

Review on Covid-19-A Novel Virus-Ocular Implications

Madhu Yadav, M.Sc., **Shalini Mohan**, MS, DNB, MNAMS

Assistant Professor, Department of Microbiology, GSVM Medical College, Kanpur

Professor, Department of Ophthalmology, GSVM medical College, Kanpur

Abstract: In 1960 human coronaviruses was discovered. First study was from human patients with the common cold, and later was known as human coronavirus 229E and human coronavirus OC43.2]Corona virus causes respiratory infection including pneumonia, cold, sneezing and coughing while in animal it causes diarrhoea and upper respiratory diseases. Transmission of corona virus is from human to human or human to animal via airborne droplets. In human cell through membrane ACE-2 exopeptidase

receptor enters corona virus. CoVs 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. WHO has advised to avoid public place and close contact to infected persons and pet animals. Corona virus (2019-nCoV) was isolated from Wuhan market China at 7 Jan. 2020.

Keywords: Corona virus, COVID-19, MERS-CoV, SARS-CoV, Wuhan

History and Origin

Corona virus first case was identified as cold in 1960. In Canadian study 2001, approximately 500 patients were identified as Flu-like system. 17-18 cases of corona virus strain was confirmed as infected by polymerase chain reaction. Till 2002 Corona was considered to be as simple non fatal virus. Various reports were published in 2003 with the proofs of spreading the corona to many countries such as United States America, Vietnam, Singapore, Hong Kong, Thailand and in Taiwan. In 2003, several cases of severe acute respiratory syndrome was caused by corona and more than 1000 patient mortality was reported. This was the black year for microbiologist. When microbiologist was started focus to understand these problems. In 2004, "state emergency" was declared by World health organization and centers for disease control and prevention³⁻⁵. In 2012, Saudi Arabian reports were presented several infected patient and deaths. COVID-19 was first identified and isolated from pneumonia patient belongs to Wuhan, china.⁶⁻⁷

Microbiology

Corona virus is spherical or pleomorphic, single stranded, enveloped positive sense single stranded RNA and covered with club shaped glycoprotein. Corona viruses are four sub types such as alpha, beta, gamma and delta corona virus. Each of sub type corona viruses has many serotypes. Some of them were affect human of other affected animals such as pigs, birds, cats, mice and dogs.⁸⁻¹²

Mode of Spreading

Peoples can get the infection through close contact with a person who has symptoms from the virus includes cough and sneezing. Generally corona virus was spread via airborne zoonotic droplets. Virus was replicated in ciliated epithelium that caused cellular damage and infection at infection site.

According to a study published in 2019, Angiotensin converting enzyme 2 (ACE.2), a membrane exopeptidase in the receptor used by corona virus in entry to human cells.¹²⁻¹⁴

Characteristics

Corona virus infected patient have many common features such as fever, cough, and fatigue while diarrhea and dyspnea were found to be as uncommon feature report published on 24 jan 2020. Bilateral abnormalities were reported in many patients. In china in 2020 Corona virus was isolated from bronchoalveolar lavage fluid. It is also detected in blood samples. Till now, corona virus was not confirmed in faeces and urine sample of patient.¹⁵⁻¹⁷



Ocular Implications in Humans and Animals

World Health Organization (WHO) on 30th January has declared a public health emergency of international concern (PHEIC).¹⁸ On the experience of MERS-CoV and SARS-CoV a set of recommendations for personal protective equipment (PPE) based have been released.¹⁹ This set of recommendation includes wearing goggles or face shield for protection against ocular transmission of the CoV. Evidence of ocular transmission has still not been well studied. On the other hand, CoV ocular infection has been well established in various animals. In some cases, such as CoVs which affect the murine and feline orders, they can cause sight-threatening ocular complications. The feline CoV (FCoV) is an Alpha corona virus that affects both domestic and wild cats. The murine CoV mouse hepatitis virus (MHV) is a collection of strains that demonstrate very different organ tropisms. Such evidence suggests that CoVs can shed and even infect ocular issues. To

understand the ocular manifestation of human CoVs more research has to be done.

Health-care professionals are of great concern who has highlighted the presence of SARS-CoV RNA in tears. In 2004, tear samples were collected from suspected SARS-CoV patients and were sent for RT-PCR for the SARS-CoV. The findings of this study suggested that SARS-CoV can be present in tears and emphasized the need for appropriate precautions to prevent transmission through ocular tissues and secretions.²⁰ However, up till today, it is still unclear how SARS-CoV can end up in tears. Proposed theories include the conjunctiva being the direct inoculation site of SARS-CoV from infected droplets, the migration of upper respiratory tract infection through the nasolacrimal duct or even hematogenous infection of the lacrimal gland. Furthermore, the results were inconsistent across studies. Another study that assessed both tears and conjunctival scrapings from 17 patients with confirmed SARS-CoV infection did not yield any positive result from RT-PCR. The authors attributed the findings to three possibilities. Firstly, the RT-PCR was not sensitive enough to pick up small quantities of SARS-CoV RNA. Secondly, the sample collection was a one time process, which may have missed the window if viral shedding in ocular tissue only lasted for a short period of time. Finally, there is also the possibility that the SARS-CoV did not exist in ocular tissue. However, as the SARS-CoV epidemic died down, these crucial questions were left unanswered.^{21,22}

Clinical Progression-Diagnosis

Human CoVs leads to cold-like upper respiratory infection and self-limiting lower respiratory infection before SARS-CoV cases . By the isolation of SARS-CoV from a patient with pneumonia in China the first death due to coronaviruses was reported. Similarities present in the clinical aspects of COVID-19 infections as observed in other respiratory infected viruses and previous beta-CoV, it is known that clinical picture varies from simple respiratory infection findings to septic shock. Similar to SARS CoV and MERS CoV that caused epidemics in the past years, the first symptoms are commonly defined as fever, cough, shortness of breath. [23] Intestinal symptoms were rarely reported in patients with COVID-19 and diarrhea was observed in about 20-25% of patients with MERS-CoV or SARS-CoV infection . On X-rays or thorax CT imaging of the examined patients, unilateral or bilateral involvement compatible with viral pneumonia was found, and bilateral multiple lobular and subsegmental consolidation areas were observed in patients hospitalized in the intensive care unit.²⁴

Lab Diagnosis

Throat-swab and Nasopharyngeal specimens from the upper respiratory tract were obtained from all patients at admission/suspected were collected in viral-transport medium

whose temperature should be maintained between 2-8°C. These samples are triple layered packed in thermocol box . 2019-nCoV was confirmed by real-time RT-PCR using the protocol of ICMR. The sample then sent to nodal center KGMU for testing of Covid-19.

Prevention

According to WHO, separate the infected patient from other family member to single room, implementation of contact and droplet precaution, airborne precaution etc. European Centre for Disease Prevention and Control (ECDC) also published the information leaflet to peoples i.e. Avoid contact with sick people, in particular those with a cough. Avoid visiting markets and places where live or dead animals are handled, Wash your hands with soap and water or use an alcohol based disinfectant solution before eating, after using the toilet and after any contact with animals, Avoid contact with animals, their excretions or droppings.^{25,26}

Conclusion

Corona virus spreads in human to human transmission by close contact via airborne droplets generating by coughing, sneezing, kissing and smooching. Such activities should be avoided with infected partners and family members. Corona virus may transmit through pet animals such as dog, cat, pig, cow, turkeys. So avoid contact and separate them if observed any infection activities like diarrhea, cold, fever. Avoid contact with sick person and also avoid the market or public place as per possible as per WHO and ECDC guideline . There are no anti corona virus vaccine to preventor treatment but some supporting therapy work. As CoVs can cause ocular infection across different animals, the possibility of SARS-CoV-2 having ocular implications cannot be ignored. However, the examples in animals also highlight that CoVs are a heterogeneous group of viruses that can cause ocular implications through a wide variety of mechanisms. Some of these mechanisms are extremely different from those adopted by human CoVs. CoVs are responsible for producing a wide spectrum of ocular manifestations from anterior segment pathologies like conjunctivitis and anterior uveitis to sight-threatening conditions like retinitis and optic neuritis. It may also be prudent to recognize that CoVs can also develop in-vivo mutations which drastically alter the manifestations of the disease. Ophthalmologists and other health-care workers should continue to prevent the possible transmission of CoVs through ocular tissue. Future research needed to fight with corona virus. Till then only 'Distance is rescue'.

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