slit lamps. This was evident in our study as well, wherein only 29.3% of respondents reported using a transparent face shield or an X-ray film mounted on an indirect ophthalmoscope.

These measures taken during the pandemic ensure safety against the transmission of the virus and were employed to keep the functionality of the health system during the pandemic, but are not suitable for examining minute details, especially in a field like ophthalmology. More than half of our participants also faced the issue of unwanted reflections while carrying out the examination. Slit-lamp biomicroscopy coupled with fundus lenses to examine the central fundus can produce glare because the axes of the observation system and the illumination system being coaxial.^[10] Fogging of fundus lenses due to ill-fitted masks/cloth masks worn by the patient may add to it, making the examination process difficult to perform and lengthy. Further, additional media in the form of a face shield or protective goggles may add to unwanted reflections. Weinstein *et al.*^[11] have studied the effects of goggles on the performance of soldiers while firing. The protective goggles worn by soldiers during firing are similar to those used by the majority of health professionals during the COVID-19 pandemic. In their study, Weinstein *et al.*^[11] have shown that fogging of the protective goggles worn may contribute to a substantial reduction of visual acuity, reduced contrast sensitivity, and difficulty in color discrimination, besides reduction in the visual field significantly. Our participants have also reported a reduction in the field and altered color perception.

Sterilization of noncontact fundus lenses

The potential risk of transmission of the virus through contact lenses and even noncontact lenses because of proximity to the patient's face and probable exposure to fomites is high. Therefore, routine sterilization of all instruments, including the lenses used in ophthalmology, is a must. The majority of our participants had used alcohol-based solutions in their OPD to cut the chain of transmission, while others had used household bleach or soap water for sterilization of these lenses. Most recommendations regarding sterilization of lenses to keep the eye services functional during the pandemic have been the same, although the Royal College of Ophthalmologists has brought out that repeated use of hypochlorite solution is corrosive and may damage the lenses, and can be irritating to the eye or skin if the lenses are not rinsed properly.^[12] In our opinion, this repeated decontamination in OPDs could be one of the contributing factors for deteriorated quality of examination

as reported by the majority of our participants and is liable to have long-term implications because of the damage incurred to the expensive ophthalmologic devices.

Visual field analysis

Glaucoma diagnosis and progression analysis have become difficult in the COVID-19 pandemic era. The contributing factors may be difficulty in follow-up and limited number of follow-ups. Another important fact highlighted by El-Nimri *et al.*^[13] is that there may be a reduction in the reliability of visual field testing due to fogging of the trial lens. Our study has also highlighted the problem, where a majority of participants felt there were unreliable results in visual field interpretation because of fogging of the trial lens. Also, an ill-fitted mask is prone to cause artifacts in the inferior hemifield because of upward displacement of the mask. El-Nimri *et al.*^[13] confirmed the findings of their study by showing that fogging of the trial lens can produce field defects comparable to glaucoma, making it difficult to interpret the findings of glaucoma progression. In another study, Young *et al.*^[14] have discussed the importance of a well-fitted mask while doing visual field analysis and have highlighted the fact that improper placement of mask may produce inferior hemifield defects even in a young healthy individual. Besides these, our study adds one more potential issue faced by ophthalmologists in visual field interpretation, that is, patient's inability to maintain focus, leading to frequent fixation losses and causing an increased number of false-negative results.

Surgeries

Performing emergency surgeries with protective goggles or shields under a microscope can be a challenge. As discussed by Weinstein *et al.*,^[11] the protective goggles significantly reduce the visual field and are also not compatible to be worn with eyeglasses. In our study, three-fourths of the participants faced the issue of fogging of optics while performing the procedures. Over more than half of the study participants also said that there was frequent fogging of the surgeon's eyeglasses. This makes our findings consistent with the findings of Weinstein *et al.*^[11]

Clamp *et al.*^[15] have shown in their study that protective equipment like face shields/goggles can increase the eye-microscope distance and reduce the field of vision while operating under a microscope. As reported by Clamp *et al.*,^[15] the median eye-microscope distance without PPE is 13 mm, while a face mask used with eye protection significantly increases the eye-microscope distance for an operating surgeon, depending on the protective measure used. As we also know from our knowledge, the anterior focal point of the eye lies at 15.7 mm in front of the cornea. Any refractive correction should be placed 1–2 mm nearer than this point in front of the eye. Any change from this may produce minification or magnification of the image formed. We believe that increased eye-microscope distance is liable to produce the same effect as is evident from our study, where one-third of the respondents felt there was an increase in eye-microscope distance, which led to significant difficulty in performing surgeries or laser procedures.

Secondly, restriction in the surgical field of view reported by 23.5% of our participants could be a result of the protective goggles used by surgeons. Goggles with flat pieces on the sides may reduce the surgeon's surgical field of view. We can

resolve this issue by using globe-shaped protective glasses. However, the latter is also prone to produce distortion of the image because of unequal cooling.

Measures taken to improve visibility

Fogging of eyeglasses/protective goggles or the optics of instrument being used was one of the top concerns faced by our participants. We asked our respondents if they had taken any step to improve the visibility while performing surgeries or laser procedures, to which over 84% said they had used a medical-grade micropore tape over the upper edge of the mask to prevent fogging. Other methods followed by our study participants were using a dehumidifier in the OT and regulating the temperature of the operating room while performing surgeries. Some studies have reported that liquid soap or hand sanitizer film over eyeglasses or protective goggles may reduce fogging. Anti-fogging sprays meant for swimming goggles or car headlights have also been used to prevent fogging. However, these methods are not entirely safe and may produce irritation to the surgeon's eyes.^[16]

Steepening of learning curve in ophthalmology

It was also observed in our survey that a larger proportion of the respondents in training (88.1%) experienced difficulty in interpreting ocular findings through PPE, when compared to the specialists (77.2%). Additionally, 95.2% of the trainee participants felt that the use of PPE has led to an increase in examination time, while 80.3% of the specialists expressed a similar concern. This comparison highlights the possible further steepening of the learning curve for ophthalmologists in training while imbibing the skills of clinical examination and performing procedures, as a result of using PPE. Ferrara *et al.*^[17] have discussed the use of technology-based training tools, such as web-based teaching, virtual surgical simulators, and telementoring, to ensure continuity in training.

This workplace study of ophthalmology practice in OPD and operating room supports our concern of the obstacles faced due to the personal protective measures used during the pandemic. Thus, it is imperative to discuss the principles of optics in detail with changing the dynamics of patient interaction during the pandemic to ensure good standards of ophthalmologic care. There are some limitations to our study. The data was collected from surgeons working in India. The findings may differ with demographic distribution and the type of personal protective measures used by the surgeons. A prospective study with a larger sample size and worldwide demographic distribution is required to confirm the findings of our study.

Conclusion

The use of mandatory PPE during the pandemic is unavoidable and is the biggest challenge for current healthcare. Ophthalmologists in India and worldwide had to reconsider the way patients are examined in the recent pandemic scenario, as continually revising protocols lead to a gap in stipulated guidelines for the use of protective equipment.

Thus, the need of the hour is to ensure the uniform use of protective equipment and instrument-based barrier shields

to combat the pandemic as well as ensure adequate quality of examination.

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Conflicts of interest

There are no conflicts of interest.

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Appendix

Survey Questionnaire

1. I give my informed consent to participate in this study
 - a. Yes
 - b. No
2. Your Email address
3. Your age (in completed years)
4. Your gender
5. What is your present designation?
 - a. Resident/trainee
 - b. General ophthalmologist
 - c. Subspeciality trainee
 - d. Subspecialist in ophthalmology
 - e. Other (please specify)
6. Which of these best describes your work setup?
 - a. Government hospital
 - b. Private hospital
 - c. Private clinic
 - d. Other
7. Have you incorporated any modifications in ophthalmological examination in the OPD to curb COVID-19 transmission?
 - a. Yes
 - b. No
8. What level of personal protective measures do you routinely take while examining the patients in OPD? (multiple options may be selected)
 - a. N95 mask
 - b. Three-ply surgical mask
 - c. Face shield, gloves, double masks
 - d. Face shield, surgical gown, gloves, double masks
 - e. Others (provide input)
9. What extent of personal protective measures do you enforce upon the patients visiting in the OPD? (multiple options can be chosen)
 - a. Three-ply surgical mask
 - b. N95 mask
 - c. Others (provide input)
10. Have you encountered any difficulty in interpreting the ocular findings of patients while examining in PPE?
 - a. Yes
 - b. No
11. Have you encountered any of the following issues while carrying out the ophthalmological examination in PPE? (multiple options can be chosen)
 - a. Fogging
 - b. Difficulty maintaining focus
 - c. Difficulty in maneuvering joystick/operating the instrument
 - d. Altered colour perception
 - e. Altered stereopsis
 - f. Unwanted reflections
 - g. Image distortion
 - h. Image minification/magnification
 - i. Others (provide input)
 - j. None
12. Which of the following adaptations have you implemented for slit-lamp-based examination? (multiple options can be chosen)
 - a. Protective breath shield mounted on slit lamp to prevent droplet transmission
 - b. X-ray film used as a barrier
 - c. Taping of patient's upper edge of mask on the nose prevent fogging
 - d. Other (please specify)
 - e. None

13. Which of these protective modifications have you incorporated for indirect ophthalmoscope? (multiple options can be chosen)
- X-ray film mounted on indirect ophthalmoscope
 - Transparent face shield custom built for indirect ophthalmoscope
 - X-ray film mounted on indirect ophthalmoscope
 - None
 - Others (please specify)
14. How have these modifications affected your overall quality of examination?
- Worsened/negatively affected
 - Unaffected
 - Improved/positively affected
15. Have you taken into consideration the post-COVID-19 status/vaccination status of patients prior to performing fundus fluorescein angiography?
- Yes
 - No
16. Which of the following technical issues in relation to personal protective measures have you encountered in visual field results interpretation? (multiple options can be chosen)
- Artefacts in inferior hemifield due to upward displacement of the mask
 - Patient discomfort and breathing difficulty leading to fixation losses
 - Fogging of the perimeter's trial lens
 - None
 - Other (please specify)
17. How has the use of PPE affected your time of examination?
- Increased
 - No change
 - Decreased
18. What is your preferred method of sterilization of noncontact fundus lenses (+20 D, +90 D, etc.)? (multiple options can be chosen)
- Alcohol-based solutions
 - 3% Hydrogen peroxide
 - Household bleach solution (sodium hypochlorite)
 - Plain water with a mild soap
 - None
 - Other (please specify)
19. Have you provided ophthalmological care to your patients through teleconsultation ?
- Yes
 - No
20. Which of the following difficulties did you face while attending to your patients through teleconsultation? (multiple options can be chosen)
- Visual acuity assessment not reliable
 - Inability to carry out detailed anterior segment/retinal examination
 - Difficulty in identifying the ocular pathology
 - Difficulty in assessing glaucoma progression
 - Quality of image not adequate to make a diagnosis
 - None
 - Other (please specify)
21. What level of personal protective gear have you adopted while performing surgeries in OT? (multiple options can be chosen)
- N95 mask
 - Three-ply surgical mask
 - Surgical gown
 - Gloves
 - Face shield
 - Protective goggles
 - None
 - Other (please specify)
22. Have you encountered any difficulty performing laser procedures/surgeries on patients while in PPE?
- Yes
 - No

23. Which of the following issues did you face while performing laser procedures/surgeries in PPE? (multiple options can be chosen)

- a. Reduced visibility due to frequent fogging of lens/optics
- b. Frequent fogging of surgeon's glasses
- c. Unwanted reflections
- d. Increase in eye-microscope distance
- e. Frequent fogging of surgeon's glasses
- f. Restricted surgical field of view
- g. Increase in eye-microscope distance
- h. Difficulty in manouvering joystick/instruments, etc.
- i. Altered stereopsis
- j. Altered colour perception
- k. None
- l. Other (please specify)

24. What measures did you take to improve the visibility while performing surgeries/laser procedures in PPE? (multiple options can be chosen)

- a. Maintaining ambient room temperature
- b. Micropore tape to stick the face mask over bridge of nose
- c. Use of dehumidifier in the procedure room
- d. None
- e. Other (please specify)