

REVIEW ARTICLE



An outlook on the havoc post-COVID-19 outbreak: A current status and consequences

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Abstract

Background: The only thing that world is most vigilant about, now, is COVID-19. An outbreak of a disease of a type of pneumonia, caused by group of coronavirus, has created havoc in around more than 180 countries and regions worldwide and has claimed numbers of lives around the globe. The virus was named SARS-COV-2 belongs to the family of coronaviruses, which is believed to have originated from bats. It was declared pandemic by the World Health Organization on March 11, 2020. It is seen that virus spreads by human-to-human transmission. **Aim:** To combat this virus, numerous measures are being taken. Effective vaccine has not been available thus far. However, it is been noted that the disease subsides by the administration of antiviral drugs and this mode of treatment has high success rate. Importance of social responsibility and refraining from spreading medically and scientifically invalidated information needs to be emphasized. **Conclusion:** The novel coronavirus spread so rapidly that it has change the rhythm of the globe, its current and future consequences on socioeconomic status and health-care facilities going to be a challenge for the country. However, every country is facing the crisis based on their own possibilities, expertise, and hypotheses. Thus, there are different criteria for testing, estimation, and hospitalization of cases making it difficult to calculate the number of people affected by pandemic. This review article summarizes the information about the virus, epidemiology, prevalence, current status in India, and the future impact of it on various strata. **Clinical Significance:** The clinical symptoms of COVID-19 may vary from symptomatic to asymptomatic forms which is characterized by severe respiratory failure, cough, myalgia, and fever. It is difficult to differentiate COVID-19 from other viral infections, symptoms are changing day by day. The incubation period can last longer than 2 weeks and it is possible that a very long incubation period could reflect double exposure. Suspected and confirmed cases should be treated in designated hospitals with effective isolation and protective conditions in a single room. Moreover, critical cases need to be admitted to the intensive care unit as soon as possible.

Keywords: COVID-19, disease outbreak, pandemic

Introduction

The prominence of a pandemic coronavirus in late 2019 alarmed populations across the globe.

In December 2019, a number of people were suffering from pneumonia in hospitals of Wuhan, Hubei Province, China, with unknown cause which attracted the global attention.^[1] A deep genomic sequencing analysis was carried out from the region of lower respiratory tract and samples were identified as novel virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which was causative agent for that observed pneumonia disease

in January 2020.^[2] The World Health Organization (WHO) declared the COVID-19 to be a Public Health Emergency of International Concern. It was declared pandemic by the WHO by the March 11, 2020, due to increase in number with 118,000 cases and over 4000 deaths in 114 countries. However, vaccines are not available against SARS-CoV-2 or any specific therapeutic drugs for this communicable disease.

COVID-19 was named in early 2020 whose occurrence was first identified in Wuhan, China, that damaged lower respiratory tract.^[3] At present, there are globally COVID-19-positive cases

5,204,508 and 337,687 deceased in more than 180 countries.

Orthocoronavirinae in the family Coronaviridae, order Nidovirales are the subfamilies of coronavirus which has four generations:

1. Alphacoronavirus
2. Betacoronavirus
3. Deltacoronavirus
4. Gammacoronavirus.

It is a single positive-sense RNA virus with mutation rate more than DNA viruses and indicates a more effective survival adaptation mechanism.^[4] SARS-CoV-2 is part of a group of viruses which resemble a crown (corona), and it belongs to the species Betacoronavirus, as the Middle East respiratory syndrome coronavirus (MERS-CoV) and SARS-CoV.^[5] It has crown-like structure because its envelope is surrounded by glycoprotein.

In India, the first case was reported on January 30, 2020, in Kerala, and then, the disease gained a foothold across the country by March 2020. In this review, we summarize the epidemiology, clinical features, diagnosis, management, and prevention of COVID-19 for future aspects.

Epidemiology

On December 31, 2019, some unexplained cases of pneumonia were observed in Hubei, China, which were reported by the Health Commission of Hubei. A total number of patients were first reported was 27, which later increased to 41 on January 11, 2020, with seven severe cases and one death. Most of the cases were found related to Huanan Seafood Wholesale Market. The Chinese health authority stated that those patients were first found negative for common respiratory viruses, but then were positive for a novel coronavirus. It was named by the WHO as the 2019 novel coronavirus (2019-nCoV).^[6] According to Li *et al.*, he suggested the human-to-human transmission phenomenon because some patients did not have travel history to Wuhan, China.^[7] The first confirmed case of COVID-19 in India was diagnosed on January 30, 2020, in Kerala. He had the travel history from Wuhan, China, and he was quarantined for 14 days. In the end of February, number increased to 3. The first three Indians tested positive for coronavirus were from Kerala. The number of confirmed cases is constantly increasing worldwide and a steep increase in cases is being observed in low-income countries.^[8] In India, total cases reached to 107 with two deaths by the end of March, while in April, the statistics were 33,000 cases and 1074 fatalities. However, each and every country is suffering from crisis based on their own possibilities, expertise, and hypotheses. Thus, every country has different criteria for laboratory testing and hospitalization of cases, which makes it difficult to calculate the number of people affected by pandemic.^[9] Today, May 24, 2020, based on the WHO reports, in India, we have 131,868 confirmed cases and 3867 deaths.^[10] As per the statistics, the number of cases reported in various states of India is as follows: Maharashtra: 56,948, Tamil Nadu: 18,545, Delhi: 15,257, Gujarat: 15,195, Rajasthan: 7703, Madhya Pradesh: 7261, and Uttar Pradesh: 6991 [Figure 1].

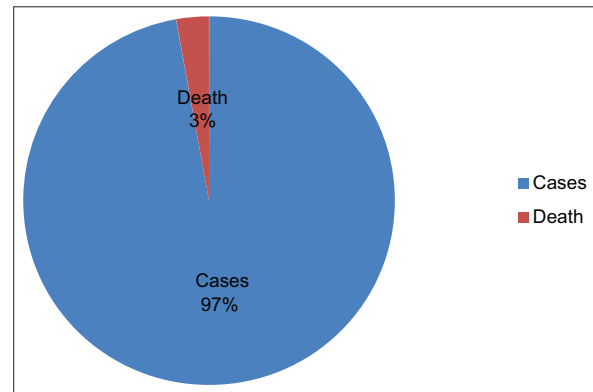


Figure 1: Pie chart depicting percentage of total number of cases and deaths as of May 2020

Pathogenesis

SARS-CoV-2 is the seventh member of the family of CoVs that infect humans. There are four human CoVs present, that is,

- i. HCoV-229E
- ii. HCoV-NL63
- iii. HCoV-OC43
- iv. HCoV-HKU1.

These are able to cause an upper respiratory tract infection (common cold), whereas SARS-CoV and MERS-CoV are responsible for atypical pneumonia.^[7] This virus is an RNA virus enveloped in a positive strand with the largest family of RNA genomes. The transcription of RNA works through the replication-transcription complex and it is organized in double-membrane vesicles. However, termination of transcription occurs at transcription regulatory sequences which are located between the so-called open reading frames (ORFs) which work as templates for the production of subgenomic mRNAs.^[11] In the atypical CoV genome, at least six ORFs are present. The pp1a and pp1ab polypeptides that are processed by virally encoded chymotrypsin-like protease (3CLpro) or main protease (Mpro), as well as one or two papain-like proteases for producing 16 non-structural proteins (nsps) were guided by ORF1a and ORF1b.^[10] However, other ORFs encode for structural proteins, including envelope, membrane, spike, nucleocapsid proteins, and accessory proteins.^[12,13] The genetic sequence of SARS-CoV-2 is $\geq 70\%$ similar to that of SARS-CoV, and it has the capability to use the same cell entry receptor (ACE2) as SARS-CoV to infect humans.^[14,15] Spike [S] protein, a type I transmembrane glycoprotein, helps the virus to enter the host body.^[16] SARS-CoV-2 replicates very rapidly after entry into alveolar epithelial cells which further triggers a strong immune response, resulting in cytokine storm syndromes and pulmonary tissue damage.^[7]

Cytokine storm syndromes, also known as hypercytokinemia, are a group of disorders and are important causes of acute respiratory distress syndrome (ARDS) and multiple organ failure.^[17-19] The protagonist of this storm is interleukin 6 (IL-6), which is produced by activated leukocytes.^[20] IL-6 also increases the production of acute-phase proteins and it plays an important

role in thermoregulation, bone maintenance, and functionality of the central nervous system.^[21] In turn, IL-6 increases during various inflammatory and autoimmune disorders.^[22] The pathogenesis of coronavirus in humans and animals is primarily due to:

- a. DPP4 [dipeptidyl peptidase-4] mediated mechanism
- b. Papain such as protease PLpro-mediated mechanism
- c. Accessory proteins such as p4a and membrane M protein-mediated mechanism.

A study by Diao *et al.*, Wang *et al.*, Tan *et al.*, Chen *et al.*, Liu *et al.*, and Ning *et al.* has suggested that CoVs are primarily due to three mechanisms, such as DPP4 [dipeptidyl peptidase-4] mediated mechanism, papain such as protease PLpro-mediated mechanism, and accessory proteins such as p4a and membrane M protein-mediated mechanism.^[23] ARDS decreased immune function and secondary infection further worsens respiratory failure.^[24]

Clinical Manifestation

The clinical symptoms of COVID-19 may vary from symptomatic to asymptomatic forms which is characterized by severe respiratory failure that needs proper mechanical ventilation and support in an intensive care unit (ICU), to multiorgan and systemic manifestations in terms of sepsis, septic shock, and multiple organ dysfunction syndromes.^[25] Symptoms vary from person to person suffering from COVID-19, following an incubation period of 1–14 to 21 days. The WHO has reported an incubation period for COVID-19 between 2 and 10 days. However, some literature suggest that the incubation period can last longer than 2 weeks which may lead to reflect double exposure.^[26] Some other main manifestations of COVID-19 are as follows:

- Fatigue
- Fever
- Dry cough
- Myalgia
- Dyspnea.

Recently, COVID-19 symptoms were also seen related to eyes. It is difficult to differentiate COVID-19 from other viral infections on the basis of symptoms. It is being noted that day-by-day symptoms are changing. The patients with symptoms may have fever or no fever, whereas asymptomatic patients can also spread SARS-CoV-2 among humans.

Diagnosis and Management

The diagnosis of COVID-19 can be confirmed by performing several tests. They include real-time fluorescence test (RT-PCR), throat swabs, secretions of the lower respiratory tract, and computed tomography imaging. Enzyme-linked immunosorbent assay kits for detection of IgM and IgG antibodies toward nucleocapsid (N) and other SARS-CoV2 proteins have also been available more recently.^[27] General treatment should

be given which includes bed rest, supportive and nutritional treatments, maintaining a constant internal environment (water, electrolytes, and other internal environment factors), and continuous monitoring of vital signs (heart rate, pulse, blood pressure, oxygen saturation, respiratory rate, etc.). As such, antiviral treatment is not recommended for COVID-19, and no vaccine is currently available.^[28] Although, scientist around the world is working on potential treatment and vaccines for COVID-19.

Management of COVID-19 involves antipyretic, that is, paracetamol and antiviral therapy, namely, interferon-alpha, lopinavir/ritonavir (Kaletra), ribavirin, chloroquine, arbidol (umifenovir), and remdesivir. Oxygen therapy is being administered for the patients with severe respiratory disease. Conservative management is the first and only line of treatment with antibiotic therapy during early and later stages. The main pharmacological experimental options are glucocorticoids, remdesivir, chloroquine and hydroxychloroquine (mainly in combination with azithromycin) tocilizumab, lopinavir-ritonavir, baricitinib, nonsteroidal anti-inflammatory drugs, and angiotensin-converting enzyme.

Suspected and confirmed cases should be treated in designated hospitals with effective isolation and protective conditions in a single room. Moreover, critical cases need to be admitted to the ICU as soon as possible.

Prevention

If nation has to deal with COVID-19 then prevention is so far the best method to reduce the impact of it. The WHO has given some protocols for COVID-19 as preventive measures.

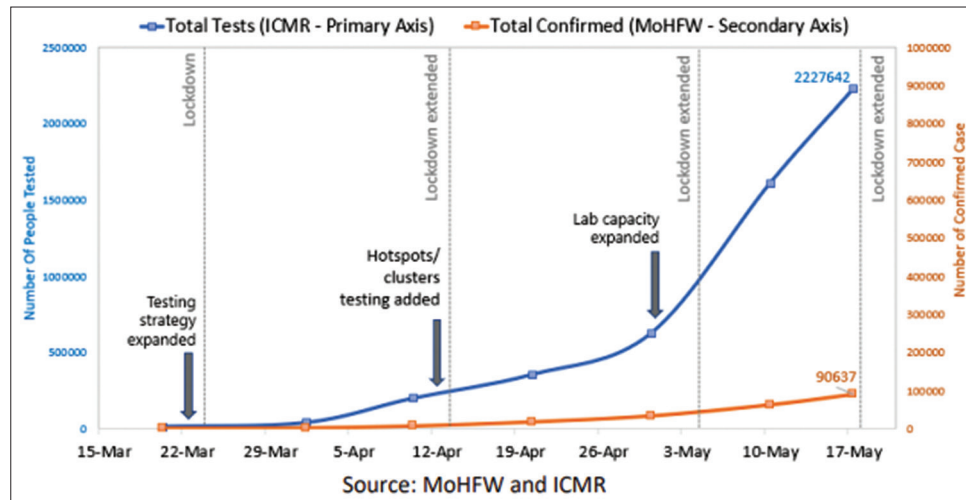
These are as follows: To wear face masks, to wash hands regularly with soap or disinfection with hand sanitizer containing at least 60% alcohol, to cover coughs and sneezes with tissue, to avoid contact with infected people, to maintain an appropriate distance from people, and to refrain from touching eyes, nose, and mouth with unwashed hands.

They have recommended avoiding movement to high-risk regions, contact with individuals who are asymptomatic and the consumption of meat from places with known COVID-19 outbreak.^[29]

It should be ensured that people follow good respiratory hygiene, thereby protecting themselves from the virus. It is advised to stay safe at home and make themselves self-isolate even with minor symptoms such as cold, cough, headache, and mild fever until recovery. It is of utmost importance to, be updated on the information from government sources, such as the WHO, local and national health authorities.

Current Scenario in India

India represents one of the most unique countries in terms of diversity and disparity. While instituting uniform COVID-19 measures and policies, an array of occupational, cultural,



Graph 1: Graph depicting total test done by ICMR till May 17

educational, and economic issue has come up. There are also challenges related to types of housing and living, as well as distribution and availability of health-care facilities. The approach befitting a country like India would be TIP – Testing and Tracing contacts, Isolation of confirmed and suspected cases as well as high-risk contacts, and Precautions and Preventive measures for the population. India is a country of diverse beliefs, cultures, systems, and practices. With digitalization and widespread access to social media, a gamut of information is available, shared, and spread in a short period which can not only adversely impact positive efforts but also lead to misplaced fear, panic, and undesirable social repercussions. Therefore repeatedly, the importance of social responsibility and refraining from spreading medically and scientifically invalidated information needs to be emphasized. The Ministry of Health and Family Welfare of India along with the Indian Council of Medical Research (ICMR) has one of the most updated online sites with all information, FAQs, advisories, and recommendations in place for COVID-19. In addition, the *Aarogya setu* app, launched for installation in smart phones aids calculation of the risk of COVID based on parameters of positive cases in the vicinity, enabling us to take necessary steps for assessing risk of spread of COVID-19 infection. As of May 14, 2020, India has enhanced its testing capacity to conduct 100,000 tests per day, with more than 500 laboratories including 359 government and 145 private in the country [Graph 1]. As of May 17, 2020, there were 53,946 active cases, 34,109 recovered/discharged/migrated, and 2872 deaths in India.

ICMR has fast tracked the global “Solidarity” trial launched by the WHO and has accelerated the clinical trial in finding an effective treatment for COVID-19. ICMR-NIV, Pune, has developed a IgG ELISA test for antibody detection for SARS-CoV-2. Further, the IgG test kit produced by ICMR-NIV, has sensitivity and specificity of 98.7% and 100%, respectively.^[30]

Since March 2020, multiple cases of patients with travel history were reported and significantly increasing in country, and this could be because of human-to-human transmission. At present,

India is going through a tough phase, country in under lockdown since March 25, 2020, all the amenities such as school, colleges, restaurants, gym, shopping malls, recreation centers, Indian railways, and airports were closed due to the spread of pandemic COVID-19 on a large scale. These amenities have been converted into quarantine place to handle an anticipated increased number of cases. Some hospitals have been converted exclusively into isolation ward for COVID-19-positive patients. An intensive campaign was done and ministry of health affairs has issued guidelines against COVID-19 such as personal hygiene, surveillance, contact tracing, quarantine, diagnosis, laboratory tests, and management. They also advised to peoples to avoid mass gatherings.

Arogya setu app was launched and developed by the Government of India to connect with the people of India in fight against COVID-19. The aim of app is to advance the initiatives of the Government of India, particularly the health department, in proactively reaching out to and informing the users of the app regarding risks and relevant advisories pertaining to the containment of COVID-19.

Consequences

On the wake of COVID-19, the global scenario is surely going to be fragile and will undergo a drastic transformation. There are number of various future scenarios depending on how the people and government deal with it. The aftermath of it would surely not only be on people but also on health sector. It also covers a social aspect and an economical too. The worldwide economy has been stumbled upon. It is now coping up by barbarism, spike in unemployment, and liquidity by the banks, state capitalism, and etcetera.

Looking forward, people have restricted themselves due to lockdown which is quite an effective measure to curb COVID-19 but might as well affect people mentally and socially. There is uncertainty about tomorrow, about the health and safety of our families, friends, and loved ones.

Conclusion

This pandemic continues to spread across the world following a trajectory that is difficult to predict. The health and socioeconomic policies adopted by different countries will determine the speed and strength of the recovery. People should follow the guidelines provided by the government and should restrict themselves and maintain social distancing.

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