

ORIGINAL RESEARCH

Spectrum of Ocular Manifestations in SARS COV – 2 Patients at Tertiary Care Center

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ABSTRACT

Introduction: The outbreak of the novel coronavirus disease (COVID-19), a highly contagious and deadly infection.

Aim: To evaluate the epidemiological pattern and spectrum of the covid ocular morbidity and appraise the typical presentation of ocular manifestations in hospitalized covid patients.

Methods: A prospective, cross-sectional study was conducted on individuals, who were hospitalized for COVID treatment between May 2021 and June 2021. The Data on patient history, physical exam, thorough ocular examination, laboratory results, and hospital disposition were collected and analyzed.

Results: A total of 658 patients were included. Ocular signs and symptoms were noted in 162 (24.62%) patients. 51.6% patients were of >50 years of age and 54.1% were males. 71.6% of them belonged to urban community. 75.3% patients developed ocular discomfort within acute (<1 week) period of covid infection. The most common ocular abnormality was watering with conjunctival irritation, followed by conjunctival injection and lid swelling. Among the 162 patients, 30 (79.0%) developed ocular involvement prior to day 30 of onset of their COVID symptoms. 56.7% patients relieved from ocular discomfort after treatment. 5.7% patients reported deterioration of visual acuity. 65.8% patients reported ocular discomfort associated with regular oxygen mask wearing. Most significant ocular morbidity was black discoloration of lids and peri ocular skin, lid swelling, and redness and purulent discharge of conjunctivitis needed emergency ophthalmic reference.

Conclusion: spectrum of covid sore eyes extends from ocular irritation to mucormycosis and other long-term complications.

Keywords: Covid – 19, Epidemiology, Ocular.

INTRODUCTION

The outbreak of the novel coronavirus disease (COVID-19), a highly contagious and deadly infection, has quickly spread throughout the world.¹ On the verge of second covid wave our understanding for the ocular manifestations of SARS-CoV-2 infection is very limited for its possible viral contingency through conjunctival secretions, its ocular presentation spectrum, and long-term complications.

As reported by Colavita et al. a traveler from Wuhan to Italy that developed bilateral conjunctivitis as her covid primary presentation and ocular swabs were collected daily from her beginning on day 3rd. The swabs were positive for cov2 RNA throughout the disease course. By day 20, the conjunctivitis disappeared, but positive swabs were collected at day 27, even after nasopharyngeal swabs had become negative.²

Coronavirus had been previously reported to be associated with conjunctivitis in humans.³ Hence Ophthalmologists can be contacted with the virus infected patient who has not yet developed covid systemic symptoms thus at greater risk for contact, disease transmission as well as diagnostic outcomes. Safety concerns should be defined for ophthalmologists at this point.

On the other end of the spectra covid infection can be manifested as severe ocular complications like rhino-orbital-cerebral mucormycosis, retinal degenerations, vasculitis etc.⁴ Concerned studies for prevention and management of such complications can decrease associated ocular morbidity. This implicates the importance of process of diagnosis, recording, analysis and reporting of spectrum of ocular manifestations that could aid in prevention, management and prognostic outcomes of ocular morbidity.

A thorough understanding of the various ophthalmic manifestations and presentations in COVID-19 will guide clinicians to make better-informed decisions while dealing with suspect diagnosis and manage potential long term complications associated with covid eyes.

AIM

To evaluate the epidemiological pattern and spectrum of the covid ocular morbidity and appraise the typical presentation of ocular manifestations in hospitalized covid patients.

METHOD

This prospective cross sectional observational study was conducted on 658 covid patients hospitalized in medical department of tertiary care center in Rajasthan between May 2021 and June 2021. Approval was taken from hospital administration and research committee to conduct the study. For enrolled hospitalized patients the Proforma was drawn up. Complete demographic data was recorded. History regarding the onset, duration, symptoms and its associations, management history were elicited. Ocular examination was performed under torchlight. depending on clinical indications. Serial examinations and imaging of patients were carried out when patients complained of any progressive emergency ocular signs. Appropriate Infection Prevention and Control measures including safe Personal Protection Equipment (PPE) practices were followed. All relevant data were compiled and entered in Microsoft Excel sheet and analysed by epi info software of CDC.

RESULTS

Out of 658 patients admitted in covid dedicated hospital, 162(24.62%) patients reported ocular manifestations. Maximum 51.6% patients were of >50 years while only 4% were of <25 years. 54.1% were male and 45.9% were females. 71.6% belonged from urban community while 28.4% were residing into rural remote areas.

All the females admitted were home maker and denied any occupational exposure for covid while no significant correlation was found for males as on occupational criteria.

34.86% hospitalized patients were suffering from chronic systemic disease. Out of which 18.42% patients were known case of diabetes mellitus followed by hypertension. 4.60% patients developed latent diabetes while on treatment of covid. 24.83% patients were having refractive error mostly due to cataract and presbyopia. Rest gave no significant history of any chronic ocular disease. 98.1% patients were covid RTPCR positive while the rest 1.9% patients became negative but were symptomatic for covid. 28.6% patients were having CT score of <15 while hospitalized while 60.4% patients were admitted with a CT score of 10-15. 91.8% patients were on ongoing corticosteroid regimen and 8.2% patients had been taken the dexamethasone therapy for more than a month, and being tapered for the same at the time of investigation.

Out of 162 ocular cases, 7.40% patients were suffering from conjunctivitis on admission to covid hospital. 21.5% patients reported initiation of ocular manifestations in period of 1-2 weeks of covid infection (sub acute) while 75.3% patients developed ocular discomfort with in a week period (acute) of covid infection. Only 3.2% patients developed ocular disease after 1 month period of covid infection categorized as chronic.

8.64% patients complained of lid swelling significantly of lower lid with redness and 3.08% patients referenced for black eschar and proptosis in either eye. These patients were in the category of chronic admitted patients for more than 2 weeks (24.8%). Other clinical symptoms vary vastly like blephritis, lid hyperemia, dry eye, foreign body sensation, photophobia, chemosis and blurring of the vision and peri-orbital pain.

5.7% patients reported deterioration of visual acuity as of prior to the infection and 16.4% patients were feeling unspecific blurring of vision with same visual acuity as of prior to hospitalization. 56.7% patients relieved from ocular discomfort being treated by ophthalmologists on reference calls, while 28.9% patients reported worsening of their ocular morbidity while admitted in ICU for covid management. Most significant ocular morbidity for which patient's relative was concerned about was black discoloration of lids and peri ocular skin, lid swelling and redness and purulent discharge of conjunctivitis.

50.3% patients were already been consulted by an ophthalmologist through reference calls and wanted a thorough ocular examination get done after discharge or quarantine period. Rest 49.7% patients reported betterment of ocular morbidity after primary treatment. 65.8% patients reported ocular discomfort associated with regular oxygen mask wearing through hospitalization. 1.4% patient developed chemical injury while using chemical disinfectants or sanitizer sprays during covid treatment.

Table 1: Socio Demographic

Hospitalized patients	N (%)
Ocular symptoms	162 (24.62%)
Non ocular	496 (75.38%)
Sex	
Male	356 (51.10%)
Female	302 (45.90%)
Area	
Urban	471 (71.60%)
Rural	187 (28.40%)

Figure 1: Ocular morbidity in covid management

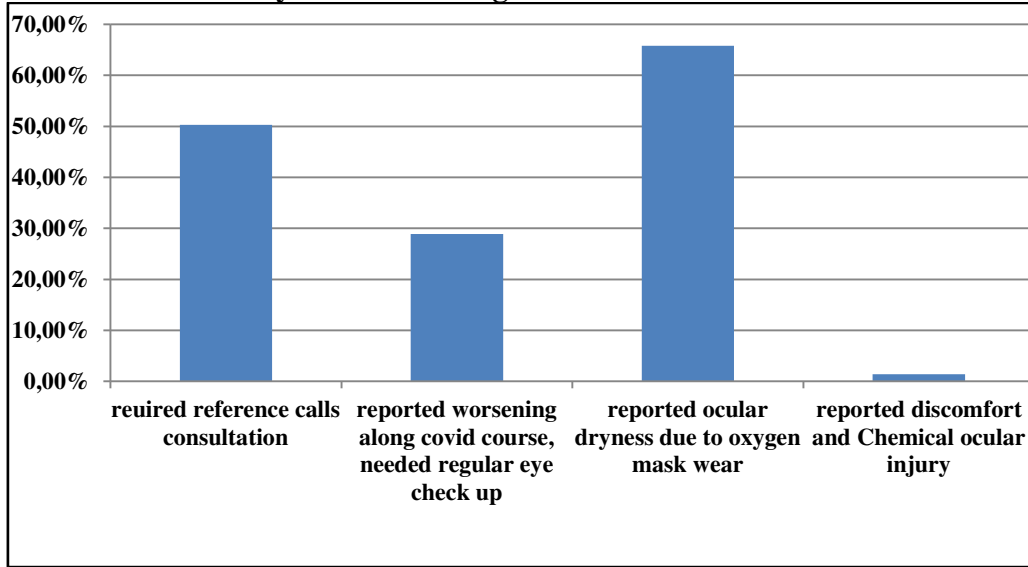


Figure 2: Ocular morbidity in relation to covid infection

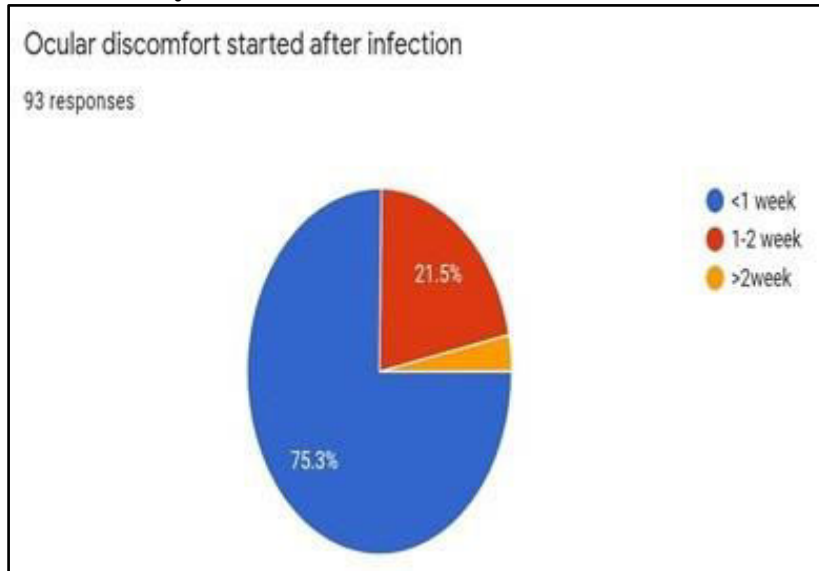
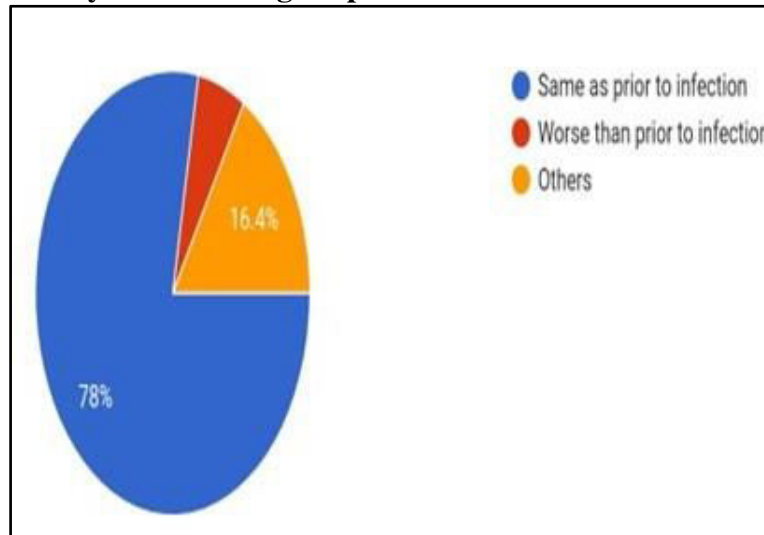


Figure 3: Visual acuity status during hospitalization



DISCUSSION

To the best of our knowledge, this is the first study that investigates the spectrum of ocular manifestations of hospitalized COVID diagnosed patients at a tertiary care medical center in India. At present, our understanding of the possible ocular complications of SARS-CoV-2 infection is very limited.

It's proven that ACE2, a cellular receptor for SARS-CoV-2⁵ has also been detected in the human retina⁶, vascularized retinal pigment epithelium, and choroid⁷ and conjunctival epithelium as well as it is also a thrombotic virus which initiates thrombotic vascular episodes of the ocular vessels.

To fully evaluate the clinical spectrum of ocular morbidities caused by SARS-CoV-2 infection, further long-term clinical studies are needed.

Guangfa Wang et al reported that they recorded red eyes development several days before the onset of SARS-CoV-2 infection.⁸

In our study we pooled a prevalence of 24.62% in hospitalized patients under covid management, so every fifth patient reported ocular discomfort. With the knowledge recruited from our findings, it can be deduced that ophthalmic manifestations are common and likely to be the presenting clinical picture in hospitalized covid patients.

Lai C-C reported that approximately one out of ten COVID-19 patients included in their study showed at least one ocular manifestations. Although these manifestations may not be frequent, they should not be overlooked by physicians and ophthalmologists.⁹

A report from Argentina identified a patient with a chief complaint of foreign body sensation and redness, no other systemic symptoms. On exam, unilateral eyelid edema and moderate conjunctival hyperemia were found. This patient developed high fever, cough and severe dyspnea 12 hours later. The patient tested positive for Covid on nasopharyngeal swab.¹⁰

our study 21.5% patients reported initiation of ocular manifestations in sub-acute period of 1-2 weeks of covid infection while 75.3% patients developed ocular discomfort with in acute (<1 week) period of covid infection. This emphasizes the importance of defining the typical sub-acute covid ocular morbidities of non-quarantined patients presenting to ophthalmologists that could be lethal to them.

Feng Y et al provided novel insight into the onset of ocular signs and symptoms in COVID-19 patients. Of patients in their study, 18.4% reported that ocular signs and symptoms were one of the initial manifestations of covid.¹¹ This is consistent with previous reports that reported that ocular signs can be the initial manifestation of disease¹² as research has identified the presence of ACE2 and TMPRSS2 receptors, which the SARS-CoV-2 virus uses to gain entry in tissues, in the eye.¹³

Veena Danthuluri in their study reported the bilateral conjunctival hyperemia typically presents within 2-4 days of disease onset and diminishes within 1-2 weeks, These case studies support the importance of conjunctivitis as an early presenting symptom and COVID-19 should be considered in the differential diagnosis of conjunctivitis.¹⁴

As Kuo and O'Brien rightly pointed out that Ophthalmologists face an increased occupational risk of contracting nosocomial COVID-19 infection due to the proximity of examination and various contact procedures and without adequate protective measures, this could prove potentially lethal.¹⁵

In addition to evaluate ocular spectrum of covid, we sought to determine whether certain associations with the development of ocular morbidity in COVID-19. Our analysis demonstrated that demographic characteristics such as age and gender did not increase the odds of developing ocular abnormalities among COVID-19 patients. In addition, there was no association between the presence of ocular history and development of ocular manifestations. Although patients suffering from chronic co-morbidities such as diabetes, hypertension were more likely to develop eye symptoms and complications.

Siedlecki J et al reported that patients with more critical illness will often be treated in intensive care units (ICU), and ocular findings may be under-reported in this setting.¹⁶

As per our data 71.6% patients who were concerned about their ocular condition and reported any discomfort were from urban community. This advocates social awareness of urban community for their ocular status that aids in prevention of further complications.

As more rural patients presented with dreaded complications of orbital mucor mycosis in a study conducted by Kochar A et al.¹⁷

Similar to previous studies, in our study the most common ocular symptoms among hospitalized patients for less than 1 week, were watering and irritation (25.30%) followed by follicular conjunctivitis (7.40%). Lid swelling (8.64%), black eschar and proptosis were the symptoms mostly presented in chronic covid patients admitted for more than 2 weeks. Other ocular symptoms vary vastly on presentation and severity basis were blephritis, lid hyperemia, dry eye, foreign body sensation, photophobia, chemosis and blurring of the vision and pain.

The spectrum reported by Kumar, K Kiran included Ocular features as diffuse conjunctival congestion and increased lacrimation seen in 19 patients (95%), chemosis in 5 patients (20%), around 9 patients (0.45%) had visible follicular response classic of viral conjunctivitis.¹⁸

Wu et al. performed a preliminary investigation about the prevalence of ocular manifestations in patients with COVID-19 and reported that chemosis, epiphora, and conjunctival hyperemia were present in one-third of the patients without another relevant association.¹⁹

8.4% Patients required emergent referral to ophthalmologists who presented with proptosis lid swelling restricted eye movements and black Escher and blurring of vision .04 patients (2.5%) among them reported restricted eye movements and lid redness diagnosed with rhino-orbitomucormycosis.

These subjected to imaging and other investigations to rule out dreaded complications like orbital mucor mycosis. Concerned medical staff could be trained to pick signs to refer the patients on time for better prognostic outcomes.

However, the etiology of deteriorating vision changes (22.1%) was not elucidated due to limited posterior segment examination, possible mechanisms could include ocular surface abnormalities or retinal pathology as well as optic nerve morbidities as previously reported by²⁰

Study published in IJO states that the median time of appearance from the time of development of COVID-19 symptoms/diagnosis of neuro-ophthalmic features is 5 days of ocular surface and anterior segment manifestations is 8.5 days and posterior segment and orbital pathology is 12 days.⁴

In our study 60.4% patients were admitted with a CT score of 10-15 and were showing ocular morbidity of different states while patients with CT score >15 with greater severity of systemic symptoms were no different from the previous group on the basis of eye disease spectrum. no correlation could be attributed to systemic severity and ocular morbidity so we should screen a patient for ocular complications irrespective of their systemic status.

In their study K Kiran Kumar et al found that among the patients with ocular manifestations, COVID-19 disease severity was mild among 5 patients (25%), moderate among 9 (45%), severe in 4 (20%), and critical in 2 patients (10%). Our findings indicate that ocular manifestation is seen in patients with varying severity of COVID-19 disease spectrum and hence severity of systemic symptoms was not relevant for ocular manifestation.¹⁸

In our study 91.8% patients were on steroid therapy as a part of Covid management regimen. 8.2% patients who were on tapering the corticosteroid therapy after taking dexamethasone for more than a month. These patients should be checked and monitored thoroughly for ocular morbidities to prevent dreaded complications like orbito mycosis.

According Honavar et al. unmonitored steroid intake being an important causative factor of covid associated ocular infections and complications. They proposed an imminent need for establishing evidence-based guidelines for use of steroids. Prophylactic Antifungals should be enquired in patients with high risk of rhino-orbito-cerebral mucormycosis diagnosed with COVID-19 who are on corticosteroids.⁴

This clearly implicates that covid can be presented and transmitted as ocular morbidity into community as well as among ophthalmologists. Valid research and documentation is required for the spectrum of ocular manifestations in covid patients that could be implied at preventive, diagnostic and management strategies of covid protocols.

Sen, Mrittika et al believed that it is important for ophthalmologists to have knowledge about the ophthalmic manifestations of the novel viral infection in order to suspect, diagnose, refer and treat the conditions with skills, machinery, and drugs that we already possess.⁴

LIMITATIONS

Limitations of our study was the lack of conjunctival swab evidence from the symptomatic cases we were not able to estimate the transmission potential of covid through infected eyes.

For acute phase ocular presentations, the participants evaluated retrospectively, so we do not know what type of their ophthalmologic status was. Climate factors must be considered for the influencing factor for ocular symptoms.

Due to safety concerns and significant technical difficulties of performing while having donned full PPE absence of slit-lamp bio microscopic examination and fundus evaluation was a potential compromise of our study.

CONCLUSION

Any individual that has a typical presentation of acute watery sore eyes with irritation should be considered highly contagious, even if COVID status is negative or unknown. Attention to ocular manifestations in combination with other COVID-19 signs could help improve COVID-19 diagnosis and management strategies. This study has broadened our view to a wider palate of presentation patters of the common ocular symptoms of hospitalized COVID patients as well as its dreaded ocular complications.it can be “arrow in our Quiver” to target the management protocols of subsequent covid waves as diagnostic and preventive criteria.

The study concluded a typical presentation pattern for covid sore eyes. Timely and through checkup for ocular manifestations in covid patients can be considered as key point to counsel patient about disease transmission as well as to treat and prevent dreaded ocular complications. That reflects importance of collaboration among interspeciality medical teams to manage and improve ocular outcome of covid patients.

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