



A CROSS-SECTIONAL STUDY OF OCULAR MANIFESTATIONS AND CLINICAL CHARACTERISTICS IN COVID-19 CASES IN BUNDELKHAND REGION IN NORTH INDIA.

Ophthalmology

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ABSTRACT

Purpose: To record Ocular symptoms at varying frequencies in COVID 19 cases with the objective of finding out the different type of ocular manifestations present in COVID- 19 patients admitted to our tertiary care facility. **Methods:** This cross sectional hospital based study was done on covid 19 diagnosed patients (N=100) admitted in isolation ward. Demographic and detailed history of the patient was written down on a structured preform. Thorough clinical examination of the anterior and posterior segments of both eyes was done in diffuse light and by indirect ophthalmoscope. Schirmer test was done on all the patients for evaluation of dry eye disease. **Results and Conclusion:** Age of the patient ranged from 18 to 60 years with mean age being 42 ± 0.21 years. Ocular examination of the patient revealed that 18 had dry eyes, followed by blurred vision (13 patients), Conjunctival congestion (12), foreign body sensation (12), watering (10), itching (9), discharge (8), ocular pain (3), and photophobia (3) were other notable ocular manifestations seen. Out of 100 patients 82 COVID-19 patients had a history of hand eye contact, including 54 cases who reported seldom hand eye contact and 28 who reported frequent hand eye contact. Pandemic continues to spread in our country, we should take note of these symptoms, immediately investigate these patients, and manage them with the utmost importance. It is suggested that the healthcare worker or an ophthalmologist wear all the recommended equipment when examining a covid 19 positive case.

KEYWORDS

COVID 19, Cross sectional, Ocular pain, Dry eye disease, Photophobia

INTRODUCTION

The coronavirus disease (COVID-19) quickly propagated over the world before being deemed a global pandemic on the March 11, 2020.¹ Angiotensin-converting enzyme 2 (ACE2), whose expression and activity have been identified on the ocular surface, including the cornea and conjunctiva, provides a trans-ocular entrance potential for SARS-CoV-2, is known to be used by SARS-CoV-2 as a cell entry receptor.^{2,3} Ocular symptoms have been recorded at varying frequencies, but according to a recent meta-analysis by Inomata et al., 11.2% of COVID-19 cases had an ocular manifestation.⁴ The infection has been associated with a wide range of ocular symptoms, including photophobia, conjunctivitis, foreign body feeling, itching, and dry eye.⁵ Even conjunctivitis has been listed in a research study as a precursor to the diagnosis of COVID-19.⁶ Therefore our study was done with the objective of finding out the different types of ocular manifestation present in COVID- 19 patients admitted to our tertiary care facility.

MATERIALS AND METHODS

This hospital based cross sectional study was done at the dedicated facility marked for COVID-19 patients under our tertiary care institute. Before initiating the study, institutional ethics review committee permission was obtained, and the study adhered to the principles enumerated in the Declaration of Helsinki. In all, 100 participants diagnosed with COVID-19 and for whom an ophthalmic examination was recommended by the medical team managing the case in COVID-19 isolation were included in the study, depending on the eligibility criteria. We limited the sample size to 100 based on the time, resources, and manpower available at our disposal. We selected the participants consecutively with the help of non probability purposive sampling. Patients admitted to the COVID-19 isolation ward after being diagnosed with COVID-19 disease by a RTPCR positive test who were in the age group of 18 to 60 years and who were willing to participate in the study were included. Patients who were hospitalized in the intensive care unit (ICU), had severe COVID-19 (SP02 95%), dyspnea at rest, required oxygen therapy, had experienced eye trauma, had allergies, undergone eye surgery, had a history of viral, bacterial, or fungal blepharitis, or had previously experienced phorias, tropias, or strabismus, were also excluded from the study. The study's demographic, clinical, and laboratory data were all collected from the patients' electronic medical records. A skilled healthcare professional used personal protective equipment to obtain nasopharyngeal swabs from all patients in order to collect the sample for the RT PCR test.

A detailed telephone interview was performed for every participant participating in the study, and the information gathered from the session was noted down on a structured proforma specifically designed for the study. To confirm the information gathered, two researchers independently assessed the data gathering forms. Slit lamp ophthalmic exams are not possible for reasons related to safety and management of disease. When utilizing an indirect ophthalmoscope (IDO), the anterior segment and fundus were examined under diffuse torch light while the observer wore the proper personal protective equipment (PPE), and the results were recorded.

A thorough clinical examination of the anterior and posterior segments of both eyes was done in diffuse light and by indirect ophthalmoscope. The Schirmer test was done on all the patients for evaluation of dry eye disease. A 35 mm by 5 mm filter paper strip is used to measure the amount of tears that are produced over a period of 5 minutes. The strip is placed at the junction of the middle 2/3 and lateral 1/3 of the lower eyelid without the use of a preplaced ophthalmic anesthetic drop. The wetted length, in millimetres, is measured after 5 minutes. The Schirmer Test is interpreted as, normal aqueous tear production is supported by measurements of > 15 mm after 5 minutes; mild-moderate reduction of aqueous production: 5 mm–14 mm after 5 minutes; severe dryness due to reduced tear production: < 5 mm after 15 minutes. An indirect Ophthalmoscopy test was performed on all the patients who were part of the study to evaluate any fundus changes. For a good peripheral exam, the patient's eyes were well dilated by using both topical 1% tropicamide and 2.5% phenylephrine. A 20-D double aspheric lens with magnification up to 3.13° and a 60° dynamic field of view was used to evaluate macular and peripheral pathology.

Conjunctival swab samples were taken only from the participants who complained of having conjunctival congestion. The health worker responsible for taking the sample adhered to the standard protocol of the institute while performing the procedure.

Data was coded and processed on Microsoft Excel Office version 2021; further statistical analysis was done on SPSS. Continuous variables in the study are demonstrated as mean $\pm$ S.D. . Frequency and percentages were used to express categorical variables in the study.

RESULTS

The mean age of the participants included in the study 42 ± 0.21 years. The age of the patient ranged from 18 to 60 years. The majority of patients (38%) belonged to the age group of 46 to 55 years. The

majority (58%) of patients included in the study were male. Among the participants, 30% had chronic medical illnesses, with hypertension and diabetes mellitus being the most commonly seen comorbidities. Cough and fever were the most common presenting complaints among the patients, with 65% and 61% having them, respectively. The other prominent symptoms with which patients presented at our facility were complaints of fatigue and chest stuffiness. Myalgia and arthralgia (29%), reduced appetite (27%), headache (22%), dyspnea (22%), sore throat (16%), shortness of breath (16%), abdominal pain (12%), diarrhea (10%), nasal congestion (6%), and nasal discharge (5%) were other symptoms seen in our study.

The ocular examination of the patient revealed that most patients (18) had dry eyes, followed by blurred vision (13). Conjunctival congestion discharge (12 patients), foreign body sensation (12 patients), watering from the eyes (10), itching (9), conjunctival discharge (8), ocular pain (3), and photophobia (3) were other notable ocular manifestations seen in the participants.

With regard to hand eye contact in patients, it was found that the majority of patients (82%) gave the history of having hand eye contact with varying degrees, whereas 18 % gave the history of never having hand eye contact.

An inquiry into any past history of ocular disease along with an ocular examination revealed that 10 participants had cataract, followed by conjunctivitis in 6 patients. Four participants had xerophthalmia, two had keratitis, one had glaucoma, and one had diabetes mellitus.

DISCUSSION

The COVID-19 virus can infect any organ or system of the body. In COVID-19 individuals, any area of the eye or ocular adnexa may become implicated. Both the haematogenous pathway to the posterior segment and direct viral implantation into conjunctival mucosa may cause ocular symptoms in these patients.^{7,8}

In line with earlier research, individuals with SARS-CoV-2 respiratory diseases manifested first as fever, cough, stuffy nose, and exhaustion before fast progressing towards pneumonia as well as shortness of breath.^{2,9,10} However, extra-pulmonary manifestations were also observed in a number of patients at the onset of the illness, including headache, myalgia or arthralgia, and diarrhoea.^{2,11}

Recent research by Wu et al. (2020)¹² discovered that one-third of COVID-19 patients showed ocular abnormalities, such as conjunctival hyperaemia or elevated secretions, that were consistent with conjunctivitis. However, our epidemiologic study summarized more manifestations present on the ocular surface mainly in the mild cases.

The present study found that the incidence of dry eye, blurred vision, foreign body sensation and conjunctival congestion were the top four ocular manifestation in all patients (18%, 13%, 12% and 12%), which could be due to the fact that COVID19 patients are more likely to have a lot of time to use electronic products. Our results showed that 61 out of 100 COVID-19 patients spent more than four hours per day on short-distance reading and 43 of them even spent more than 6 hours per day on reading. Because of this, healthcare workers should propose patients reading scientifically and reducing short-distance reading time. Other significant findings from the study on examination were tearing, itching, conjunctival discharge, ocular pain and photophobia.

Similar to ours, research by Chen L. et al. 2, the rate of occurrence of dry eye was 20.9% among the study participants. After the commencement of COVID-19, scores on the Salisbury Eye Evaluation Questionnaire (SEEQ) and Ocular Surface Disease Index (OSDI) significantly increased, indicating severe ocular surface degradation, according to research by Hong N. et al.,³ Increased screen use during the previous year has also been linked to an increased rate of dry eye in COVID 19 patients.²

The incidence of conjunctival congestion in our study is 12%, which is higher than Wu's report¹² (3/38, 7.9%), Zhong's large sample report (9/1099, 0.8%)¹³, Guan et al.,¹⁴ and Xia's study (1/30, 3.3%).¹⁵ Wu found that conjunctival congestion occurred in patients with more severe COVID-19. Zhong and colleagues extracted data from 552 hospitals in 30 provinces, autonomous regions and municipalities in China, while 21 common-type and nine severe-type COVID-19 patients were observed by Xia in Zhejiang Province.

We did not directly diagnose individuals with conjunctivitis since SARS-CoV-2 nucleic acid had not been detected in their conjunctival swab samples for the patients for whom it was obtained. Conjunctivitis may be the main cause for the conjunctival congestion in these patients, as they weren't diagnosed with any other chronic eye conditions or symptoms linked to intraocular conditions (such as iritis, choroiditis, or retinal disease). This suggests that the likelihood of endophthalmitis is very low. Conjunctival congestion was one of four COVID-19 symptoms that patients initially experienced, which serves as a reminder that ocular symptoms first appear at the beginning of the development of COVID-19. In order to detect SARS-CoV-2 among individuals with conjunctival congestion, healthcare professionals should pay close attention to patients' ocular symptoms and presentations in the early stages of the disease.

It is believed that close contact or respiratory droplets are the major means by which transmission of SARS-CoV-2 occurs.⁶ The ocular surface has exposure to the outside world, which might serve as a possible entry point for viruses and other infections to enter the human body.^{6,17}

Moreover, eye rubbing is another high risk factor for virus transmission, which has been confirmed in adenovirus-induced conjunctivitis.¹⁸ In our study we found that out of 100 patients, 82 COVID-19 patients had a history of hand eye contact, including 54 cases who reported seldom hand eye contact and 28 who reported frequent hand eye contact.

The present study has some limitations. First, the sample size was relatively small, and the covered population excluded severe cases since only patients with mild symptoms could complete our electronic questionnaire or telephone follow-up. Second, most of the ocular manifestations were self reported by the participants with the help of a questionnaire owing to the fact that a physical examination by slit lamp is not feasible and a conjunctival swab test for SARS-CoV2 was not performed in the early stages.

However, a representative picture of conjunctival congestion was sent to patients for reference, which made the conjunctival congestion data reasonable. Third, no normal population was observed in our study; therefore, a normal control group should be included for comparison in future studies.

CONCLUSIONS

It is in the interest of the general public and health workers to know about the signs and symptoms of covid 19 disease, which will ultimately lead to timely management and help in decreasing the spread of the disease.

Dry eye, along with blurred vision, were the common symptoms seen in our study participants. Hence, as the pandemic continues to spread in our country, we should take note of these symptoms, immediately investigate these patients, and manage them with the utmost importance.

We have seen that hand eye contact plays a part in the transmission of the virus; therefore, in order to interrupt the spread, it is recommended that the healthcare worker or an ophthalmologist wear all the recommended equipment when examining a covid 19 positive case.

Acknowledgements

Statement of competing interests

Authors report no competing interests'.

Table 1: Demograic Details of the Participants (N=100)

Age distribution	No. of patients	Percentage
18-25	4	4%
26-35	19	19%
36-45	28	28%
46-55	38	38%
56-60	11	11%
Gender		
Male	58	58%
Female	42	42%
Chronic medical illness		
Hypertension	13	13%
Diabetes mellitus	8	8%

Cardiovascular and cerebrovascular disease	4	4%
Respiratory disease	2	2%
Chronic liver disease	3	3%

Table No. 2: Clinical Features & Chronic Eye Disease in Participants

Symptoms	No. of patients	Percentage
Cough	65	65%
Fever	61	61%
Fatigue	39	39%
Chest stuffiness	31	31%
Myalgia and arthralgia	29	29%
Reduced appetite	27	27%
Head ache	22	22%
Dyspnea	22	22%
Sore throat	16	16%
Shortness of breath	16	16%
Abdominal pain	12	12%
Diarrhea	10	10%
Nasal congestion	6	6%
Nasal discharge	5	5%
Chronic eye disease		
Conjunctivitis	6	6%
Keratitis	2	2%
Xerophthalmia	4	4%
Cataract	10	10%
Glaucoma	1	1%
Diabetic retinopathy	1	1%

Table No. 3: Ocular Manifestations, History of Hand Eye Contact and Screen Time

Ocular characteristics	No. of patients	Percentage %
Dry eye	18	18%
Blurred vision	13	13%
Conjunctival congestion	12	12%
Foreign body sensation	12	12%
Watering from eyes	10	10%
Itching	9	9%
Conjunctival discharge	8	8%
Ocular pain	3	3%
Photophobia	3	3%
Hand eye contact		
Never	18	18%
Seldom	54	54%
Often	28	28%
Screen Time		
>6 Hours	43	43%
>4 Hours	18	18%
>2 Hours	19	19%

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