

# A cross-sectional survey of ocular problems after COVID-19 infection among healthcare workers at a teaching hospital

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## ABSTRACT

**Purpose:** The COVID-19 pandemic was caused by severe acute respiratory syndrome coronavirus-2 (SARS-COV2). The impact of the pandemic is becoming more apparent now on various tissues and body organs. Limited knowledge is present about the characteristics, duration, and long-term sequelae of ocular problems post-COVID-19 infection. The purpose of the present study was to evaluate and analyze the ocular problems occurring in healthcare workers after COVID-19 infection. **Material and Method:** This was a cross-sectional survey study conducted in the Department of Ophthalmology, Patna Medical College and Hospital, Patna. The participants were healthcare workers who were exposed to COVID-19 infection  $\geq 6$  months back. A questionnaire was prepared. Responses were evaluated and analyzed. Patient consent and institutional committee permission were taken as per norms. **Result:** A total of 210 healthcare workers who were infected with COVID-19  $> 6$  months back responded with complete answers. The maximum number of respondents was between the ages of 31 and 60 (73.3%). The pre-covid ocular problems were present in 25% of the participants, especially in those having chronic diseases (such as diabetes, hypertension, or both). Post-ocular problems were faced by 60% of the participants, which was significant ( $P < 0.01$ ). Dry eye, itching, and foreign body sensations were present in 60% of those facing ocular problems ( $P < 0.01$ ). Ocular surface manifestations were more common. **Conclusion:** A knowledge, understanding, and awareness about ocular problems and their long-term sequelae in post-COVID-19-infected patients will help in early diagnosis and better management of such patients.

**Keywords:** COVID-19, ocular problems, ocular surface

## Introduction

COVID-19 Pandemic was caused by severe acute respiratory syndrome coronavirus (SARS-COV 2). The infection has affected the mankind most severely. It has far-reaching and lasting consequences. The full spectrum and impact of the disease is yet to be unraveled. Although SARS-COV2 has primarily

affected the respiratory system, other organs of the body are also involved. A knowledge of the ophthalmic manifestation of the novel coronavirus is important to suspect, diagnose, and treat the condition. The impact of the COVID-19 pandemic on the eyes is becoming more apparent now and has led to a better understanding of ocular problems. Several post-COVID ocular problems are dry eyes, foreign body sensation, itching, conjunctivitis, blurred vision, photophobia, redness, tearing, eye pain, eye discharges, etc.

Some other problems are also associated with headaches and difficulty focusing while reading. Awareness about post-COVID

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ocular problems will help in better diagnosis and appropriate early treatment.

## Material and Method

This was a cross-sectional survey study conducted in the Department of Ophthalmology, Patna Medical College and Hospital, Patna (PMCH, Patna). The participants were healthcare workers who were exposed to COVID-19 infection  $\geq 6$  months back. A questionnaire was prepared containing multiple choice questions, and answers in Yes/No format. It has the following sections: demographic and personal data as age, gender, address, education, medical history, and smoking status. Specific questions regarding eye findings such as burning, itching dryness, discharge, foreign body sensation, blurry vision, and photophobia were also queried. This questionnaire was distributed among healthcare workers who were infected with COVID-19  $\geq 6$  months back, after taking informed consent. The study was conducted between January 2023 and March 2023 (3 months). Approved from college ethics committee on 15.12.2022.

A total of 230 participants gave consent to enroll in the study, but only 210 complete questionnaire responses were received, and the responses were evaluated and analyzed (statistical analysis done with SPSS software).

**Result:** A total of 210 participants' responses were evaluated.

## Results

The following results were observed in the above survey. A maximum number of respondents ( $n = 154$ ) were between the age group 31 and 60 years. There were 110 male participants and 100 female participants ( $P > 0.05$ ). The educational qualifications of participants were good, with 160 having a bachelor's degree or higher education status. History of chronic disease was present in 55 participants (26.19%). A total of 85.71% were nonsmokers. 52.38% used electronic devices for around 3–6 hours [Table 1]. Considering the severity of COVID-19 infection, 68% had mild or no symptoms that required home isolation. 15% had severe systemic symptoms that required hospitalization. 17% had mild symptoms treated on an OPD basis. Pre-COVID ocular problems were seen in 53 participants (25.2%) while post-COVID ocular problems were present in 126 participants (60%) ( $P < 0.01$ ) [Table 2]. Dry eye, itching, and foreign body sensation were the most prevalent ocular problems in post-COVID-19 infected patients. (65%). Posterior segment symptoms were uncommon [Table 3].

## Discussion

About 73% of respondents were between age group 31 and 60 years. The educational level of participants was good, with over 75% having a bachelor's degree or higher education. In the healthcare workers who were exposed to COVID-19 infection, ocular problems were significantly reported ( $P < 0.01$ ).<sup>[1-4]</sup> The cause may be due to direct

**Table 1: Baseline characteristics**

	No. of participants
Age (in years)	
18–30	35
31–45	76
46–60	78
>60	21
Gender	
Male	110
Female	100
Educational level	
Higher level	40
Bachelor's degree	120
High school	50
History of Chronic disease	
Disease	No of participants
Hypertension	15
Diabetes	20
Hypertension along with diabetes	20
No history of Chronic disease	
History of smoking	
Smoker	30 participants
Non-smoker	180 participants
Electronic device use per day of participants (number of hours)	
$\leq 3$ h	30
3–6 h	110
>6 h	70

**Table 2: Ocular symptoms in Covid-19**

	No Ocular symptoms	Ocular symptoms present
No. of participants with pre-COVID ocular problems	157	84, $P < 0.05$
No. of participants with post-covid ocular problems	53	126, $P < 0.01$

**Table 3: Frequency of ocular problems Post-COVID-19 infected participants (n=126)**

Ocular problems	No. of participants	Percentage
Dry eye	60	48%
Foreign body sensation	35	28%
Itching	31	25%
Eye redness	31	25%
Tearing	28	22%
Conjunctivitis	25	20%
Eye discharge	22	18%
Eye pain	18	15%
Photophobia	12	10%
Blurring of vision	12	10%
Floaters	6	5%

involvement of SARS-COV2 or a generalized immune response.<sup>[5,6]</sup> AS ACE 2 (Angiotensin-converting enzyme 2) expressed in aqueous humor, direct inoculation of SARS COV-2 virus is possible. The involvement of opportunistic infections cannot be ruled out.

The most frequent ocular symptoms were dry eye, itching, and foreign body sensation. According to Nasiri N *et al.*<sup>[7]</sup>, dry eye and foreign body sensation in the eye were the most prevalent symptoms. A meta-analysis by Soltanis *et al.*<sup>[8]</sup> concluded that the most frequent ocular symptoms were dry eyes, foreign body sensation, and ocular pain. Recent surveys and studies have already pointed towards increased ocular surface problems in the case of post-COVID patients.<sup>[10]</sup> Ocular surface problems were significantly increased in post-COVID-19 patients, which is the main result of our study.

Ocular problems were more reported in those having a severe form of COVID-19 infection that required hospitalization.<sup>[7,9]</sup>

The study can be summarized by the following results-

1. Ocular surface problems and symptoms, especially dry eye syndrome, were more prevalent in post-COVID-19 infected patients ( $P < 0.01$ ).
2. Those having a previous history of ocular problems or a history of chronic diseases such as diabetes, hypertension, or both were suffering from >2 ocular symptoms in the post-COVID-19 period.
3. Those who had severe systemic COVID-19 infection and required hospitalization were faced with more ocular problems.

## Conclusion

A knowledge, understanding, and awareness of ocular problems in post-COVID-19 infected patients will help in earlier diagnosis and better management of such cases in the future. Further studies are needed for a better understanding of the long-term sequelae of COVID-19 infection in the eye in the general population.

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## Conflicts of interest

There are no conflicts of interest.

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