

Coronavirus Pandemic- A Mini review

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Abstract

The coronavirus disease was declared a global pandemic by WHO in March 2020. The virus, which has its origin in bats, started from Wuhan in China and rapidly spread to the entire world leading to increased morbidity and mortality. The spread is via droplet infection. The primary symptoms are fever, cough, sore throat, dyspnea and malaise. It is known to cause increased complication in cases with pre-existing comorbidities and in the elderly. Confirmatory diagnosis is by nucleic acid amplification testing though a rapid antigen test with shorter turnaround time is also approved. Prevention by home isolation of cases and contacts and appropriate sanitization is very crucial to limit the spread of infection.

Keywords: COVID-19; Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2); RT-PCR

Introduction

WHO declared the novel coronavirus disease (COVID-19) caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) a global pandemic on 12th March 2020. Till date that is 23rd March 2021, WHO has reported 123,216,178 confirmed cases of COVID-19 including 2,714,517 deaths [1].

Coronaviruses are enveloped RNA viruses with spike like projections on the surface, giving rise to a crown like appearance under electron microscopy [2].

The origin and spread of COVID-19 began from Wuhan, the capital of Hubei in December 2019 where adults started presenting with a severe pneumonia. Cases increased exponentially with a reported epidemic doubling time of 1.8 days. It led to China changing its definition of confirmed cases to include patients with negative/pending molecular tests but with clinical and radiological features of COVID-19 [3].

Pathogenesis

The spread of infection is via droplet infection and all ages can be affected [4]. The infected droplets can spread 1 - 2 meters and can deposit on surfaces where it can remain viable for days in a favourable atmosphere. Coronavirus infection is acquired through inhalational route or through contact by contaminated surfaces. The incubation period of the virus varies from 2 to 14 days [5].

Clinical features

The clinical features of COVID-19 are similar to other respiratory infections. Fever, sore throat, cough, headache, myalgia and breathlessness are the common clinical features. Few cases have shown a rapid deterioration by the end of the first week, leading to respiratory failure and death. This can be explained by an increase in the inflammatory cytokines- IL-2, IL-7, IL-10, GCSE, TNF- α . Acute respiratory distress syndrome, acute lung injury, shock and acute kidney injury are among the common complications reported due the COVID-19. Increased morbidity and mortality has been reported in the elderly and cases with underlying co-morbidities like diabetes and immunocompromised with case fatality rate being 2 - 3% [6].

Diagnosis

Appropriate sample collection is the most crucial step in laboratory diagnosis of COVID-19. Samples for coronavirus testing are collected from upper and lower respiratory tract. The upper respiratory tract specimens include nasopharyngeal swab, oropharyngeal swab while sputum, bronchoalveolar lavage are collected from lower respiratory tract. Synthetic fiber swabs with plastic shafts are used to collect the sample. Wooden shaft swabs or calcium alginate ones are not used for sample collection as they may inactivate the virus leading to a false negative test [7]. The gold standard test for confirmatory diagnosis of COVID-19 is nucleic acid amplification test based RT-PCR. The PCR is directed against viral genes- N, E, S and RdRP. WHO guidelines state that in order to confirm a positive test, a validated RT-PCR assay directed against a minimum of two regions on the SARS-CoV-2 genome must be chosen with one being specific for SARS-CoV-2 [8].

FDA has also approved Cartridge based Nucleic Acid Amplification Test (CBNAAT) using Cepheid Xpert Xpress SARS-CoV2 for emergency use. This is directed against E gene and SARS-CoV-2 specific N2 region of the N gene.

RT-PCR is a complex and time consuming test requiring 24 - 48 hours for test results. Besides, it requires trained personnel and advanced laboratories running under Biosafety 2 level conditions.

There has also been advent of rapid nucleic acid detection based tests like TruNat used originally for tuberculosis. It is a chip based real time PCR assay run on TruNat machines with a very short turnaround time of 1 hour. In this test, the virus is lysed during the testing thus minimizing the risk of infection [9,10].

Antigen based COVID-19 tests are based on detection of nucleocapsid (N) protein and the S1 or S2 domains of the S protein. They are used to detect acute infection when the virus is actively multiplying. They have a sensitivity of 34 - 80% [11].

In India, ICMR issued guidelines for use of rapid antigen test as an initial test for surveillance in containment zones, however negative antigen test should be confirmed by nucleic acid amplification based tests. In non- containment areas and hospitals, RT-PCR/TruNat/CBNAAT is recommended for screening [12].

Treatment

There is no specific treatment for coronavirus, it is rather supportive and symptomatic. The crucial step is isolation to prevent further spread and transmission to contacts. Cases that are mildly symptomatic can be dealt with at home with adequate counseling about danger signals. Maintenance of hydration and control of fever and cough are the basic principles in management of COVID-19 infection. Hypoxic patients may require oxygen therapy through use of nasal prongs, nasal cannula and non-invasive ventilation [13]. WHO advocates against the use of corticosteroids in treatment of coronavirus infection. Drugs proposed for treatment include remdesivir, intravenous immunoglobulin, chloroquine and plasma from recovered patients of COVID-19 [14].

Prevention

Prevention is a crucial step in limiting the spread of COVID-19. Home isolation of confirmed/ suspected cases with mild symptoms is suggested. The case should be isolated in a room with adequate ventilation and sunlight. They should be educated to wear surgical masks and practice cough hygiene. Adequate sanitization should also be encouraged.

Health care workers should be provided with N-95 respirators and personal protective equipment to prevent transmission of infection to them from patients. There should be adequate decontamination of rooms and surfaces with sodium hypochlorite. Aerosol generating procedures like intubation, tracheostomies and suction should be performed with adequate precautions to avoid airborne transmission through droplets [13,14].

Conclusion

Safe and effective vaccines will be a gamechanger: but for the foreseeable future we must continue wearing masks, physically distancing and avoiding crowds. Being vaccinated does not mean that we can throw caution to the wind and put ourselves and others at risk, particularly because it is still not clear the degree to which the vaccines can protect not only against disease but also against infection and transmission. The vaccines currently approved are BNT162b2/COMIRNATY Tozinameran which is nucleoside modified mRNA based and COVISHIELD which is recombinant ChAdOx1 adenoviral vector encoding the Spike protein antigen of the SARS-CoV-2 [1].

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