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Know the unknown fact of novel COVID -19 corona virus

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ABSTRACT

Coronavirus disease (COVID-19) is a contagious disease triggered by the novel coronavirus. A novel coronavirus was observed as the causative agent and was subsequently termed COVID-19 by the World Health Organization (WHO). In December 2019, a disruption of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections appeared in Wuhan, Hubei Province, China and spread across China and beyond. In India, the first case of CORONA virus was reported in Kerala state on 30 January 2020. The most common symptoms of COVID-19 are fever, cough, shortness of breath, and breathing difficulties. In more severe cases infection can give rise to pneumonia, severe acute respiratory syndrome, and even death. The period within which the symptoms would appear is 1-14 days i.e. the incubation period of COVID-19. The present review highlights the types, etiology, transmission stages, manifestations, prevention, therapeutic options, learning points from outbreak, and initiative taken by Government of India (GOI) to control the spread of literary deathly disease.

Keywords: *Corona; COVID-19; World Health Organization; Etiology; Transmission.*

1. INTRODUCTION

An unrivaled outbreak of novel COVID-19 with clinical symptoms of dry cough, dyspnea, fever, and bilateral lung infiltrates on imaging of unknown aetiology was observed in Wuhan City, Hubei province in China emerged in December 2019. The causative agent was recognized from throat swab samples of patients and was afterward named Severe Acute Respiratory Syndrome novel Coronavirus 2 (SARS-CoV-2). The disease was named COVID-19 by the World Health Organization (WHO) [1,2]. Coronaviruses are types of zoonotic viruses that typically influence the respiratory tracts of birds and mammals, including humans and they are transmitted between animals and people. Experts associate the novel COVID-19 disease with the common cold, bronchitis, pneumonia and severe acute respiratory syndrome [3].

2. MAIN TEXT

Corona at a Glance.

Coronaviruses (CoVs) be owned by the subfamily *Orthocoronavirinae* in the family of *Coronaviridae* in the order *Nidovirales*, and this subfamily including alpha-coronavirus, beta-coronavirus, gamma-coronavirus, and delta-coronavirus. Over the last 7 decades, researchers have found that coronaviruses can infect mice, rats, dogs, cats, turkeys, horses, pigs, and cattle. Sometimes, these animals can transmit coronaviruses to humans means undergo *zoonotic* transmission. CoV is an enveloped, positive-sense, single-stranded RNA beta-coronavirus. Similar to severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) viruses, the COVID-19 genome encodes non-structural proteins (such as 3-chymotrypsin-like protease, papain-like protease, helicase, and RNA-dependent RNA polymerase), structural proteins (such as spike glycoprotein) and accessory proteins [4]. Threatening diseases that have spread due to coronaviruses are COVID-19, SARS, and MERS (Table 1). Currently, scientists identified a new coronavirus outbreak that has now reached across various countries. It has the name coronavirus disease 2019, or COVID-19 [5, 6].

Types.

Different kinds of human corona viruses categorized on the basis of how severe the resulting disease becomes, and how far they can spread. Researchers recently recognize seven types of coronavirus that can infect humans. Common types include:

- 229E (alpha coronavirus)
- NL63 (alpha coronavirus)
- OC43 (beta coronavirus)
- HKU1 (beta coronavirus)
- MERS-CoV
- SARS-CoV
- SARS-CoV-2 (COVID-19)

Uncommon strains that cause more severe complications include MERS-CoV, which causes Middle East respiratory syndrome (MERS), and SARS-CoV, the virus responsible for the severe acute respiratory syndrome (SARS). In 2019, a new strain called SARS-CoV-2 started spreading and causing the disease COVID-19 [7].

Etiology.

The sequence analysis showed that the novel COVID-19 viruses possessed a typical genome structure of beta-coronaviruses including SARS-CoV and MERS-CoV7. Coronaviruses primarily cause enzootic infections in birds and mammals and, in the last decades, have shown to be capable of infecting humans as well. The first people with COVID-19 had links to an animal and seafood market. This fact suggested that animals initially transmitted the virus to humans (*zoonotic* transmission) [8].

Mechanism of Transmission & Spread.

Earlier investigations identified two species of snakes that could be a probable repository of the COVID-19. Though, there has

been no reconcilable affirmation of coronavirus resources other than mammals and birds [9]. Genomic sequence analysis of COVID-19 showed 88% similarity with bat-derived severe acute respiratory syndrome (SARS)-like coronaviruses, reveal that mammals are the most likely link between COVID-19 and humans. Several investigations have suggested that person-to-person transmission is a possible route for spreading COVID-19 infection. This is assisted by cases that observed within families and among people who did not visit the wet animal market. Person-to-person transmission occurs primarily *via* up-front contact or *via* droplets spread by coughing or sneezing from an infected person. In an investigation on women in their third trimester who were confirmed to be corona positive, there was no evidence that there is transmission from mother to child. However, all pregnant mothers went through caesarean sections, so it remains indefinite whether transmission can occur during vaginal birth. This is a relevant concern because pregnant mothers are relatively more prone to infection by respiratory pathogens and severe pneumonia [10].

The binding of a receptor demonstrated by presenter cells is the first step of viral infection followed by fusion with the cell membrane. It is rationale that the lung epithelial cells are the basic target of the virus. Thus, it has been observed that human-to-human transmissions of SARS-CoV occur by the binding between the receptor-binding domain of virus spikes and the cellular receptor which has been recognized as angiotensin-converting enzyme 2 (ACE2) receptor. Significantly, the sequence of the receptor-binding domain of COVID-19 spikes is familiar to that of SARS-CoV. This data strongly indicates that entry into the host cells is most likely *via* the ACE2 receptor.

There are currently few studies that suggest the pathophysiological features of COVID-19, and there is major uncertainty regarding its mechanism of spread. Current information is largely derived from similar coronaviruses, which are transmitted from human-to-human through the respiratory vehicle. Commonly, respiratory viruses are most infectious when a patient is symptomatic. However, there is an increasing case of evidence to reveal that human-to-human transmission may be occurring during the asymptomatic incubation period of COVID-19, which has been observed to be between 2 and 14 days [8]. It should be noted that, different countries/territories/areas may have differing degrees of transmission as observed by the distinguishable numbers of cases and other factors. These transmissions are categorised as under:

Community transmission is observed by the inability to relate confirmed cases through chains of transmission for a large number of cases, or by increasing positive tests through sentinel samples (routine systematic testing of respiratory samples from established laboratories).

Local transmission designates locations where the source of infection is within the reporting location.

Imported cases only indicate locations where all cases have been acquired outside the location of reporting.

Under investigation specify locations where type of transmission has not been determined for any cases.

Interrupted transmission recommends locations where interruption of transmission has been demonstrated (details to be determined) [11].

Stages of Pandemic.

The number of novel COVID-19 continues to surge across India. Following are the various stages of pandemic, i.e. another way to explain the mechanism of spread and what do they designate.

Stage 1: First appearance of the disease:

It is the stage when the COVID-19 is just placed, and positive cases observe for the very first time. In this phase of a pandemic, the disease does not spread locally. Cases observed are usually individuals who have had travel history to an already affected country or area.

Stage 2: Local transmission

This phase is when the local transmission starts to emerge. The virus spreads indigenously, through a person who either has a travel history, or the one who has come in direct contact with an already infected individual. This stage typically perceives an infected person and spread the virus onto his/her family, friends, neighbors, and individuals who tend to be in his/her close vicinity and locality. The virus transmission in this stage can be monitored by contact tracing, isolating people with manifestations, strict screening measures, social distancing, and lockdown efforts. According to the Indian Council of Medical Research (ICMR), India is currently in this stage of the novel coronavirus transmission.

Stage 3: Community transmission

This is the stage where the fraternity transmission starts to occur, making it difficult to trace the source of the infection. The infections are typically passed on community. Moreover, individuals who don't have a travel history to any infected 'hotspots', or who have had no known contact with any infected individual, also begin to test positive. Once community transmission begins, it becomes difficult to contain the disease and to stop the chain of transmission. As the disease appears in random persons in a community, contact tracing and isolation becomes impossible and large-scale lockdowns become extremely significant.

Stage 4: Widespread outbreak

In this fourth and final stage of transmission, there is a widespread outbreak (an epidemic) as the number of cases and deaths start rapidly multiplying, with no end in sight. In this stage, the disease becomes endemic, i.e. native to the population. While China witnessed this stage of transmission earlier in February, countries like Italy, USA, Spain and France are apparently in this stage [12].

Manifestation & Diagnosis.

Symptoms differ from person-to-person with COVID-19. It may give rise to few or no symptoms. However, it can also cause to severe illness and may be fatal. Common symptoms include fever, breathlessness, cough, potential loss of taste or smell. It may take 2–14 days for a person to notice symptoms after infection. Clinical features of COVID-19 include dry cough, fever, diarrhoea, vomiting, and myalgia. Individuals with multiple medical conditions are prone to severe infection and may also present with acute kidney injury (AKI) and features of Acute respiratory distress syndrome (ARDS). Extensive laboratory tests should be requested for patients with suspected infection. Patients may present with an elevated C-reactive protein, erythrocyte sedimentation rate, lactate dehydrogenase, creatinine, and prolonged prothrombin time. Full genome sequencing and phylogenetic analysis on fluid from broncho alveolar lavage can affirm COVID-2019 infection.

Investigations for other respiratory pathogens should also be conducted [13-16].

Prevention.

Various bodies including the WHO and US Centres for Disease Control and Prevention (CDC) have issued guidance on preventing further spread of COVID-19 [17, 18]. They advised avoiding travel to high risk locations, contact with individuals who are symptomatic, and the consumption of meat from regions with known COVID-19 outbreak.

Basic hand hygiene measures are also advised, including frequent hand washing and the use of Personal Protective Equipment (PPE) such as face masks. Japanese based company Bespoke Inc. has also launched an artificial intelligence powered chatbot (Bebot) that provides up-to-date information regarding the coronavirus outbreak, preventative measures that can be taken, as well as a symptom checker. India has launched Aarogya Setu COVID-19 tracking mobile application to prevent and control the pandemic includes self-care and over-the-counter (OTC) medication [19]. People can take several steps, including:

- Resting and avoiding overexertion
- Drinking enough water
- Avoiding smoking and smoky areas
- Taking acetaminophen for pain and fever
- Using a clean humidifier or cool mist vaporizer

Therapeutic options.

The on-on-one transmission of COVID-19 infection led to the isolation of patients that were managed with a variety of treatments. At present, there are no particular antiviral drugs or vaccine against COVID-19 disease for potential therapy of humans. The only tentative alternative available is using broad-spectrum antiviral drugs like Nucleoside analogues and also HIV-protease inhibitors that could attenuate virus infection until the specific antiviral becomes available [20, 21]. The course of treatment included twice a day oral administration of 75 mg oseltamivir, 500 mg lopinavir, 500 mg ritonavir and the intravenous administration of 0·25 g ganciclovir for 3–14 days [22]. Another investigation indicated that the broad-spectrum antiviral remdesivir and hydroxyl chloroquine are really effective in the management of 2019-nCoV infection *in vitro*. These antiviral agents have been applicable in human patients with a safety track record. Thus, these medicaments can be considered to treat COVID-19 infection [23, 24]. Furthermore, there are a number of other compounds that are in development.

These include the clinical candidate EIDD-2801 compound that has shown high therapeutic potential against seasonal and pandemic influenza virus infections and this represents another potential moiety to be considered for the treatment of COVID-19 infection [25]. Along those lines, until more specific therapeutics become available, it is reasonable to consider more broad-spectrum antivirals that provide drug treatment options for COVID-19 infection include neuraminidase inhibitors, peptide (EK1) and RNA synthesis inhibitors. It is coherent however, that more research is urgently needed to identify novel active pharmaceutical ingredients for treating COVID-19 infections. Moreover, evidence shows that convalescent plasma from patients who have recovered from viral infections can be used as a treatment without the occurrence of severe adverse events [26, 27]. In order to develop pre-and post-exposure prophylaxis against COVID-19, there is a drastic need to establish an animal model to investigate the severe disease currently observed in humans. Several groups of scientists are currently working hard to develop a nonhuman primate model to study COVID-19 infection to establish hasten novel therapies and for the testing of potential vaccines in addition to providing a better perception of virus-host interactions [28-30].

Government of India (GOI) initiatives to fight against pandemic.

GOI reviews countrywide preparedness to deal with COVID-19 and directs officials to ensure sufficient availability of essential medical equipment. List of initiatives taken by GOI to tackle COVID-19 but not limited to [31]:

- Mask production initiated in wake of COVID-19 Pandemic under National Rural Livelihood Mission (NRLM) - *Ministry of Rural Development*
- Manual on homemade masks to prevent COVID-19 - *Ministry of Health and Family Welfare*
- CSIR- Institute of Microbial Technology (IMTECH) takes up sample testing for Covid-19 - *Office of Principal Scientific Advisor to GOI*
- President and Vice President hold discussions with Governors, Lieutenant Governors (LGs) and Administrators of States and Union Territories (UTs) on COVID-19 response - *President's Secretariat*
- Vice President urges Governors/ Lt. Governors to advice religious leaders to not hold any congregations/ functions - *Vice President's Secretariat*
- Armed Forces working hand-in-hand with civilian authorities in fight against COVID-19 - *Ministry of Defence*
- Prime Minister’s (PM's) address to the Nation - *Prime Minister's Office*
- Defence Research and Development Organization (DRDO) develops bio suit with seam sealing glue to keep health professionals fighting COVID-19 safe - *Ministry of Defence*
- Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) ties up with Wipro 3D to manufacture automated ventilators to meet COVID 19 related crisis - *Ministry of Science & Technology*
- PM interacts with Chief Ministers (CMs) to bolster efforts to tackle COVID-19 - *Prime Minister's Office*
- COVID-19 Fact Check Unit Comes into Operation - *Ministry of Information & Broadcasting*
- Government provides relief for third party Motor Insurance & Health policy holders in the light of COVID-19 lockdown - *Ministry of Finance*
- Homemade masks to overcome shortage - *Ministry of Science & Technology*
- Naval Dockyard Mumbai designs low cost Temperature Gun (IR based Temperature Sensor) - *Ministry of Defence*
- Ex-Servicemen mobilized to fight COVID-19 pandemic - *Ministry of Defence*
- Ministry of Home Affairs (MHA) writes to States/UTs to take measures to fight fake news in order to prevent panic among people and the spread of COVID-19 in India - *Ministry of Home Affairs*
- National Cadet Corps (NCC) offers its volunteer cadets for National duty to fight COVID-19 under 'Ex NCC Yogdan' - *Ministry of Defence*

- Food Corporation of India (FCI) ramps up food grain supplies across the country during the lockdown due to COVID-19 outbreak - *Ministry of Consumer Affairs, Food & Public Distribution*
- Cabinet Secretary meeting with Chief Secretaries / Director General of Police (DGPs) of all States via video conferencing - *Cabinet Secretariat*
- Launched National Monitoring Dashboard on COVID 19 Grievances - *Ministry of Personnel, Public Grievances & Pensions*
- The Reserve Bank of India (RBI) Moratorium on EMI: FREQUENTLY ASKED QUESTIONS - *Ministry of Finance*
- Tata Institute of Fundamental Research (TIFR) initiative to spread awareness on Covid-19 - *Ministry of Science & Technology*
- Updates on COVID-19 - *Ministry of Health and Family Welfare*
- National Testing Agency postpones Joint Entrance Examination (Main) April-2020 - *Ministry of Human Resource Development*
- No Shortage of Medicines to combat Covid-19 outbreak; - *Ministry of Chemicals and Fertilizers*
- Ayurveda's immunity boosting measures for self care during COVID 19 crisis – *AYUSH*
- Reviews the sampling and testing strategy for COVID 19 - *Ministry of Health and Family Welfare*
- Cargo flights carry medical supplies to eastern and southern parts of the country; private airlines also carry out critical supply operations - *Ministry of Civil Aviation*
- More than 280 units in special economic zones (SEZs), manufacturing essential items like pharmaceuticals and hospital devices, are operational - *Ministry of Commerce & Industry*
- Food Processing ministry forms Task Force in the wake of Covid-19 to resolve problems of the industry- *Ministry of Food Processing Industries*
- Prime Minister's video conference with the Heads of Indian Missions - *Prime Minister's Office*
- Premium payment period for Postal Life Insurance & Rural Postal Life Insurance extended upto 30th April 2020 - *Ministry of Communications*
- Govt gives benefits to farmers on crop loan repayments due to Covid-19 lockdown - *Ministry of Agriculture & Farmers Welfare*
- Transportation of essential commodities to various parts of the country by Indian Railways continues at full speed - *Ministry of Railways*
- Technology by Pune based Startup incubatee of Scitech Park to disinfect Maharashtra hospitals in Covid 19 fight - *Ministry of Science & Technology*
- COVID-19 Update: Availability of personal protective equipment (PPE) kits, N95 masks and ventilators - *Ministry of Health and Family Welfare*
- PM interacts with social welfare organizations - *Prime Minister's Office*
- MHA issues an Addendum to the Guidelines regarding Nationwide Lockdown to fight COVID-19 - *Ministry of Home Affairs*
- The government dedicated to alleviate sufferings of people during the Nationwide Lockdown to fight COVID-19: Union Home Minister - *Ministry of Home Affairs*
- National Book Trust, India of Ministry of Human Resource Development (MHRD) to launch 'Corona Studies Series' books to provide relevant reading materials for all age-groups for the post-Corona readership needs - *Ministry of Human Resource Development*
- Pradhan Mantri Garib Kalyan Package: Insurance scheme for health workers fighting COVID-19 - *Ministry of Health and Family Welfare*
- PM says social distancing is the most effective way of fighting against COVID-19; urges countrymen to protect themselves and their families - *Prime Minister's Office*
- Aarogya Setu is a COVID-19 tracking mobile application developed by the National Informatics Centre - *Ministry of Electronics and Information Technology.*

Learning point from COVID -19 pandemic.

Considerable actions to reduce person-to-person transmission of COVID-19 are necessary to control the current outbreak. Exceptional awareness and efforts to protect or reduce transmission should be pertaining to susceptible populations including children, health care workers, and elderly people. A guideline was published for the medical staff, healthcare workers, and, public health individuals and researchers who are interested in the 2019-nCoV [32].

Table 1. A comparison of SARS versus COVID-19 in terms of clinical presentation, incubation period, number infected globally, deaths globally, number infected in India and deaths in India. Data reported as of 4th May 2020 [4].

	SARS	COVID-19
Clinical presentation	Fever	Fever
	Dry cough	Cough
	Shortness of breath	Shortness of breath
Incubation period	2–7 days	2–14 days
Number infected globally	8096	3621631
Deaths globally	774	250847
Number infected in India	3	46437
Deaths in India	0	1566

The early death cases of COVID-19 outbreak happened primarily in the elderly individual, possibly due to a weak immune system that permits faster progression of viral infection. The public services and facilities should furnish decontaminating reagents for cleaning hands on a regular basis. Physical contact with wet and contaminated articles should be considered in dealing with the virus, mainly materials such as faecal and urine samples that can probably serve as an alternative route of transmission [33].

China and other countries including the Russia, India and Turkey have carried out major prevention and control measures including

travel screenings to control further spread of the virus. Epidemiological changes in COVID-19 transmission should be monitored taking into account potential routes of transmission and subclinical infections, in addition to the adaptation, evolution, and virus spread among humans and possible intermediate animals and reservoirs. There remains a considerable number of queries that require to be taken into consideration. These include, but are not limited to, details about who and how many people have been tested, what proportion of these people turned corona positive and whether this rate remains constant or variable. Very few paediatric cases have so far been observed; is this due to lack of testing or a true lack of infection/susceptibility? Of the ones that have so far been tested, how many have developed a severe disease and how many were tested positive but indicated no clinical sign of disease? There are some basic queries that would provide an outline for which more specific and detailed public health provisions can be carried out.

3. CONCLUSIONS

The novel COVID-19 outbreak has been considered as pandemic. Internationally, 3621631 cases of COVID-19 (in accordance with the applied case definitions and testing strategies in the affected countries) have been reported, including 250847 deaths. It is observed that quarantine alone may not be sufficient measure to prevent the spread of COVID-19, and the global impact of this viral infection is one of intensifying concern. Further investigation is undoubtedly needed to understand the exact mechanism of human-to-human and animal-to-human transmission to support the development of a virus-specific vaccine. Markedly, the pandemic potential of COVID-19 requires rigorous surveillance and on-going monitoring to accurately track and potentially predict its future host accommodation, extension, transmissibility, multiplication and virulence property. These factors will ultimately influence mortality rates and prediction of the course of the disease [34]. However, the rapidly growing feature of the novel-COVID-19 pandemic, ever changing statistics, and constant unwind of new research findings indicates a major limitation to the present review. The infection rate of COVID-19 in India is reported to be 1.7, significantly lower than in the worst affected countries. Michael Ryan, chief executive director of the Organization's health emergencies programme, said that India had "tremendous capacity" to deal with the coronavirus outbreak and, as the second most populous country, will have an enormous impact on the world's ability to deal with it.

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