A Review on Novel Corona Virus (Covid-19)

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A B S T R A C T

There is a new public health crises threatening the world with the emergence and spread of 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus originated in bats and was transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019.The disease is transmitted by inhalation or contact with infected droplets and the incubation period ranges from 2 to 14 days. The symptoms are usually fever, cough, sore throat, breathlessness, fatigue, malaise among others. The disease is mild in most people; in some (usually the elderly and those with comorbidities), it may progress to pneumonia, acute respiratory distress syndrome (ARDS) and multi organ dysfunction. Many people are asymptomatic.Diagnosis is by demonstration of the virus in respiratory secretions by special molecular tests. Common laboratory findings include normal/ low white cell counts with elevated C-reactive protein (CRP). The computerized tomographic chest scan is usually abnormal even in those with no East respiratory syndrome coronavirus (MERS-CoV), but has lower fatality. The global impact of this new symptoms or mild disease. Treatment is essentially supportive; role of antiviral agents is yet to be established. Prevention entails home isolation of suspected cases and those with mild illnesses and strict infection control measures at hospitals that include contact and droplet precautions. The virus spreads faster tha n its two ancestors the SARS-CoV and Middle epidemic is yet uncertain.

Keywords: 2019-nCOV, SARS-CoV-2, COVID-19, Pneumonia,

1. Introduction & Background

In late December 2019, a case of unidentified pneumonia was reported in Wuhan, Hubei Province, People's Republic of China (PR C). Its clinical characteristics were very similar to those of viral pneumonia. After analysis of respiratory samples, the experts at the PRC Centers for Disease Control declared that the pneumonia, later known as novel coronavirus pneumonia (NCP), was caused by a novel coronavirus(1).The World Health Organization (WHO) officially named the disease 'COVID-19'. The International Committee on Taxonomy of Viruses named the virus 'severe acute respiratory syndrome coronavirus 2' (SARS-CoV-2. This virus belongs to the β-coronavirus family, a large class of viruses that are prevalent in nature. Similar to other viruses, SARS-CoV-2 has many potential natural hosts, intermediate hosts and final hosts(2). Genome analysis of SARS-CoV-2 sequences revealed that the complete genome sequence recognition rates of SARS-CoV and bat SARS coronavirus (SARSr-CoV-RaTG13) were 79.5% and 96%, respectively (3). This implies that SARS-CoV-2 might originate from bats. On 29 February 2020, data published by WHO showed that since 12 December 2019 when the first case was reported, there had been 79 394 confirmed cases of SARS-CoV-2 infection and 2838 deaths (4). In the meantime, 6009 cases had been confirmed and 86 patients had died in 53 countries and regions outside China (4) .COVID-19 poses a major threat to global public health. This article reviews the genetic structure, source of infection, route of transmission, pathogenesis, clinical characteristics, and treat - ment and prevention of SARS-CoV-2 in order to help follow-up research, prevention and treatment, and to provide readers with the latest understanding of this new infectious disease.

HISTORY

Coronaviruses are enveloped positive sense RNA viruses ranging from 60 nm to 140 nm in diameter with spike like projections on its surface giving it a crown like appearance under the electron microscope; hence the name coronavirus (5). Four corona viruses namely HKU1, NL63, 229E and OC43 have been in circulation in humans, and generally cause mild respiratory disease. There have been two events in the past two decades wherein crossover of animal betacorona viruses to humans has resulted in severe disease. The first such instance was in 2002 – 2003 when a new coronavirus of the β genera and with origin in bats crossed over to humans via the intermediary host of palm civet cats in the Guangdong province of China. This virus, designated as

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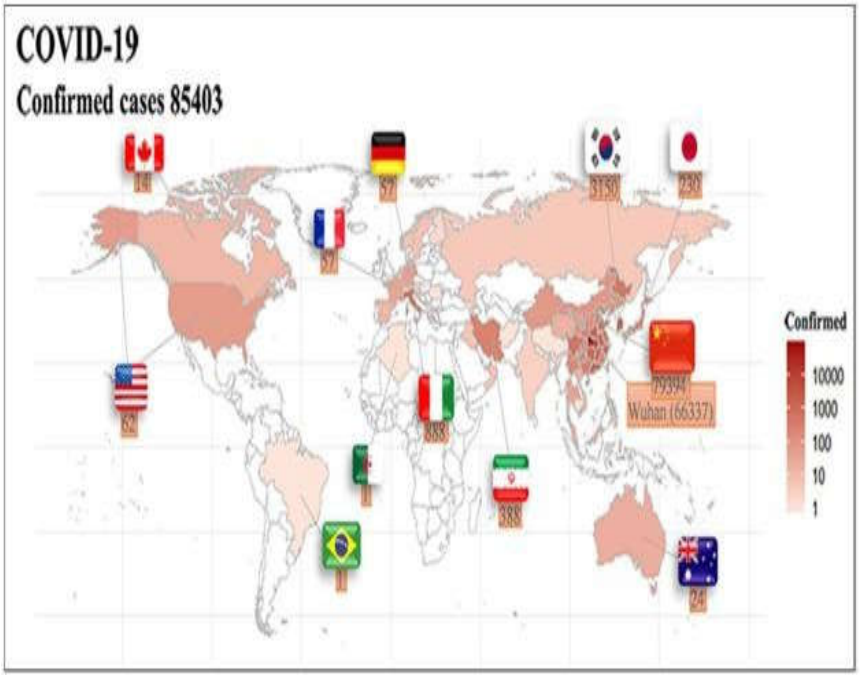

Fig. 1. Geographical distribution of 85 403 confirmed cases of COVID-19 novel coronavirus pneumonia. The depth of colour represents the number of confirmed cases of COVID-19 infection. *Source:* https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200229-sitrep-40-covid-19 .

severe acute respiratory syndrome coronavirus affected 8422 people mostly in China and Hong Kong and caused 916 deaths (mortality rate 11%) before being contained (6).Almost a decade later in 2012, the Middle East respiratory syndrome coronavirus (MERS-CoV), also of bat origin, emerged in Saudi Arabia with dromedary camels as the intermediate host and affected 2494 people and caused 858 deaths (fatality rate 34%) (7).

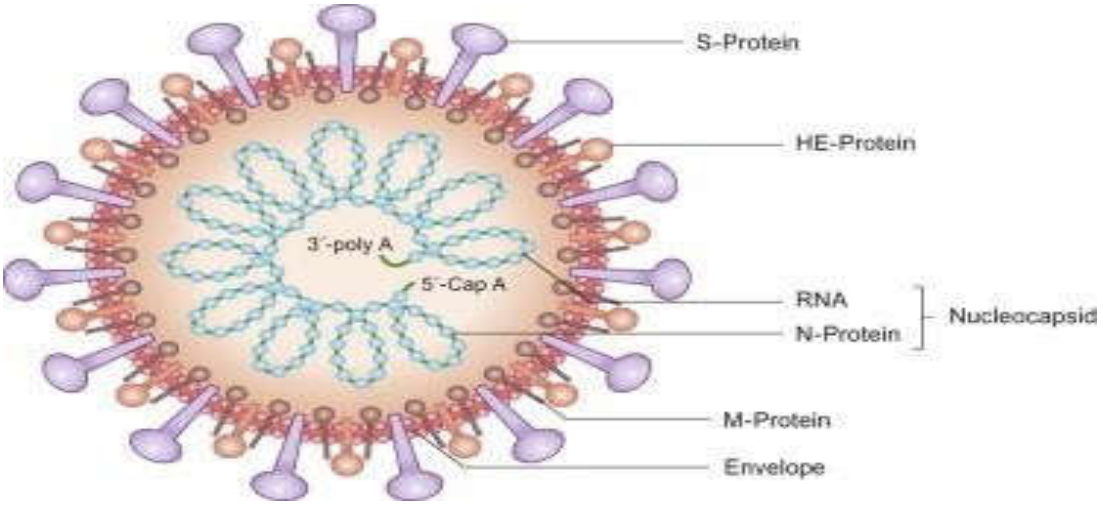

Fig (2) covid structure

2. Epidemiology and Pathogenesis (9,10)

All ages are susceptible. Infection is transmitted through large droplets generated during coughing and sneezing by symptomatic patients but can also occur from asymptomatic people and before onset of symptoms (8). Studies have shown higher viral loads in the nasal cavity as compared to the throatwith nodifference in viral burden between symptomatic and asymptomatic people (11). Patients can be infectious for as l ong as the symptoms last and even on clinical recovery. These infected droplets can spread 1–2 m and deposit on surfaces. They are destroyed in less than aminute by common disinfectants like sodium hypochlorite, hydrogen peroxide etc. (12). Infection is acquired either by inhalation of these droplets or touching surfaces contaminated by them and then touching the nose, mouth and eyes. The virus is also present in the stool and contamination of the water supply and

subsequent transmission via aerosolization/ feco oral route is also hypothesized. The incubation period varies from 2 to 14 d [median 5 d]. Studies have identified angiotensin receptor 2 (ACE2) as the receptor through which the virus enters the respiratory mucosa (10).The basic case reproduction rate (BCR) is estimated to range from 2 to 6.47 in various modelling studies (10). In comparison, the BCR of SARS was 2 and 1.3 for pandemic flu H1N1 2009.

Types of Evidence Needed for Controlling an Epidemic.	
Evidence Needed	**Study Type**
No. of cases, including milder ones	Syndromic surveillance plus targeted viral testing
Risk factors and timing of transmission	Household studies
Severity and attack rate	Community studies
Severity "pyramid"	Integration of multiple sources and data types
Risk factors for infection and severe outcomes, including death	Case–control studies
Infectiousness timing and intensity	Viral shedding studies

Table (1) Epidemic Control of Covid.

3. Transmission pattern

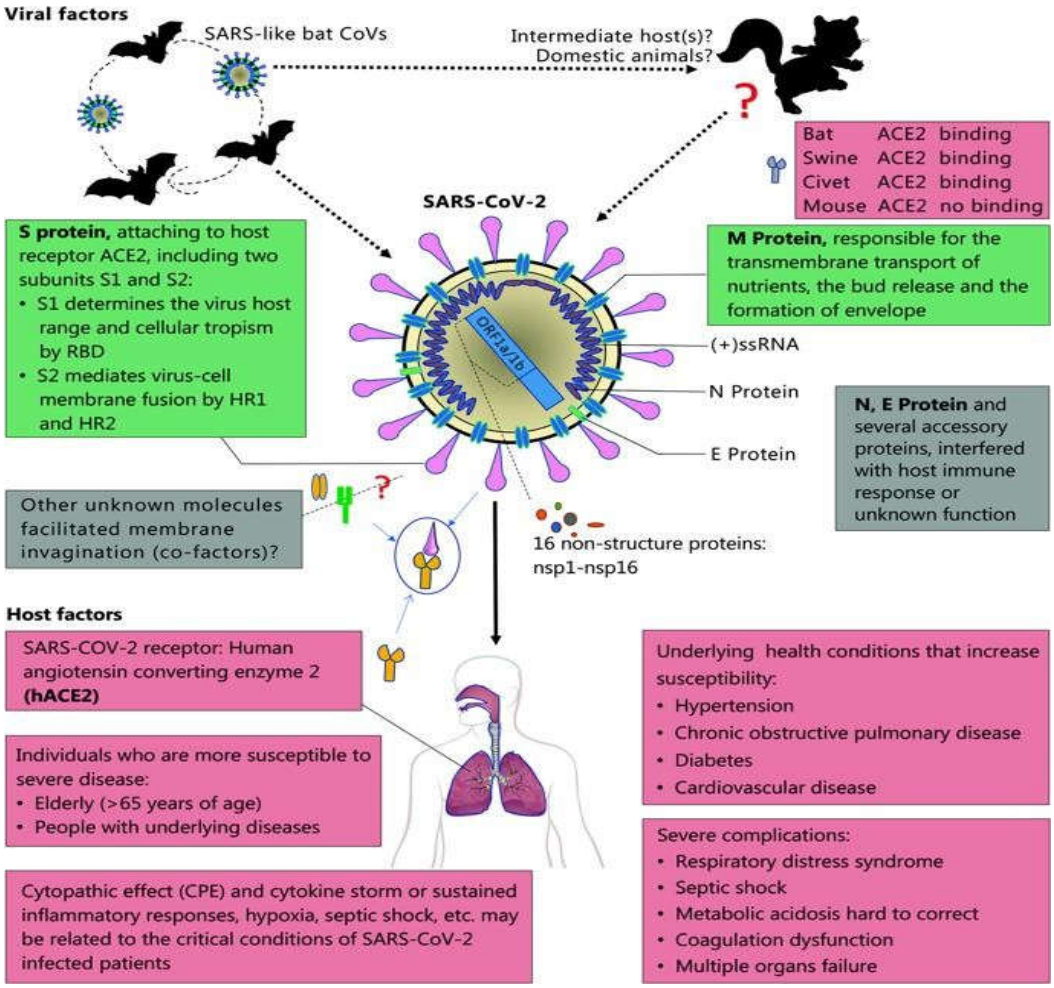

Fig 3 Transmission pattern of covid

Many domestic and wild animals, including camels, cattle, cats, and bats, may serve as hosts for coronaviruses (17). It is considered that, generally, animal coronaviruses do not spread among humans (15). However, there are exceptions, such as SARS and MERS, which are mainly spread though close contact with infected people via respiratory droplets from cough or sneezing. With regard to COVID-19, early patients were reported to have some link to the Huanan Seafood Market in Wuhan, China, suggesting that these early infections were due to animal-to-person transmission. However, later cases were reported among medical staff and others with no history of exposure to that market or visiting Wuhan, which was taken as an indication of human-tohuman transmission (13,14,16)

4. Clinical manifestation

The complete clinical manifestation is not clear yet, as the reported symptoms range from mild to severe, with some cases even resulting in death (18). The most commonly reported symptoms are fever, cough, myalgia or fatigue, pneumonia, and complicated dyspnea, whereas less common reported symptoms include headache, diarrhea, hemoptysis, runny nose, and phlegm producing cough (18,20).Patients with mild symptoms were reported to recover after 1 week while severe cases were reported to experience progressive respiratory failure due to alveolar damage from the virus, which may lead to death (19).cases resulting in death were primarily middle-aged and elderly patients with pre-existing diseases (tumor surgery, cirrhosis, hypertension, coronary heart disease, diabetes, and Parkinson's disease) (19).Case definition guidelines mention the following symptoms: fever, decrease in lymphocytes and white blood cells.

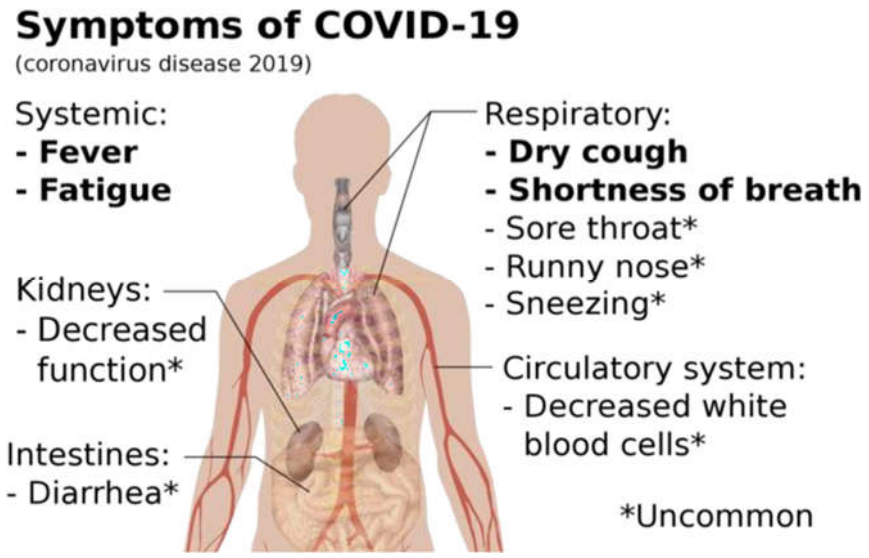

Fig : 4 symptoms of covid-19

5. Diagnosis

The detection of viral nucleic acid is the standard for non- invasive diagnosis of COVID-19. However, the detection of SARS- CoV-2 nucleic acid has high specificity and low sensitivity, so there may be false-negative results and the testing time could be relatively long. The Novel Coronavirus Pneumonia Diagnosis and Treat- ment Plan (5 th trial version) took 'suspected cases with pneumonia imaging features' as the clinical diagnostic criteria in Hubei Province.

- Reverse transcriptase polymerase chain reaction:

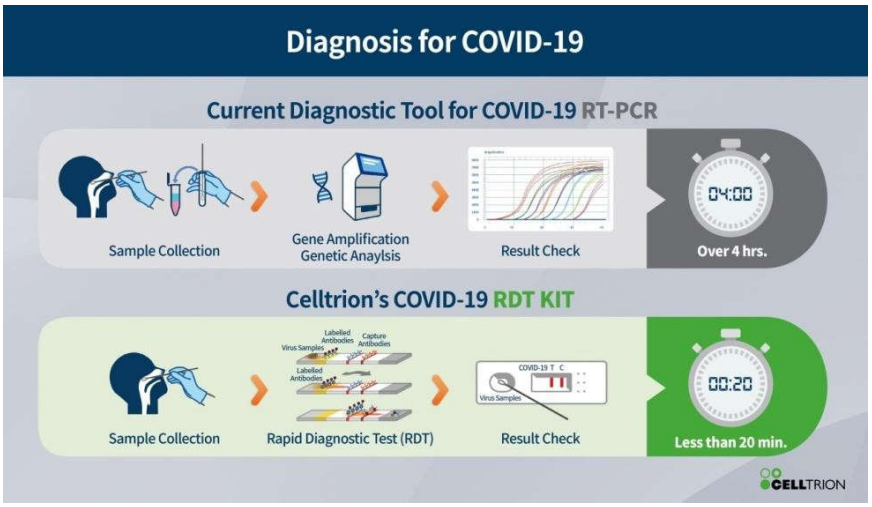

Fig: 5 Diagnosis for covid-19

6. MANAGEMENT of covid-19

6.1 PHARMACOTHERAPY:

Treatment is essentially supportive and symptomatic. The first step is to ensure adequate isolation to prevent transmission to other contacts, patients and healthcare workers. Mild illness should be managed at home with counselling about danger signs. The usual principles are maintaining hydration and nutrition and controlling fever and cough.Routine use of antibiotics and antivirals such as oseltamivir should be avoided in confirmed cases. In hypoxic patients, provision of oxygen through nasal prongs, face mask, high flow nasal cannula (HFNC) or non-invasive ventilation is indicated. Mechanical ventilation and even extra corporeal membrane oxygen support may be needed. Renal replacement therapy may be needed in some.Antibiotics and antifungals are required if co-infections are suspected or proven. The role of corticosteroids is unproven; while current international consensus and WHO advocate against their use, Chinese guidelines do recommend short term therapy with low-to-moderate dose corticosteroids in COVID-19 ARDS (21,22). Detailed guidelines for critical care management for COVID-19 have been published by the WHO (23).There is, as of now, no approved treatment forCOVID-19.

6.2 Role of Antivirals:

Antiviral drugs such as ribavirin, lopinavirritonavirhave been used based on the experience with SARS and MERS. In a historical control study in patients with SARS, patients treated with lopinavir-ritonavir with ribavirin had better outcomes as compared to those given ribavirin alone (24). In the case series of 99 hospitalized patients with COVID- 19 infection from Wuhan, oxygen was given to 76%, noninvasiveventilation in 13%, mechanical ventilation in 4%, extracorporeal membrane oxygenation (ECMO) in 3%, continuous renal replacement therapy (CRRT) in 9%, antibiotics in 71%, antifungals in 15%, glucocorticoids in 19% and intravenous immunoglobulin therapy in 27% (24).
Antiviral therapy consisting of oseltamivir, ganciclovir and lopinavirritonavirwas given to 75% of the patients. The duration of non-invasive ventilation was 4–22 d [median 9 d] and mechanical ventilation for 3–20 d [median 17 d]. In the case series of children discussed earlier, all children recovered with basic treatment and did not need intensive care (25).There is anecdotal experience with use of remdeswir, a broad spectrum anti RNA drug developed for Ebola in management of COVID-19 (26). More evidence is needed before these drugs are recommended.

6.3 Other drugs:

Other drugs proposed for therapy are arbidol (an antiviral drug available in Russia and China), intravenous immunoglobulin, interferons, chloroquineand plasma of patients recovered from COVID-19 Additionally, (26,27,28). about using traditional Chinese herbs find place in the Chinese guidelines (26,29)

6.4 Precautions for covid-19

At the community level, people should be asked to avoid crowded areas and postpone non-essential travel to places with ongoing transmission. They should be asked to practicecough hygiene by coughing in sleeve/ tissue rather than hands and practice hand hygiene frequently every 15–20 min. Patients with respiratory symptoms should be asked to use surgical masks. The use of mask by healthy people in public places has not shown to protect against

respiratory viral infections and is currently not recommended by WHO. However, in China, the public has been asked to wear masks in public and especially in crowded places and large scale gatherings are prohibited (entertainment parks etc). China is also considering i ntroducing legislation to prohibit selling and trading of wild animals (30).

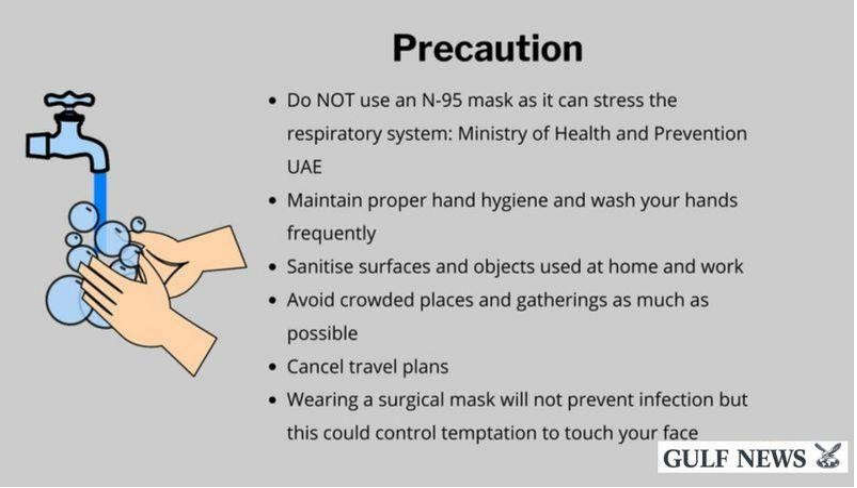

Fig:6. Precaution measures for covid-19

7. **Conclusions**

This study shows a holistic picture of the current research in response to the outbreak of COVID-19. During this early period, many studies have been published exploring the epidemiology, causes, clinical manifestation and diagnosis, and prevention and control of the novel coronavirus. Thus far, most studies have focused on the epidemiology and potential causes. However, studies exploring prevention and control measures have begun to gradually increase. Studies in this domain are urgently needed to minimize the impact of the outbreak. Government agencies have quickly incorporated recent scientific findings into public policies at the community, regional, and national levels to slow down and/or prevent the further spread of the COVID-19. We recommend that the scholarly community conduct further research to provide valid and reliable ways to manage this kind of public health emergency in both the short term and long-term.

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