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Original Research Article

Awareness and knowledge of ocular manifestation in COVID-19 patients among health care workers (HCWs) in Central India

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ABSTRACT

Aim: To know the awareness and knowledge of ocular manifestation in COVID-19 patients among health care workers (HCWs) in central India**Materials and Methods:** A web-based survey, cross-sectional study was conducted to obtain responses from health care workers (HCWs) in central India from the month of May – July 2020 to access the awareness and knowledge of ocular manifestation in COVID 19 patients among HCWs in central India. This survey was divided into three parts: (i) Participant characteristics (ii) awareness / knowledge of COVID-19 disease (iii) awareness / knowledge regarding ocular manifestation of COVID 19 patients and their source of information. Knowledge regarding ocular manifestation of the disease was assessed by questions focusing on COVID-19 signs / symptoms and risk in eyes, its transmission, and prevention. Ethical clearance was taken and electronic informed consent was taken and confidentiality of each person was maintained throughout the study.**Results:** A total of 408 healthcare workers participated in the study, in which approximately 59.06% (n = 241) of males and 40.94% (n= 167) females, majority of them belong to urban area 74% (n= 302). Most of the HCWs 39.9% were between 35-44 years of age, in which 51.71% (n = 211) were Doctors, 35.04% (n =143) were nursing staff and 6.61%, 1.47% were hospital attendant and sanitary workers respectively. Almost all participants (n=408) had heard about COVID-19, out of which 92.15% agreed that corona patients can recover completely. The study revealed that most of HCWs had good knowledge about the disease and its transmission. However, 336 (82.35%) HCWs were aware that the disease can also affect the eye and 278 (68.13%) accepted that it can cause conjunctivitis. The study revealed that 193 doctors (91.46%), 120 (83.91%) nursing staff and only 23 allied health workers (42.59%) thought that COVID-19 can affect eyes. In which (n=119) 56.39% doctors, (n=61) 42.65% nursing staff, and only (n=19) 35.18% allied health care workers believed that corona can spread through tears. Most doctors (n=165, 78.19%) agreed that COVID 19 can cause conjunctivitis, Which was not same in the case of nursing staffs and other allied Health care workers. Hence, there was a knowledge gap between doctors and other HCWs regarding ocular manifestation of COVID-19 disease.**Conclusion:** The study concluded that most of the HCWs were aware about the disease (COVID-19) and had good knowledge about the general condition of the disease but participant's knowledge regarding ocular manifestation of the disease was comparatively less, though most of the HCWs agreed that COVID-19 could also affect the eyes.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: reprint@ipinnovative.com

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1. Introduction

Corona virus disease (COVID-19) was first reported in Wuhan, China, in December 2019, followed by an outbreak

across all over the world and in India.¹ The ongoing COVID-19 epidemic has spread very quickly and many countries have also reported community level spread. The World Health Organization (WHO) declared corona virus disease as a pandemic on March 11, 2020.^{2,3} However, Confirmed case of COVID-19 in India was first reported in January 2020. Elderly people and those with co-morbidities like heart disease, lung disease and diabetes, are at higher risk of developing severe form of COVID-19 disease and reverse transcription polymerase chain reaction (RT-PCR) from a nasopharyngeal swab is the standard test for the detection of the virus.⁴

The Spread of COVID-19 is through droplet, feco-oral, direct contact and it has an incubation period of 2-14 days,⁵ this disease had significant worldwide impact both in terms of mortality and economic morbidity. The natural course of the disease has been shown to have pyrexia which may be associated with chills, rigors, malaise, myalgia, dry cough, dyspnoea, headache and pink eye (conjunctivitis). However there has been a lots of controversies over transmission of the virus to the ocular tissue.⁶⁻⁸ It is hypothesized that the nasolacrimal system can act as a conduit for viruses to travel from the upper respiratory tract to the eye. Therefore, ocular tissue and fluid may represent a potential source of SARS-CoV-2 infection as well as transmission of the disease.^{9,10} All around the world healthcare workers are the frontlines and particularly vulnerable to this infection, so they are the primary sector in contact with patients. Thus, HCWs are expected to be at high risk of infection.

Many studies and research article has been published regarding COVID-19 disease, however no such study till date has been done where awareness and knowledge about the ocular manifestation of COVID-19 disease among the healthcare workers has been highlighted. This study is one of its own kind as it has aimed to identify the awareness and status of knowledge among HCWs regarding general aspect of the disease as well as its ocular implication. Hence, it will not only help the HWCs to take preventive measure to control the spread of the disease but also to protect themselves from different aspect of the disease.

2. Materials and Methods

A web-based survey, cross-sectional study was conducted to obtain responses from health care workers (HCWs) in Central India during the month of May to July 2020 to know the awareness and knowledge of ocular manifestation in COVID 19 patients among health care workers (HCWs) in central India. It was due to the country's lockdown, restriction in movements as well as maintaining proper physical distancing with others we use digital media as a tool for data collection in our study.

The survey consisted of HCWs' characteristics, awareness, information sources, knowledge and perceptions related to COVID-19 as well as its ocular manifestations.

A link based draft survey was made and it was distributed to 10 experts to comprehensively assess the content of the questionnaire. In addition, the materials used for developing the survey questionnaire were also provided to the expert for any further clarifications.

A pilot web survey was also conducted among 10 randomly selected HCWs to assess clarity and acceptability of the study, time required and viability to answer the questionnaire was evaluated. Required adjustment and edition were done as for better understanding of the questions and finally the survey was distributed to the study population through a URL link.

This online-based web survey consisted of 23 questions which took approximately 5 minutes to complete. These questionnaires were divided into three parts: (i) participant characteristics (ii) awareness / knowledge of COVID-19 disease (iii) awareness / knowledge regarding ocular manifestation of COVID-19 patients and their source of information. All participants were asked to provide honest answers; confidentiality of each person was maintained throughout the study by making participants' information anonymous. Electronic informed consent was taken on the initial page of the survey.

Knowledge regarding ocular manifestation of the disease was assessed by questions focusing on COVID-19 signs / symptoms and risk in eyes, its transmission, and prevention. Each response was scored as "1" (correct) and "0" (wrong), with scores ranging from 1 to 7. A cutoff level of 2 was considered to indicate poor knowledge about COVID-19 whereas 3-4 fair knowledge and ≥ 5 was considered good knowledge about COVID-19

All data obtained were validated and analyzed using SPSS version. Descriptive analysis was done to calculate frequencies and proportions. The chi-square test was used to investigate the level of association among variables. A P value of less than 0.05 was considered statistically significant. The study was performed following the declaration of Helsinki as revised in 2013.

3. Results

A total of 408 healthcare workers responded to the survey based study. It was found that approximately 59.06% (n = 241) of the responders were males and 40.94% of the responders were females, in which majority of them were from Urban area 74% (n= 302) and only around (n= 106) 26% of the individuals belonged to Rural area. The majority of the responders 39.9% (n = 163) were between 35-44 years of age and only around 2% of the individuals were above 55 years of age. The number of HCWs working in government institutes were as high as 52.94%, and 47.06% worked in private set up. Among the various sub-groups, 51.71% (n = 211) were Doctors, 35.04% (n =143) were nursing staff and 6.61, 1.47% were hospital attendant and sanitary workers respectively. It was seen that 61.70%(n=252) of HCWs had

masters degree were as 31.12 % (n=127) were graduates (Table 1).

Almost all participants (n=408) had heard about the disease corona, out of which 94.85% agreed that anyone can suffer from the disease and 92.15% HCWs were aware of the fact that corona patients can recover completely. Most of the HCWs had good knowledge about the organ corona disease can affect and about the transmission of the disease. Hence, we can say that most of the HCWs were aware about the disease and had good knowledge about the disease. However coming to ocular manifestation of Covid-19 disease, 314 (76.93%) HCWs were aware that the disease can also affect the eye and 278 (68.13%) accepted that it can cause conjunctivitis. It was found that 52.94% HCWs believed that chances of eyes getting affected in corona patients is high, and 60.78% HCWs feel that the disease can also spread through tears. In our study 176 (43.13%) health workers admitted that chances of spread of disease through tears is likely to be high, were as 34.06% was not sure about it. Our study revealed that most of the health care workers were aware about the fact that COVID-19 can also affect the eyes and had fair knowledge about ocular manifestation of the disease (Table 2). In this study we also observed that 193 doctors (91.46%), 120 (83.91%) nursing staff and only 23 allied health workers (42.59%) thought that COVID-19 can affect eyes. However, (n=119) 56.39% Doctors, (n=61) 42.65% nursing staff, and only (n=19) 35.18% allied health care workers believed that corona can spread through tears. Most Doctors (n=165, 78.19%) agreed that COVID 19 can cause conjunctivitis, which was not same in the case of nursing staffs and other allied health care workers (Table 3). Hence, we can say that though there was a knowledge gap between doctors and other HCWs regarding ocular manifestation of COVID-19 but it was not significant (p Value > 0.05). Over all participant's knowledge of questions related to ocular manifestation of the disease was comparatively less, though they were aware that COVID-19 could affect the eyes.

4. Discussion

A total of, 408 respondents were included in the study in which 51.71% (n = 211) were Doctors, 35.04% (n =143) were nursing staff and rest were hospital attendant, OT technicians, sanitary workers etc. The survey found that the majority of HCWs were aware about the disease and had good knowledge about the disease and its transmission, which was in agreement with the finding of M. Saqlain et al (HCW3) and Giao et al^{11,12} who reported that 93.2% and 88.4% participants, had sufficient knowledge regarding COVID-19 respectively. This high percentage of awareness and knowledge in our study may be due to the fact that most of the HCWs enrolled in our study were doctors and nursing staff. However Nemati M et al in found that only 56.5% of HCWs had satisfactory knowledge regarding

Table 1: Socio demographic characteristics of health care workers (N=408)

Characteristics	Participants
Gender:	
Male	241 (59.06%)
Female	167 (40.93%)
Age group:	
18-24	41(10.02%)
25-34	150 (36.7%)
35-44	163(39.9%)
45-54	45(11.2%)
55-	7(1.71%)
>65	2(0.49%)
Profession:	
Doctors	211 (51.71%)
Nursing Staff	143 (35.04%)
Others	54 (13.23%)
Place of Work	
Government	216 (52.94%)
Private	192 (47.05%)
Location:	
Urban	302 (74.1%)
Rural	106 (25.9%)

Table 2: Awareness and knowledge of healthcare workers toward COVID-19, [n(%)]

Questions	Correct Response
Are You Aware of Corona Disease or COVID-19 (yes):	408 (100%)
Any person can suffer from Covid 19 (yes)	387 (94.85%)
Can corona patients recover completely (yes)	376 (92.15%)
Can corona disease (Covid-19) affect the eyes (yes)	336 (82.35%)
Chances of Eye getting affected in corona patients is High (False)	86(21.07%)
Can Covid-19 spread from tears (yes)	199(48.77%)
Chances of spread of Corona Through tears is High (False)	93(22.7%)
Corona Disease can cause Conjunctivitis (yes)	278(68.13%)
Covid 19 Disease can cause blindness (no)	11(2.69%)
Is it necessary for Covid-19 patients to undergo eye screening test (no)	402(98.5%)

the disease.¹³ Of note, 85.04% (n=347) of HCWs in our survey used television and radio as their main source of information, followed by social media (59.06%, n=241) and family members/other colleagues (34.06%, n=139) (Table 4). M. Saqlain et al¹¹ found that 87.68% of HCWs used social media as their main source of information, followed by radio and television (45.89%) and seniors/other colleagues (42.51%) these findings were consistent with other studies done by Giao H et al¹² and Bhagavathula

Table 3: Awareness and knowledge among HCWs regarding eye involvement by COVID-19 disease

Questions	Correct Response [n(%)]		
	Doctors	Nursing Staff	Allied HCWs
COVID-19 can affect eyes	193 (91.46%)	120 (83.9%)	23 (42.59%)
COVID-19 can spread through tears	119 (56.39%)	61 (42.65%)	19 (33.18%)
COVID-19 can cause conjunctivitis	165 (78.91%)	89 (62.23%)	24 (44.44%)
COVID-19 can cause blindness	2 (0.94%)	4 (2.79%)	5 (9.25%)

Table 4: Source of information about coronavirus disease 2019 (COVID-19) (N=408)

Mass media (TV, radio, newspaper)	347 (85.04%)
Social media (WhatsApp, Facebook, Twitter)	241 (59.06%)
Family & Friends	139 (34.06%)
International health organization / Government sites (WHO, ICMR, CDC)	146 (35.78%)

AS.¹⁴ However, study done by Ronald Olum et al¹⁵ suggested that knowledge on COVID-19 was significant among HCWs who used news media such as television for their information. As majority of HCWs use Mass media and social media to seek information on COVID-19, HCWs should also consult reliable sources, such as guidelines and reports published by WHO, US Centers for Disease Control and Prevention (CDC) and the Indian Council of Medical Research (ICMR), to seek information regarding the disease, as misinformation is serious concern in the global pandemic and can lead to deception among common people.

Interestingly, majority of the participants were aware about ocular involvement of COVID-19 but the knowledge among the HCWs was found to be limited when question were asked regarding ocular manifestation of the disease. The current study revealed that 193 doctors (91.46%), 120 (83.91%) nursing staff and 23 allied health workers (42.59%) thought that COVID-19 could affect eyes, despite that only 56.39% Doctors, 42.65% nursing staff, and only 35.18% allied health care workers believed that corona can spread through tears. Most Doctors (n=165, 78.19%) agreed that COVID 19 could cause conjunctivitis, however 89 (62.23%) nursing staff and only 24 (44.44%) other allied HCWs admitted that the disease can cause conjunctivitis. Our study revealed that though HCWs were aware of the fact that COVID-19 can affect the eye but participant's knowledge about the ocular association and implication of the disease was less.

Study done by Ping Wu et al. disclosed that 31.6% patients had ocular manifestations consistent with conjunctivitis, including conjunctival hyperemia, chemosis, epiphora, or increased tear secretions in which 5.2% yielded positive findings for SARS-CoV-2 in their conjunctival specimens.¹⁶ However, SARS-CoV-2 RNA was detected in tears of 24% of patients with laboratory-proven RTPCR test in moderate to severe COVID-19 patients in the study done by Arora R et al.¹⁷ Study done by Kumar K et al and Xia J et al to assess the presence of novel coronavirus in tears and conjunctival secretions of SARS-CoV-2-infected patients

also had positive finding in the tear samples.^{18,19} Liwen Chen et al accepted the fact that 20.97% covid patients had dry eye symptoms, 12.73% had blurred vision and 11.80% had foreign body sensation during the course of the disease,²⁰ which correlated with the study done by Zhou Y et al and Aggarwal K et al.^{21,22}

Presence of the SARS coronavirus in tears has important implications for the practice of ophthalmology and medicine, as it is a potential hazard to healthcare workers in close contact with the face and specifically the eyes of SARS patients. There is also a potential possibility of transmission to other patients and even to HCWs through the use of reusable eye equipment such as the Goldmann applanation or Schiøtz tonometer, trial frames or contact lenses, and even reusable Stenopic Slit /pinhole devices which come in close contact with the patient's eyes can be the cause of spread of the disease. Hence, Apart from proper physical distancing with patients coming to routine OPD, proper sterilizing technique should be used while handling these instruments.

5. Conclusion

COVID-19 pandemic is not only a challenge to health care workers but also to humanity. In our study though the HCWs were well aware about of the general symptoms etiology and mode of transmission of the disease, but the knowledge regarding the ocular manifestation of the disease was comparatively less. The study also revealed that knowledge on COVID-19 was significantly higher among doctors than the other allied health care workers. Hence, a comprehensive training program should be provided by the health ministries targeting all HCWs to promote all precautionary and preventive measures for COVID-19, to maintain (achieve) equilibrium in terms of clinical knowledge.

In conclusion, although ophthalmology is not the main battlefield related to COVID-19 disease and its manifestation, despite that conjunctival congestion was one of the COVID-19 related ocular symptoms, which may have

clinical diagnostic significance. Hence, the understanding of ocular manifestations of the disease will help to deepen the understanding of COVID-19–associated eye diseases and its clinical outcomes.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

References

- Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci.* 2020;16(10):1745–52.
- WHO Director-General's opening remarks at the media briefing on COVID-19: March 2020. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19>.
- Maurya RP. Ocular trauma during COVID-19 crisis: Trends and management. *Indian J Clin Exp Ophthalmol.* 2020;6(4):478–9.
- Gahlot A, Singh SP, Verma V, Singh M. A study of knowledge, attitude and practices regarding SARS COV-2 infection and its control amongst medical students of Rama Medical College Kanpur (U.P). *Indian J Forensic Community Med.* 2020;7(3):134–9.
- Backer J, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China. *Euro Surveill.* 2020;25(5):1–11.
- Loon SC, Teoh SCB, Oon LLE, Se-Thoe SY, Ling AE, Leo YS, et al. The severe acute respiratory syndrome coronavirus in tears. *Br J Ophthalmol.* 2004;88(7):861–3.
- Lu CW, Liu XF, Jia ZF. Transmission nCoV 2019 through the ocular surface must not be ignored. *Lancet.* 2020;395(10224):39.
- Maurya R. COVID-19 and ophthalmologists. *Indian J Clin Exp Ophthalmol.* 2020;6(3):312–4.
- Seah I, Agrawal R. Can the coronavirus disease 2019 (COVID-19) affect the eyes. A review of coronaviruses and ocular implications in humans and animals. *Ocul Immunol Inflamm.* 2020;28(3):391–5.
- Seah IYJ, Anderson DE, Kang AEZ, Wang L, Rao P, Young BE, et al. Assessing Viral Shedding and Infectivity of Tears in Coronavirus Disease 2019 (COVID-19) Patients. *American academy of Ophthalmology.* 2020;127(7):977–9.
- Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z, et al. Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan. *J Hosp Infect.* 2020;105(3):419–23.
- Giao H, Nguyen TNH, Tran VK, Vo KN, Vo VT, Pham LA. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital. *Asian Pac J Trop Med.* 2020;13(6):260–5.
- Nemati M, Ebrahimi B, Nemati F. Assessment of Iranian Nurses' Knowledge and Anxiety Toward COVID-19 During the Current Outbreak in Iran. *Arch Clin Infect Dis.* 2020;15:e102848.
- Bhagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA, Bandari DK. Novel coronavirus (COVID-19) knowledge and perceptions: a survey on healthcare workers. 2020;doi:10.1101/2020.03.09.20033381.
- Olum R, Chekwech G. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. *Front Public Health.* 2020;8:181. doi:10.3389/fpubh.2020.00181.
- Wu P, Duan F, Luo C, Liu Q, Qu X, Liang L, et al. Characteristics of Ocular Findings of Patients With Coronavirus Disease 2019 (COVID-19) in Hubei Province, China. *JAMA Ophthalmol.* 2020;138(5):575–8.
- Arora R, Goel R, Kumar S, Chhabra M, Saxena S, Manchanda V, et al. Evaluation of SARS-CoV-2 in Tears of Patients with Moderate to Severe COVID-19. *Am Acad Ophthalmol.* 2021;128(4):494–503.
- Kumar K, Prakash AA, Gangasagara SB, Rathod SBL, Ravi K, Rangaiah A, et al. Presence of viral RNA of SARS-CoV-2 in conjunctival swab specimens of COVID-19 patients. *Indian J Ophthalmol.* 2020;68(6):1015–7.
- Xia J, Tong J, Liu M, Shen Y, Guo D. Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS-CoV-2 infection. *J Med Virol.* 2020;92(6):589–94.
- Chen L, Deng C, Chen X, Zhang X, Chen B, Yu H, et al. Ocular manifestations and clinical characteristics of 534 cases of COVID-19 in China: A cross-sectional study. *MedRxiv.* 2020;doi:10.1101/2020.03.12.20034678.
- Zhou Y, Zeng Y, Tong Y, Chen C. Ophthalmologic evidence against the interpersonal transmission of 2019 novel coronavirus through conjunctiva. *medRxiv.* 2020;doi:10.1101/2020.02.11.20021956.
- Aggarwal K, Agarwal A, Jaiswal N, Dahiya N, Ahuja A, Mahajan S, et al. Ocular surface manifestations of coronavirus disease 2019 (COVID-19): A systematic review and meta-analysis. *PLoS One.* 2020;15(11):e0241661.

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