# Evidence Search Service Results of your search request

## Ocular manifestations of COVID-19

**ID of request:** 22799  
**Date of request:** 20th April, 2020  
**Date of completion:** 22nd April, 2020

If you would like to request any articles or any further help, please contact:  Jason Curtis at [jason.curtis1@nhs.net](mailto:jason.curtis1@nhs.net)

Please acknowledge this work in any resulting paper or presentation as: Evidence search: Ocular manifestations of COVID-19. Jason Curtis. (22nd April, 2020). SHREWSBURY, UK: Shrewsbury and Telford Health Libraries.

**Sources searched**  
EMBASE (2)  
Google Scholar (1)  
MEDLINE (11)  
TRIP Database (1)

**Date range used** (5 years, 10 years): 2019 -   
**Limits used** (gender, article/study type, etc.): English-language only   
**Search terms and notes** (full search strategy for database searches below):

Relevant natural language and controlled vocabulary terms were selected and combined. Final result sets were de-duplicated and reviewed for relevance by the searcher, irrelevant results being discarded.

Searched: Medline, EMBASE, TRIP Database, NICE Evidence Search, Cochrane Library, UpToDate,

Search strategy for TRIP, NICE, Cochrane, UpToDate and Google Scholar:

(coronavirus OR covid19 OR covid-19 OR "corona virus") AND (eye OR eyes OR ocular OR ophthamology OR conjunctivitis OR conjunctival)

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### [C. Search History](#SearchHistory)

## A. Synopses or Summaries

#### Centre for Evidence-Based Medicine

**Spreading SARS-CoV-2 through ocular fluids** (2020)

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The evidence so far is that conjunctival secretions and tears from patients with SARSCoV-2 infection can contain virus RNA. Under 1% of patients with the infection will have conjunctivitis. They may pose a greater risk than those without ocular symptoms.

## B. Original Research

1. **A comprehensive Chinese experience against SARS-CoV-2 in ophthalmology.**  
   Yu A.-Yong Eye and vision (London, England) 2020;7:19.

The 2019 novel coronavirus disease (COVID-19) has now swept through the continents and poses a global threat to public health. Several investigations have been conducted to identify whether COVID-19 can be transmitted through the ocular route, and the conclusion is that it is a potential route but remains uncertain. Due to the face-to-face communication with patients, frequent exposure to tears and ocular discharge, and the unavoidable use of equipment which requires close proximity, ophthalmologists carry a high risk of contracting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Based on 33 articles published by Chinese scholars, guidelines and clinical practice experience in domestic hospitals, we have summarized the Chinese experience through the lens of ophthalmology, hoping to make a contribution to protecting ophthalmologists and patients around the world.

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1. **Can the Coronavirus Disease 2019 (COVID-19) Affect the Eyes? A Review of Coronaviruses and Ocular Implications in Humans and Animals.**  
   Seah Ivan Ocular immunology and inflammation 2020;28(3):391-395.

In December 2019, a novel coronavirus (CoV) epidemic, caused by the severe acute respiratory syndrome coronavirus - 2 (SARS-CoV-2) emerged from China. This virus causes the coronavirus disease 2019 (COVID-19). Since then, there have been anecdotal reports of ocular infection. The ocular implications of human CoV infections have not been widely studied. However, CoVs have been known to cause various ocular infections in animals. Clinical entities such as conjunctivitis, anterior uveitis, retinitis, and optic neuritis have been documented in feline and murine models. In this article, the current evidence suggesting possible human CoV infection of ocular tissue is reviewed. The review article will also highlight animal CoVs and their associated ocular infections. We hope that this article will serve as a start for further research into the ocular implications of human CoV infections.

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1. **Characteristics of Ocular Findings of Patients With Coronavirus Disease 2019 (COVID-19) in Hubei Province, China.**  
   Wu Ping JAMA ophthalmology 2020;:No page numbers.

ImportanceWhile the outbreak of coronavirus disease 2019 (COVID-19) has resulted in more than 100 000 infected individuals in China and worldwide, there are few reports on the association of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) with ocular abnormalities. Understanding ocular manifestations of patients with COVID-19 by ophthalmologists and others may facilitate the diagnosis and prevention of transmission of the disease.ObjectiveTo investigate ocular manifestations and viral prevalence in the conjunctiva of patients with COVID-19.Design, Setting, and ParticipantsIn this case series, patients with COVID-19 treated from February 9 to 15, 2020, at a hospital center in Hubei province, China, were retrospectively reviewed for ocular manifestations. During the period of treatment, the ocular signs and symptoms as well as results of blood tests and reverse transcriptase-polymerase chain reaction (RT-PCR) from nasopharyngeal and conjunctival swabs for SARS-CoV-2 were noted and analyzed.Main Outcomes and MeasuresOcular signs and symptoms as well as results of blood tests and RT-PCR for SARS-CoV-2.ResultsOf the 38 included patients with clinically confirmed COVID-19, 25 (65.8%) were male, and the mean (SD) age was 65.8 (16.6) years. Among them, 28 patients (73.7%) had positive findings for COVID-19 on RT-PCR from nasopharyngeal swabs, and of these, 2 patients (5.2%) yielded positive findings for SARS-CoV-2 in their conjunctival as well as nasopharyngeal specimens. A total of 12 of 38 patients (31.6%; 95% CI, 17.5-48.7) had ocular manifestations consistent with conjunctivitis, including conjunctival hyperemia, chemosis, epiphora, or increased secretions. By univariate analysis, patients with ocular symptoms were more likely to have higher white blood cell and neutrophil counts and higher levels of procalcitonin, C-reactive protein, and lactate dehydrogenase than patients without ocular symptoms. In addition, 11 of 12 patients with ocular abnormalities (91.7%; 95% CI, 61.5-99.8) had positive results for SARS-CoV-2 on RT-PCR from nasopharyngeal swabs. Of these, 2 (16.7%) had positive results for SARS-CoV-2 on RT-PCR from both conjunctival and nasopharyngeal swabs.Conclusions and RelevanceIn this study, one-third of patients with COVID-19 had ocular abnormalities, which frequently occurred in patients with more severe COVID-19. Although there is a low prevalence of SARS-CoV-2 in tears, it is possible to transmit via the eyes.

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1. **Evaluation of coronavirus in tears and conjunctival secretions of patients with SARS-CoV-2 infection.**  
   Xia Jianhua Journal of medical virology 2020;:No page numbers.

OBJECTIVEThis study aimed to assess the presence of novel coronavirus in tears and conjunctival secretions of SARS-CoV-2 infected patients.METHODSA prospective interventional case series study was performed, and 30 confirmed novel coronavirus pneumonia (NCP) patients were selected at the First Affiliated Hospital of Zhejiang University from January 26, 2020 to February 9, 2020. At an interval of 2-3 days, tear and conjunctival secretions were collected twice with disposable sampling swabs for reverse transcription polymerase chain reaction (RT-PCR) assay.RESULTS21 common type and 9 severe type NCP patients were enrolled. Two samples of tear and conjunctival secretions were obtained from the only one patient with conjunctivitis yielded positive RT-PCR results. 58 samples from other patents were all negative.CONCLUSIONWe speculate that SARS-CoV-2 may be detected in the tears and conjunctival secretions in NCP patients with conjunctivitis. This article is protected by copyright. All rights reserved.

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1. **Is novel coronavirus disease (COVID-19) transmitted through conjunctiva?**  
   Peng Y. Journal of Medical Virology 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ec770d3958060804abee10a27b830d37)

1. **Keratoconjunctivitis as the initial medical presentation of the novel coronavirus disease 2019 (COVID-19).**  
   Cheema Marvi Canadian journal of ophthalmology. Journal canadien d'ophtalmologie 2020;:No page numbers.

We present a case of coronavirus disease 2019 (COVID-19) with an initial medical presentation of keratoconjunctivitis, the first such reported case in North America. The patient's primary symptom was a red eye with watery discharge, though she did have mild respiratory symptoms, without fever. She was diagnosed with keratoconjunctivitis; evolving corneal findings were characterized through repeat visits to ophthalmology. A conjunctival swab of the affected eye was positive for the SAR-CoV-2 virus. This case emphasizes the importance of ensuring that first-line health care providers, including ophthalmologists, optometrists, emergency physicians, and family physicians, consider COVID-19 on the differential for any patient with recent travel who presents with acute conjunctivitis. Having a high index of suspicion with this presentation would allow for appropriate precautions to be taken to prevent further spread of COVID-19.

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1. **Novel Coronavirus disease 2019 (COVID-19): The importance of recognising possible early ocular manifestation and using protective eyewear.**  
   Li Ji-Peng Olivia The British journal of ophthalmology 2020;104(3):297-298.

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=cb35d6ec870766f23e1e1e41e5028e3d)

1. **Ocular manifestation, eye protection, and COVID-19**  
   Mungmungpuntipantip R. Graefe's Archive for Clinical and Experimental Ophthalmology 2020;:No page numbers.

[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=ff6815a950e69b1f0831641176297320)

1. **Ocular manifestations of a hospitalised patient with confirmed 2019 novel coronavirus disease.**  
   Chen Lu The British journal of ophthalmology 2020;:No page numbers.

PURPOSETo report the ocular characteristics and the presence of viral RNA of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in conjunctival swab specimens in a patient with confirmed 2019 novel coronavirus disease (COVID-19).PARTICIPANT AND METHODSA 30-year-old man with confirmed COVID-19 and bilateral acute conjunctivitis which occurred 13 days after illness onset. Based on detailed ophthalmic examination, reverse transcription PCR (RT-PCR) was performed to detect SARS-CoV-2 virus in conjunctival swabs. The ocular characteristics, presence of viral RNA and viral dynamics of SARS-CoV-2 in the conjunctival specimens were evaluated.RESULTSSlit lamp examination showed bilateral acute follicular conjunctivitis. RT-PCR assay demonstrated the presence of viral RNA in conjunctival specimen 13 days after onset (cycle threshold value: 31). The conjunctival swab specimens remained positive for SARS-CoV-2 on 14 and 17 days after onset. On day 19, RT-PCR result was negative for SARS-CoV-2.CONCLUSIONSARS-CoV-2 is capable of causing ocular complications such as viral conjunctivitis in the middle phase of illness. Precautionary measures are recommended when examining infected patients throughout the clinical course of the infection. However, conjunctival sampling might not be useful for early diagnosis because the virus may not appear initially in the conjunctiva.

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1. **Precautionary measures needed for ophthalmologists during pandemic of the coronavirus disease 2019 (COVID-19).**  
   Wan Kelvin H. Acta ophthalmologica 2020;:No page numbers.

The novel coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) emerged in December 2019 in Wuhan, China has spread to over 113 countries with 118,326 infected and 4,292 died as of 11 March 2020 and the World Health Organization (WHO) has just announced COVID-19 a global pandemic. A person under investigation (PUI) for COVID-19 is less likely to present initially to the ophthalmologists compared to emergency care or internal medicine physicians. However, in late February 2020, 2 patients presented simultaneously to our eye casualty with sudden onset of unilateral painful red eye associated with a decline in visual acuity, their intraocular pressure (IOP) were over 40 mmHg and slit-lamp examination findings were suggestive of acute primary angle closure (APAC).

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[Available online at this link](https://www.knowledgeshare.nhs.uk/index.php?PageID=link_resolver&link=1b4e09ca06ae20acca06f8044c760cdc)

1. **Role of the Eye in Transmitting Human Coronavirus: What We Know and What We Do Not Know**  
   Sun Preprints 2020;:na.

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1. **SARS-CoV-2 may be related to conjunctivitis but not necessarily spread through the conjunctiva SARS-CoV-2 and conjunctiva.**  
   Guo Dongyu Journal of medical virology 2020;:No page numbers.

We appreciate the comments of Liu et al.1 and Peng et al.2 in relation to our previous study. Currently, the controversy on the relationship among SARS-CoV-2 infection, the ocular surface and conjunctivitis are reflected in two aspects as follows: (i) can SARS-CoV-2 infection cause conjunctivitis? (ii) can SARS-CoV-2 be transmitted through the ocular surface? This article is protected by copyright. All rights reserved.

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1. **The evidence of SARS-CoV-2 infection on ocular surface.**  
   Zhang Xian The ocular surface 2020;:No page numbers.

This is a cross-sectional study of patients who received a COVID-19 diagnosis between December 30, 2019 and February 7, 2020 at Tongji Hospital. A total of 102 patients (48 Male [47%] and 54 Female [53%]) with clinical symptoms, Rt, and chest Computed Tomography (CT) abnormalities were identified with a clinical diagnosis of COVID-19. Patients had a mean [SD] gestational age of 57.63 [14.90] years. Of a total of 102 patients identified, 72 patients (36 men [50%] and 36 women [50%]; mean [SD] age, 58.68 [14.81] years) were confirmed to have COVID-19 by laboratory diagnosis with a SARS-CoV-2 RT-PCR assay. Only two patients (2.78%) with conjunctivitis were identified from 72 patients with a laboratory confirmed COVID-19. Of those two patients, SARS-CoV-2 RNA fragments were found in ocular discharges by SARS-CoV-2 RT-PCR in only one patient. Our findings suspect the incidence of SARS-CoV-2 infection through the ocular surface is extremely low, while the nosocomial infection of SARS-CoV-2 through the eyes after occupational exposure is a potential route. To lower the SARS-CoV-2 nosocomial infection, all health care professionals should wear protective goggles.The inefficient diagnostic method and the sampling time lag may contribute to the lower positive rate of conjunctival swab samples of SARS-CoV-2.

1. **There may be virus in conjunctival secretion of patients with COVID-19.**  
   Liang Liang Acta ophthalmologica 2020;:No page numbers.

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Click on the Search button (illustrated with binoculars). This will open up a search window. Type in the term you need to find and links to all of the references to that term within the document will be displayed in the window. You can jump to each reference by clicking it.

**Word documents**  
Select Edit from the menu, the Find and type in your term in the search box which is presented. The search function will locate the first use of the term in the document. By pressing 'next' you will jump to further references.

## C. Search History

|  | **Source** | **Criteria** | **Results** |
| --- | --- | --- | --- |
| 2. | Medline | exp CORONAVIRUS/ | 12080 |
| 3. | Medline | (coronavirus OR "corona virus" OR covid19 OR covid-19 OR wuhan OR hubei OR "novel coronavirus" OR "2019-nCoV" OR "SARS-Cov").ti,ab | 18905 |
| 4. | Medline | exp CORONAVIRUS INFECTIONS/ | 10466 |
| 5. | Medline | (2 OR 3 OR 4) | 26460 |
| 6. | Medline | exp "EYE DISEASES"/ | 562697 |
| 7. | Medline | (conjunctiv\* OR chemosis OR epiphora OR uveitis OR retin\*).ti,ab | 294581 |
| 8. | Medline | (ophthalmolog\* OR eye OR eyes).ti,ab | 371816 |
| 9. | Medline | (ocular ADJ2 (involvement OR manifestation\* OR disease\* OR symptom\*)).ti,ab | 20339 |
| 10. | Medline | (6 OR 7 OR 8 OR 9) | 898988 |
| 11. | Medline | (5 AND 10) | 269 |
| 12. | Medline | 11 [DT FROM 2019] | 82 |
| 14. | EMBASE | (coronavirus OR "corona virus" OR covid19 OR covid-19 OR wuhan OR hubei OR "novel coronavirus" OR "2019-nCoV" OR "SARS-Cov").ti,ab | 20859 |
| 15. | EMBASE | exp CORONAVIRUS INFECTIONS/ | 11955 |
| 16. | EMBASE | exp CORONAVIRINAE/ | 12944 |
| 17. | EMBASE | (14 OR 15 OR 16) | 31309 |
| 18. | EMBASE | exp "EYE DISEASES"/ | 895992 |
| 19. | EMBASE | (conjunctiv\* OR chemosis OR epiphora OR uveitis OR retin\*).ti,ab | 415634 |
| 20. | EMBASE | (ophthalmolog\* OR eye OR eyes).ti,ab | 468849 |
| 21. | EMBASE | (ocular ADJ2 (involvement OR manifestation\* OR disease\* OR symptom\*)).ti,ab | 23580 |
| 22. | EMBASE | (18 OR 19 OR 20 OR 21) | 1254134 |
| 23. | EMBASE | (17 AND 22) | 521 |
| 24. | EMBASE | 23 [DT FROM 2019] [English language] | 95 |

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