



Corona Virus Outbreak

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Introduction

Very recently, a novel beta-CoVs coronavirus (2019-nCoV) originating from the province of Wuhan, China, has been causally linked to severe respiratory infections in humans.^[1] As of today 28/03/2020, there are 517678 confirmed cases of covid-19 in the world, involving 202 countries and resulting in almost 26,495 deaths worldwide^[2]. India has 819 positive cases resulting in 19 deaths. This article will give a panorama view of this new emerging infection. This corona virus infection is rapidly evolving and much of the details and research is required for the same.

History

Coronaviridae (CoVs) are the largest known single-stranded RNA viruses. Coronaviruses are members of the subfamily *Coronavirinae* in the family *Coronaviridae* and the order *Nidovirales* (International Committee on Taxonomy of Viruses).^[3] This subfamily consists of four genera

- Alpha-CoVs- responsible for gastrointestinal disorders in human, dogs, pigs, and cats;

- Beta-CoVs- including the Bat coronavirus (BCoV), the human severe acute respiratory syndrome (SARS) virus and the Middle Eastern respiratory syndrome (MERS) virus
- Gamma-CoVs- infecting birds
- Delta CoVs- infecting birds.^[1,3]

Origin and Spread of COVID 19

This virus was first detected in Wuhan City, Hubei Province, China. The first infections were linked to a live animal market, but the virus is now spreading from person-to-person. It is important to note that person-to-person spread can happen on a continuum.^[4]

On December 31 of last year, Chinese authorities alerted the World Health Organization of an outbreak of a novel strain of coronavirus causing severe illness, which was subsequently named SARS-CoV-2^[5]

On 31 December 2019, the WHO China Country Office was informed of cases of pneumonia unknown etiology (unknown cause) detected in Wuhan City, Hubei Province of China. From 31 December 2019 through 3 January 2020, a total of

44 case-patients with pneumonia of unknown etiology were reported to WHO by the national authorities in China. During this reported period, the causal agent was not identified.^[6]

On 30 January 2020, a laboratory confirmed case of 2019-nCoV was reported in Kerala. The patient, a student returning from Wuhan, is currently in stable condition and cared for in hospital isolation.^[7]

Between 30 January and 3 February 2020, Ministry of Health and Family Welfare (MoHFW) confirmed three cases of 2019-nCoV in Kerala. Patients are in stable condition and are being closely monitored in hospital isolation. MoHFW has designated, ICMR National Institute of Virology (NIV), Pune as the nodal centre for coordinating diagnostics for 2019-nCoV. As of 05 February 2020, 901 samples have been tested of which only 3 were positive^[8]. All three cases have fully recovered and discharged from the hospital. No further cases have been reported.^[9]

As of 09 March, a total of 44 confirmed cases have been reported from India. As on 14 March, a total of 84 cases of COVID-19 have been reported in India (67 Indian nationals and 17 foreign nationals*; and of the total 10 were cured and 2 deaths reported). Death was reported in a 76-year-old male from Karnataka and 68-year-old female from Delhi, both with co-morbidities. Hospital isolation of all confirmed cases, tracing and home quarantine of the contacts are ongoing.

Local transmission of COVID-19 (infection among those with no travel history to affected countries) has been reported in five states: Delhi, Karnataka, Kerala, Maharashtra and Uttar Pradesh. Places of mass gatherings like cinema theatres, malls, marriage halls, pubs, music fests, marathons, night-clubs have been closed^[10]

As on 22 March 2020, a total of 360 COVID-19 cases (319 Indian Nationals and 41 Foreign Nationals) have been reported from 23 States/UTs across India. New Delhi has issued orders allowing only essential services to operate in 75 districts with confirmed COVID-19 cases until 31 March 2020. Indian Prime Minister called for

'Janata curfew' on 22 March from 7 AM-9 PM, urging people to stay home except those in essential services, enforcing public led social distancing interventions.

In Uttar Pradesh, 2463 suspects are under surveillance– 2410 at home quarantine and 53 in institutional isolation.^[11] As of 28 March, according to the MoHFW, a total of 909 COVID-19 cases (862 Indians and 47 foreign nationals) have been reported in 27 states/union territories (80 who have been cured/discharged/migrated and 19 reported deaths).

ICMR has issued guidelines for use of commercial kits for nasal/throat swab based diagnosis of COVID-19 - 104 out of 119 proposed labs in public sector are functional for SARS-CoV2 test. Additionally, a total of 15 private labs in 7 states are functional.^[12]

Epidemiology and Pathogenesis

The most likely ecological reservoirs for SARS-CoV-2 are bats, but it is believed that the virus jumped the species barrier to humans from another intermediate animal host. The intermediate host has not yet been identified.

Experiences from previous outbreaks of Severe Acute Respiratory Syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) show that transmission through food consumption has not occurred earlier. Concerns were expressed about the potential for these viruses to persist on raw foods of animal origin, till date no case of transmission via food is not yet reported. Coronaviruses are very stable in a frozen state according to studies of other coronaviruses, which have shown survival for up to two years at -20°C.

Specifically, coronaviruses are thermo labile, which means that they are susceptible to normal cooking temperatures (70°C). Therefore, as a general rule, the consumption of raw or undercooked animal products should be avoided to prevent not only infection but also cross contamination.^[13]

COVID-19 infection showed high level of cytokines and chemokines that included IL1- β , IL1RA, IL7, IL8, IL9, IL10, basic FGF2, GCSF, GMCSF, IFN γ , IP10, MCP1, MIP1 α , MIP1 β , PDGFB, TNF α , and VEGFA. Infection resulted in severe pneumonia, RNAemia, combined with the incidence of ground-glass opacities, and acute cardiac injury.

The cytokines reasoned to be resulting in severity of disease in intensive care unit patient were IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1 α , and TNF α .^[14]

Clinical Features

The symptoms of COVID-19 infection appear after an incubation period of approximately 5.2 days. Period from symptoms till death ranged from 6 to 41 days with a median of 14 days depending on the age and immune status of the patient. It was observed that this period was shorter in patients >70 years of age as compared to below 70.^[14]

The most common symptoms at onset of COVID-19 illness are fever, cough, and fatigue, while other symptoms include sputum production, headache, haemoptysis, diarrhoea, dyspnoea, and lymphopenia. The similarities in the symptoms between COVID-19 and earlier betacoronavirus are fever, dry cough, dyspnea, and bilateral ground-glass opacities on chest CT scans.

COVID-19 showed some unique clinical features that include the targeting of the lower airway as evident by upper respiratory tract symptoms like rhinorrhoea, sneezing, and sore throat. Infiltrates in the upper lobe of the lung on chest radiograph were associated with increasing dyspnea with hypoxemia.

GI symptoms such as diarrhea were observed in some patients of covid19, a low percentage of MERS-CoV or SARS-CoV patients experienced similar GI distress. It is important to test faecal and urine samples to exclude a potential alternative route of transmission, specifically through health care workers, patients etc. Therefore there is an urgent need to develop

strategies to develop different modes of transmission such as urine and feces to effectively minimize the transmission and control the disease.^[14]

Chest CT scan abnormalities were observed in all patients as reported. Of the 41 patients, 40 (98%) had bilateral involvement to lungs and findings observed were bilateral multiple lobular and subsegmental areas of consolidation in ICU patients and bilateral ground-glass opacity and subsegmental areas of consolidation in non-ICU patients. All patients had symptoms suggestive of pneumonia. Common complications included ARDS (12 [29%] of 41 patients), followed by RNAemia (six [15%] patients), acute cardiac injury (five [12%] patients), and secondary infection (four [10%]). Invasive mechanical ventilation was required in four (10%) patients, with two of them (5%) had refractory hypoxaemia and received extracorporeal membrane oxygenation as salvage therapy.^[15]

Lab Reports

Higher leukocyte numbers, abnormal respiratory findings, and increased levels of plasma pro-inflammatory cytokines were observed in patients infected with covid-19. Lymphocytes and haemoglobin was below the normal range in many patients. Platelets were below the normal range in 12 (12%) patients and above the normal range in four (4%).^[16]

C-reactive protein was noted 16.16 mg/L which was above the normal range of (0–10 mg/L). High erythrocyte sedimentation rate and D-dimer were also observed^[19] and D-dimer level on admission were higher in ICU patients (median prothrombin time 12.2 s [IQR 11.2–13.4]; median D-dimer level 2.4 mg/L [0.6–14.4]) than non-ICU patients (median prothrombin time 10.7 s [9.8–12.1], $p=0.012$; median D-dimer level 0.5 mg/L [0.3–0.8], $p=0.0042$).

Levels of aspartate aminotransferase were increased in 15 (37%) of 41 patients, including eight (62%) of 13 ICU patients and seven (25%) of 28 non-ICU patients. Hypersensitive troponin I

was increased substantially in five patients, in whom the diagnosis of virus-related cardiac injury was made.^[15]

At the end with complete clinical course were analyzed most patients had marked lymphopenia, and nonsurvivors developed more severe lymphopenia over time. White blood cell counts and neutrophil counts were higher in nonsurvivors than those in survivors. The level of D-dimer was higher in nonsurvivors than in survivors. Blood urea and creatinine progressively increased with clinical deterioration before death.^[17]

Treatment

At present the treatment of patients of covid-19 is mainly symptomatic.

Huang et al^[18] reported about the common complications of covid-19 acute respiratory distress syndrome, followed by anemia, acute heart injuries, and secondary infections. to treatment them empirical antibiotics, antiviral therapy (oseltamivir), and systemic corticosteroids were used. Invasive mechanical ventilation was used in intractable hypoxemia. Remdesivir was used by Holshue et al^[19] in treating covid19 patients and achieved good results. Additionally to antiviral therapy, neuraminidase inhibitors, RNA synthesis inhibitors, and Chinese traditional medicine could also be used in treatment of covid-19 as postulated by Lu^[20] but its efficacy still needs to be verified by clinical trials.^[21]

Prevention

Strategies such as early diagnosis, reporting, isolation, and supportive treatments; timely release of epidemic information; and maintenance of social orders is best way to deal with covid-19 infection in absence of effective treatment.

Protective measures such as improving personal hygiene, wearing medical masks, adequate rest, and keeping rooms well ventilated can effectively prevent covid-19 infection among individuals.^[21]

Washing your hands with soap and water or using alcohol-based (at least 70% alcohol) hand rub kills viruses that may be on your hands. Maintaining 1

meter (3 feet) distance prevents breathe in the droplets, including the COVID-19 virus. Once contaminated, hands can transfer the virus to your eyes, nose or mouth. From there, the virus can enter your body and can make you sick so to prevent it we should avoid touching eyes, nose and mouth.

Good respiratory hygiene should be followed such as covering your mouth and nose with your bent elbow or tissue when you cough or sneeze. Then used tissue should be disposed off immediately.

Sick individuals should wear facemask when around other people. If an individual is not sick then they should not wear facemask unless they are caring for someone who is sick. Facemasks may be in short supply and they should be saved for caregivers.^[22]

If fever, cough and difficulty breathing develop in an individual ,then they should seek medical attention and call in advance National and local authorities as they will have the most up to date information directing individuals to right health facility and also prevent them from spread of virus and other infection.^[23]

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