

Prevalence and Spectrum of Ocular Manifestations in COVID-19 Patients at A Tertiary Care Centre: A Retrospective Cross-Sectional Study

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Abstract:

Introduction: Ophthalmologists can play an important role in COVID-19 pandemic by identification of ocular symptoms which are like warning bells to the arrival of the deadly COVID-19 disease. The study highlights the spectrum of ocular manifestations of the COVID-19 pandemic along with the need for early diagnosis and subsequent treatment for the same. The current COVID-19 pandemic has affected all organs of the body with the eye being no exception. Eye being an entrance window for COVID-19 infection, Ophthalmologists can contribute to the prevention of its spread by early detection and treatment. This study will add to our knowledge the prevalence of various ocular manifestations in COVID-19 infection.

Objectives: To find out the proportion and spectrum of ocular manifestations in patients of COVID-19.

Material and Methods: This was a retrospective cross-sectional hospital-based study. It was conducted at Department of Ophthalmology and Covid Care Centre affiliated to a tertiary care institute in Nashik district. COVID-19 patients who were being treated in the Covid Care Centre (OPD, IPD and ICU) were included in the study. Total 1221 patients were included for the present study. A detailed history of the patients was noted. The patients in covid care centre – ward and ICU were examined with a torch light and bedside visual acuity was undertaken. COVID-19-positive patients attending the OPD underwent thorough ocular examination by recording their visual acuity on the Snellen's chart, anterior segment evaluation on slit lamp and fundus examination by indirect ophthalmoscope and 90 D lens.

Results: Out of 1221 patients, ocular manifestations were observed in 13.8% (168) patients. Dry eye was the most common ocular manifestation which was observed in 4.99% (61) participants, followed by Epiphora in 3.93% (48) and Conjunctivitis in 1.97% (24) participants. Orbital Mucormycosis was also observed in 1.63% (20) patients.

Conclusion: This study found proportion and various common ocular manifestations of COVID19 disease which helped patient to get diagnosed early and receive the treatment required. Thus, the ophthalmologists play a very crucial role in fighting this pandemic by remaining vigilant in patients presenting with ocular symptoms.

Keywords: SARS-CoV-2; COVID19; Prevalence; Ocular Infection; Manifestation;

Ophthalmology.

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Introduction

Corona virus disease 2019 (COVID-19) was declared a pandemic by the WHO on March 11, 2020. It is caused by the highly transmissible Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)[1]. The disease has been named as "COVID19" where "CO" stands for corona, "VI" for virus, "D" for disease and "19" is the year in which the pandemic took place[2]. A young Ophthalmologist, Dr Li Wenliang, from Wuhan was the one who warned about the COVID 19 outbreak. Ophthalmologists can play an important role in this pandemic by identification of ocular symptoms which are like warning bells to the arrival of the deadly COVID disease. The key to roll back the disease is early diagnosis as well as prevention. Mild conjunctivitis can be the first and only symptom of the disease [2,3,4,5]. Epiphora has also been reported as the presenting symptom[1]. Ocular surface disorder like dry eye can be commonly seen in ICU patients on ventilators. Mechanically ventilated patients may land up in infectious keratitis[2]. Viral keratoconjunctivitis and episcleritis may be an initial presentation in a patient with respiratory infection[3,4,6,7]. Posterior segment manifestations are usually vascular and inflammatory in nature, presenting as Central Retinal Vein Occlusion, Central Retinal Artery Occlusion and Central Serous Retinopathy. Thrombophilic factors may play a role[2, 3,8]. Thromboembolic phenomena may cause Central Retinal Vein Occlusion[9]. Orbital involvement may present with Mucormycosis which is a life-threatening and opportunistic infection. COVID patients were also becoming susceptible to Mucormycosis owing to their compromised immune status and comorbidity like Diabetes mellitus[3,10].

Mucormycosis is characterized by infarction and necrosis of host tissues resulting from hyphae invasion of blood vessel[11]. Ocular cells are a portal of entry for corona virus. The virus has been isolated in the tear samples in COVID-19 confirmed patients. Thus a respiratory illness could be transmitted through ocular secretions as well as by fomite transmission with the entry of the virus into the eyes by contaminated hands¹. Ophthalmologists should be well aware of the possible ocular associations in COVID-19 disease. Relevant history of fever with respiratory complaints, travel history and specific ocular signs should be kept in mind. Appropriate tests should be advised. Thus we can alleviate the spread of infection by early diagnosis and initiation of timely treatment for vision and life threatening complications[3]. Despite conjunctivitis generally being a self-limited and benign condition, it is an important route of viral transmission and, therefore, prevention is the most important aspect to remember as Ophthalmologists to protect our patients and ourselves. It is said that it might be a sign for severe forms because if the eyes are infected by direct droplet contact transmission, the viral load going into the respiratory system is high[4]. The current COVID19 pandemic has affected all organs of the body with the eye being no exception. Eye being an entrance window for COVID19 infection, Ophthalmologists can contribute to the prevention of its spread by early detection and treatment. The study highlights the spectrum of ocular manifestations of the COVID19 pandemic along with the need for early diagnosis and subsequent treatment for the same. This study will add to our knowledge the prevalence of various ocular manifestations

in COVID-19 infection which should be kept in mind so that one does not miss out the diagnosis and delay the treatment thereby hampering the prognosis. Many ocular manifestations have been reported in literature, but our study adds other ocular manifestations like Central Serous Retinopathy and Fungal Endophthalmitis.

Objectives:

1. To estimate the proportion of ocular manifestations in patients of COVID-19.
2. To study the spectrum of various ocular manifestations in patients of COVID-19.

Material and Methods

This was a retrospective cross-sectional hospital-based study. It was conducted at Department of Ophthalmology and Covid Care Centre affiliated to a tertiary care institute in Nashik district. COVID-19 patients who were being treated in the Covid Care Centre (OPD, IPD and ICU) were included in the study. The inclusion criteria were all patients reporting to OPD and Covid Care Centre with a history of COVID-19 infection were screened for ophthalmic manifestations. Duration of the study was from March 2021 to May 2021. COVID-19 confirmed with RT-PCR positive laboratory report for patients aged between 18 to 80 years. Patients excluded from the study were those with prior documented ocular manifestations (glaucoma, uveitis, retinal vascular occlusion, diagnosed cases of anterior segment disorders). All the COVID-19-positive patients during March-May 2021 presenting to tertiary care hospital were included in the study. Thus, total 1221 patients were included for the present study. A detailed history of the patients was noted. The patients in covid care centre – ward and ICU were examined with a torch light and bedside visual acuity was undertaken.

COVID-19-positive patients attending the OPD underwent thorough ocular examination by recording their visual acuity on the Snellen's chart, anterior segment evaluation on slit lamp and fundus examination by indirect ophthalmoscope and 90 D lens. Study was carried out after Institutional Ethical Committee approval. OPD and IPD papers of all COVID-19-positive patients were screened. Those who received ophthalmic call were also screened. Their notes were analyzed in detail. The data was collected and analyzed using appropriate statistical test at the end of the study using SPSS 22.0 version software. P value of 0.05 or less was considered significant in the present research.

Observations and Results

Out of 1221 patients, ocular manifestations were observed in 13.8% (168) patients. Dry eye was the most common ocular manifestation which was observed in 4.99% (61) participants, followed by Epiphora in 3.93% (48) and Conjunctivitis in 1.97% (24) participants. Orbital Mucormycosis was also observed in 1.63% (20) patients (Table 1). The patients of Mucormycosis also presented with Papilledema, sixth nerve palsy and total ophthalmoplegia. Other ocular manifestations were observed in less than 0.5% (range 0.08 - 0.41%) COVID-19 patients which included Vernal Keratoconjunctivitis (VKC), Episcleritis, Central Retinal Artery Occlusion, Central Retinal Vein Occlusion, Fungal Endophthalmitis, Central Serous Retinopathy and Viral Corneal Ulcer. Minimum duration of presentation for anterior segment manifestation was 3 days while 35 days was the maximum duration from COVID-19 infection. Posterior segment manifestation was seen between 35-60 days from COVID-19 infection.

Table 1: Spectrum of ocular manifestations

Ocular Manifestations	Number of Cases	Prevalence (%)	Duration of presentation from COVID19 infection
Anterior Segment			
Conjunctivitis	24	1.97	7-15 Days
Episcleritis	3	0.25	15-20 Days
Epiphora	48	3.93	3-5 Days
Dry Eye	61	4.99	7-8 Days
Vernal Kerato-conjunctivitis (VKC)	5	0.41	20-25 Days
Viral Corneal Ulcer	1	0.08	35 Days
Posterior Segment			
CRAO (Central Retinal Artery Occlusion)	3	0.24	50-60 Days
CRVO (Central Retinal Vein Occlusion)	1	0.08	35 Days
Fungal Endophthalmitis	1	0.08	60 Days
CSR (Central Serous Retinopathy)	1	0.08	50 Days
Orbital			
Orbital Mucormycosis	20	1.63	7- 50 Days

Discussion

The main outcome of our study was to evaluate the various ocular manifestations in COVID- 19 patients. Conjunctivitis was the common presentations with an incidence rate of around 2%. Sindhuja et al reported a prevalence of 6.29%[12]. The incidence of conjunctivitis was found to be 0.8 to 65% in different study populations. Episcleritis was the presenting manifestation in three cases with an incidence rate of 0.3%. Mangana et al[13] reported episcleritis in a 31 year old COVID positive woman. Cheema et al[6] reported Keratoconjunctivitis in a patient with mild respiratory symptoms. We also observed five cases of Keratoconjunctivitis amounting to an incidence rate of 0.4%. Coronavirus causes a state of hyper inflammation which triggers venous thromboembolism. We came across an incidence rate of 0.24 % of CRAO cases. CRVO was reported in one case accounting to an incidence of 0.08%. These rates coincide with studies done by Acharya et al[8] and Gaba et al[14]. CSR was observed

in one of the patients in the post-covid period. We observed a case of fungal endophthalmitis in a 40-year-old COVID positive male with posterior synechiae, streak hypopyon, altered fundal glow and dense vitritis. Similar case series of presumed fungal endophthalmitis has been reported by Kunal Shah et al[15] in post-covid patients. Low levels of CD4 and CD8 counts and high-dose steroid therapy in COVID-19 patients contribute to immunosuppression and opportunistic infections.

The most remarkable ocular manifestation which we encountered was 20 cases of Orbital Mucormycosis with an incidence rate of 1.63%. Viral corneal ulcer was observed in one patient with COVID-19 who presented with Orbital Mucormycosis. Patients were treated by FESS (Functional Endoscopic Sinus Surgery), Maxillectomy and Exenteration by team of ENT surgeon, Maxillofacial Surgeon and Ophthalmologist. These cases coincide with the case reports presented by Sen et al[3].

Anterior Segment



Figure 1: Viral Corneal Ulcer, Conjunctivitis, Episcleritis

Posterior Segment



Figure 2: Left Eye CRAO, Fungal Endophthalmitis, CSR



Figure 3: Ptosis, Ophthalmoplegia

Conclusion

COVID-19 is one of the deadliest pandemics the world has ever faced. It is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2). It is a highly transmissible disease affecting the respiratory system with the eye being a portal of entry. This study found common ocular manifestations of COVID-19 disease which helped patient to get diagnosed early and thereby get the required treatment. Further studies on this aspect should explore association of these ocular manifestations with various factors like socio-demographic, COVID vaccination status,

etc. Thus the ophthalmologists play a very crucial role in fighting this pandemic by remaining vigilant in patients presenting with ocular symptoms.

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