

## Corneal and Conjunctival Manifestations of Coronavirus Disease 2019 (SARS-CoV-2) in Sohag Governorate, Egypt

Hany Mahmoud<sup>1\*</sup>, Amr Elrashidy<sup>2</sup>, Hesham Elsherif<sup>3</sup>, Amr Mounir<sup>4</sup>

<sup>1</sup> Lecturer of Ophthalmology, Faculty of Medicine, Sohag University, Egypt

<sup>2</sup> Consultant of Tropical Medicine, Sohag Tropical Medicine Hospital, Egypt

<sup>3</sup> Consultant of Tropical Medicine, Sohag Tropical Medicine Hospital, Egypt

<sup>4</sup> Lecturer of Ophthalmology, Faculty of Medicine, Sohag University, Egypt

E-mail: drhanymahmoud@gmail.com

### Abstract:

**PURPOSE:** To evaluate the corneal and conjunctival manifestations of patients with positive Coronavirus Disease 2019 (COVID-19) in Sohag Province, Egypt.

**PATIENTS& METHODS:** 63 patients who suffered from COVID-19 in the period 10–24 May 2020 at Sohag Tropical Medicine Hospital were enrolled in this study; they were subjected to anterior segment examination by the portable slit lamp or bedside examination.

**RESULTS:** The study included 63 patients 37 male patients (58.7 %) and 28 female patients (44.4 %). The mean age of patients was 36.12± 14.24 with age range [19:71ys]. 13 cases were presented with anterior segment manifestations. 5(7.9%) patients suffered from conjunctival hyperemia, 2 (3.1%) patients suffered from follicular conjunctivitis, 2 (3.1%) patients presented with conjunctival chemosis and 2(3.1%) patients (one of them was on mechanical ventilation) suffered from subconjunctival hemorrhage.

**Conclusion:** Important number of COVID-19 patients are presenting with ocular complaints mainly anterior segment manifestation like conjunctival hyperemia and follicular conjunctivitis. Infection prevention protocols are mandatory to limit potential ocular transmission of COVID-19 during the pandemic.

**Key words:** COVID-19, corneal and conjunctival manifestations, follicular conjunctivitis, subconjunctival hemorrhage, Sohag

### Introduction:

Since December 2019, Coronavirus disease 2019 (COVID-19) has been reported among patients in China. The disease shows quick spreading

worldwide. The pathogen of COVID-19 is a novel coronavirus (severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]), which identified as a member of the Coronaviridae family.<sup>1</sup>

The natural course of the disease has been found to have an incubation period of 2–7 days, preceded by a pyrexia (38.0°C or more) and may be associated with chills, rigors, myalgia, malaise, dry cough, dyspnea, or headache. <sup>2</sup>

Few previous studies have evaluated ophthalmological signs and symptoms in patients infected with SARS-CoV-1 and SARS-CoV-2. A few papers have evaluated for the presence of SARS-CoV-2 in tear fluid. <sup>3,4</sup>

The eyes represent an important point of entry for respiratory coronaviruses. <sup>5</sup> Lack of wearing eye protection was associated with an increased risk of coronavirus transmission from infected patients to health care workers during the 2003 Toronto severe acute respiratory syndrome SARS outbreak. <sup>6</sup>

The most common ophthalmologic sign related to coronavirus infection was conjunctival inflammation (conjunctivitis). <sup>7</sup>

The aim of this study was to report the corneal and conjunctival in patients diagnosed as positive Coronavirus Disease 2019 (SARS-CoV-2) in Sohag Governorate, Egypt.

## PATIENTS AND METHODS:

This was a case series study of 63 cases of hospitalized COVID-19 patients in a referral hospital in Sohag city, Sohag governorate, Egypt. Patients who presented with symptoms of SARS Infection and confirmed by conventional qualitative reverse transcription-polymerase chain reaction (RT-PCR) on nasopharyngeal specimens in the period 10–24 May 2020 at Sohag Tropical Medicine Hospital were included in the study.

Included cases were defined according to WHO case definitions. <sup>8</sup>

The ophthalmic examination in cases of suspicious COVID-19, universal precautions had been followed, including standard infection prevention measures as well as new approaches directed toward COVID-19, as outlined by the AAO. <sup>9</sup>

A thorough history had been conducted regarding the onset, duration, and characteristics of symptoms. A presumptive diagnosis can be obtained based on detailed history taking followed by eye examination.

Anterior segment examination by the portable slit lamp or bedside examination can confirm findings of ocular surface diseases. Measurement of visual acuity, intraocular pressure, with

dilated fundus examination may be needed to rule out more dangerous ocular diseases. The study protocol was approved by the ethical committee of the Sohag Tropical diseases Hospital, and all the included patients provided written informed consent.

## RESULTS:

The study included 63 cases of hospitalized COVID-19 patients with positive RT-PCR on nasopharyngeal specimens in the period 10–24 May 2020. They included 37 male patients (58.7 %) and 28 female patients (44.4 %).

Mean of patients' age  $36.12 \pm 14.24$  with age range [19:71ys]. 63 patients were in good general condition and didn't necessitate intensive care unit ICU admission, 5 patients were subjected to mechanical ventilation and improved at ICU and 3 patients had died after mechanical ventilation.

Thirteen cases were complaining of eye manifestations, as regards the symptoms; 5 patients were complaining of redness and watery eye, 2 patients were complaining of bloody eye appearance, 2 patients were complaining of puffy eye, 2 patient were complaining of foreign body sensation, 1 patient was complaining of watery eye

only and 1 patient was complaining of yellowish eye discharge. All symptoms were summarized in table 1

Table 1: Characters of patients' symptoms at presentation

Symptom	Number	percentage
Redness and watery eye	5	7.9%
Bloody eye	2	3.1%
Foreign body sensation	2	3.1%
Discharge	1	1.58%
Watery eye	1	1.58%
Puffy eye	2	3.1%

After external eye and anterior segment examination by the portable slit lamp or bedside examination, the following signs were found; 5 cases showed conjunctival hyperemia in bulbar and palpebral conjunctiva (Figure 1), 2 cases showed conjunctival Chemosis, 2 cases showed follicular conjunctivitis (Figure 2), 2 cases showed eyelid edema and 2 cases showed Subconjunctival hemorrhage (Figure 3). All signs were summarized in table 2

Table 2: Characters of patients' signs at presentation

Signs	Number	percentage
Conjunctival Hyperemia	5	7.9%
Conjunctival Chemosis	2	3.1%
Follicular conjunctivitis	2	3.1%
Eyelid edema	2	3.1%
Subconjunctival hemorrhage	2	3.1%



Figure 3: Subconjunctival hemorrhage



Figure 1: Conjunctival Hyperemia



Figure2: Follicular conjunctivitis

During the period of follow up, the patients with follicular conjunctivitis and conjunctival chemosis were treated with weak steroids and tear substitutes for about one week, all resolved.

Another 2 patients, one of them was on mechanical ventilator, suffered from subconjunctival hemorrhage, and was treated with antibiotics and tear substitutes for eye drops and eye patches if needed.

The systemic clinical features of 13 Patients with anterior segment manifestations were summarized in table 3

Table 3: Systemic clinical features of 13 Patients with anterior segment manifestations

Patient (Sex, Age)	Temperature On admission °C	Respiratory manifestations	Clinical Grade
F , 37 ys	38.5	Dyspnea	Moderate
M , 31 ys	38	Dyspnea, cough	Moderate
M , 45 ys	39	Dyspnea, diarrhea	Moderate
M , 48 ys	38.5	Dyspnea	Moderate
F , 64 ys	39.5	Dyspnea, cough	Critical
F , 71 ys	39	Cough	Moderate
M , 29 ys	38	Dyspnea	Moderate
M , 30 ys	39	Dyspnea	Severe
F , 61 ys	39.5	Dyspnea, cough	Moderate
M , 33 ys	38	Dyspnea, diarrhea	Severe
M , 27 ys	38.5	Cough	Moderate
M , 29 ys	38	Dyspnea	Critical

## DISCUSSION:

The family of Coronaviridae viruses consists of enveloped viruses with a large plus-strand RNA genome that is capped and polyadenylated.<sup>10</sup> The serology of each type is characterized by a specific host range and genome sequence.

The most pathogenic of the types of coronaviruses is SARS-CoV, which causes a life-threatening pneumonia.<sup>11, 12</sup>

In our study, we reported the anterior segment manifestations of patients with positive Coronavirus Disease 2019 (COVID-19) in Sohag city, Egypt, we found that there were 13 cases with anterior segment manifestations.

Redness and watery eye together with conjunctival hyperemia were the most prominent

symptom and sign in these patients.

In a study of Wu P et al,<sup>13</sup> they investigated the ocular manifestations and viral prevalence in the conjunctiva of patients with COVID-19 in Hubei Province, China, they found that 12 of 38 patients suffered from ocular manifestations in a picture of conjunctivitis, including conjunctival hyperemia, epiphora, chemosis, and increased secretions.

Conjunctival involvement in the form of hyperemia with eye watering has been noted even with the previous corona virus pandemic in 2003-04.<sup>14</sup>

The route of virus spread from nose to the eye had been hypothesized that it occurs through spread by different ways ranging from a direct ocular mucous membrane virus

inoculation, to spread through lacrimal duct through nasopharynx and by systemic spread to ocular surface through lacrimal gland, however; none of these routes are proven.<sup>15</sup>

In our study, there were 2 cases with bilateral follicular conjunctivitis with watery discharge, palpebral conjunctival follicles, and tender palpable preauricular lymph nodes which was consistent with acute viral conjunctivitis.

2 case reports documented bilateral follicular conjunctivitis in a COVID-19 positive patient with positive ocular swabs, these reports suggest that tears can be a potential source of infection early in the course of the disease and that the conjunctiva may sustain viral RNA replication for an longer period of time.<sup>16, 17</sup>

Subconjunctival hemorrhage was the only ocular presentation in 2 patients; one of them was in critical stage on mechanical ventilation, here; it wasn't a true ocular manifestation of the virus but it can be explained by the sudden severe venous congestion to the head which occurs due to severe cough especially in critical ill patients.<sup>18</sup>

Limitations of this study included a relatively small number of cases and absence of detailed

ocular examinations to exclude intraocular disease due to the logistic limitations of managing these patients at this time, also the precautions which are needed to limit the transmission of infection to the health care workers interfered with investigating these patients ophthalmologically.

**In conclusion;** important number of COVID-19 patients are presenting with ocular complaints mainly anterior segment manifestation like conjunctival hyperemia and follicular conjunctivitis. Infection prevention protocols are mandatory to limit potential ocular transmission of COVID-19 during the pandemic.

### References:

1. Lu R, Zhao X, Li J, et al. Genomic characterization and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*. 2020;395(10224):565-574.
2. Zhong NS, Zheng BJ, Li YM, et al. Epidemiology and cause of severe acute respiratory syndrome (SARS) in Guangdong, People's Republic of China, in February, 2003. *Lancet*. 2003;362(9393):1353-1358.
3. Peiris JS, Yuen KY, Osterhaus AD, Stöhr K. The severe acute respiratory syndrome. *N Engl J Med*. 2003;349(25):2431-2441.
4. Loon SC, Teoh SC, Oon LL, et al. . The severe acute respiratory syndrome coronavirus in tears. *Br J Ophthalmol*. 2004;88(7):861-863.

5. Belser J.A., Rota P.A., Tumpey T.M. Ocular tropism of respiratory viruses. *Microbiol Mol Biol Rev.* 2013;77(March (1)):144–156.
6. Raboud J., Shigayeva A., McGeer A. et al, Risk factors for SARS transmission from patients requiring intubation: a multicentre investigation in Toronto, Canada. *PLoS One.* 2010; 5(5): e10717.
7. Amesty MA, Alió Del Barrio JL, Alió JL. COVID-19 Disease and Ophthalmology: An Update [published online ahead of print, 2020 May 22]. *Ophthalmol Ther.* 2020;1-12.
8. World Health Organization. Case definitions for surveillance of severe acute respiratory syndrome (SARS). ([www.who.int/csr/sars/casedefinition/en](http://www.who.int/csr/sars/casedefinition/en))
9. Chodosh J, Holland GN, Yeh S. Important coronavirus updates for ophthalmologists. Available at: <https://www.aao.org/headline/alert-important-coronavirus-context>. Accessed June 1, 2020.
10. Peiris JS, Chu CM, Chang VC, et al. Clinical progression and viral load in a community outbreak of coronavirus-associated SARS pneumonia: a prospective study. *Lancet.* 2003;361:1767–72.
11. Lai MM. SARS virus: the beginning of the unraveling of a new coronavirus. *J Biomed Sci.* 2003;10:664–75.
12. Drosten C, Günther S, Preiser W, et al. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *N Engl J Med.* 2003;348:1967–76.
13. Wu P, Duan F, Luo C, et al. Characteristics of Ocular Findings of Patients With Coronavirus Disease 2019 (COVID-19) in Hubei Province, China [published online ahead of print, 2020 Mar 31]. *JAMA Ophthalmol.* 2020;138(5):575-578.
14. 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;1-5.
15. Qing H, Li Z, Yang Z, et al. The possibility of COVID-19 transmission from eye to nose. *Acta Ophthalmol.* 2020;98(3):e388.
16. Chen L, Liu M, Zhang Z, et al. Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease. *Br J Ophthalmol* 2020;0:1–4.
17. Colavita F, Lapa D, Carletti F, et al. SARS-CoV-2 isolation from ocular secretions of a patient with COVID-19 in Italy with prolonged viral RNA detection. *Ann Intern Med* 2020; <https://doi.org/10.7326/M20-1176>.
18. Duke-Elder S. System of Ophthalmology Diseases of the Outer Eye. VIII. London: Henry Kimpton; 1965. Conjunctival diseases; pp. 34–39.