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A REVIEW ON WORLD'S PANDEMIC COVID-19

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ABSTRACT
Coronavirus (COVID-19) is an enveloped RNA virus that are diversely found in humans and wildlife. The epicenter of infection was linked to seafood and exotic animal wholesale markets in the city. The pneumonia caused by novel coronavirus (SARS-CoV-2) in Wuhan, China in December 2019 is a highly contagious disease. The World Health Organization (WHO) has declared the ongoing outbreak as a global public health emergency. Currently, the research on novel coronavirus is still in the secondarystage. This review will introduce a general overview of coronavirus and summarizes the epidemiology, clinical characteristics, diagnosis, treatment and prevention of knowledge surrounding COVID-19. This review in the hope of helping the public effectively recognize and deal with the 2019 novel coronavirus (SARS-CoV-2), and providing a reference for future studies.

KEYWORDS: SARS-CoV-2; COVID-19; coronavirus; pneumonia; respiratory infection.

1. Genetic structure and pathogenic mechanism of SARS-CoV-2

Coronavirus (COV) is a single strand RNA virus with a diameter of 80-120nm. It is divided into four types: α-coronavirus (α-COV), β-coronavirus (β-COV), δ-coronavirus (δ-COV) and γ - coronavirus (γ-COV).[1] Six coronaviruses were previously known to cause disease in humans, SARS-CoV-2 is the seventh member of the coronavirus family that infects human beings after SARS-CoV and MERS-CoV.[2] SARS-CoV-2, like SARS-CoV and MERS-CoV, belongs coronavirus.

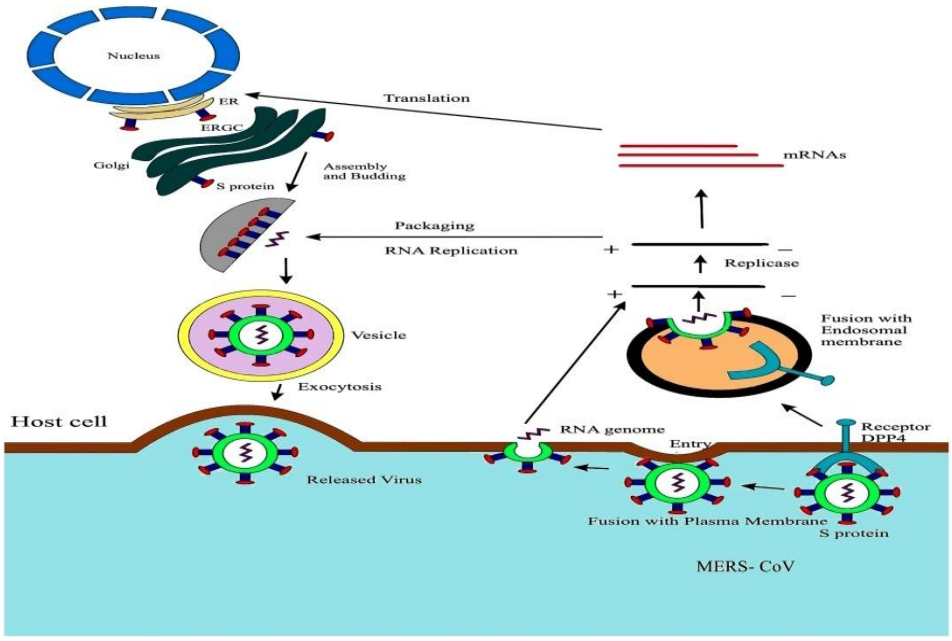
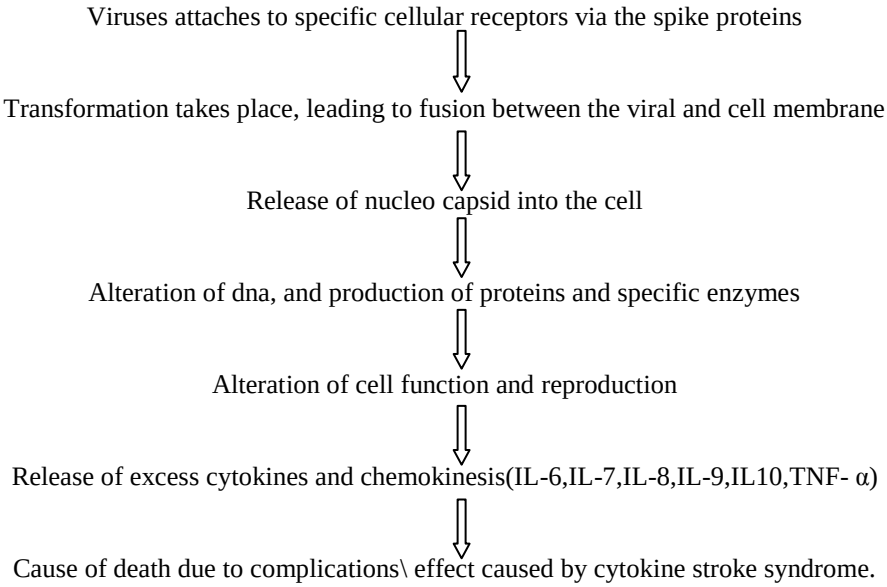


Fig.1: Represents pathogenesis of covid-19.

Pathogenesis



2. Prevalence of SARS-CoV-2

Basic Reproduction Number (R_0) refers to the average amount of secondary infection that patients may produce in completely susceptible population without intervention.[3] The estimation of R_0 varies among different research teams is updated as more information is exposed. Wu, JT, Leung et al. of York University estimated the R_0 of novel coronavirus to be 2.47-2.86.[4] using the SEIR model. The R_0 value of other viruses of β - coronavirus, such as SARS-CoV, is estimated to be 2.2-3.6.[5] The R_0 value of MERS-CoV is estimated to be 2.0-2.7.[6] These indicate that SARS-CoV-2 has relatively high transmissibility. Population is generally susceptible to SARS-CoV-2, the median age was 47.0 years (IQR, 35.0 to 58.0), 87% case patients were 30 to 79 years of age, and 3% were age 80 years or older, and the number of female patients was 41.9%.[7,8] Most cases were diagnosed in Hubei Province, China (75%). 81% cases were classified as mild, 14% cases were severe, and 5% were critical. The overall case-fatality rate (CFR) was 2.3%, but cases in those aged 70 to 79 years had an 8.0% CFR and cases in those aged 80 years and older had a 14.8% CFR.[8] This implies that elderly male citizens are more susceptible to this coronavirus as compared with other groups, and this virus is more likely to affect elderly male citizens with chronic underlying diseases (diabetes, hypertension, heart disease, etc.).[9] In summary, COVID-19 is high in prevalence and population is generally susceptible to such virus, and COVID-19 rapidly spread from a single Wuhan city to the entireworld in an period of 2months So that prompt measures should be taken to control the spread of the disease.

3. Transmission of SARS-CoV-2

Previous epidemiological studies have proved that there are three conditions for wide spread of virus, i.e. the source of infection, route of transmission, from the perspective of viral latency.[10] There is no exception for SARS-CoV-2.

3.1. Source of infection

Bats are considered to be the natural hosts of SARS-CoV-2, wheras the intermediate hosts are pangolins and snakes., studies of Peking University[11] suggest that SARS-CoV-2 infection is probably caused by snakes. Furthermore, Studies of Institut Pasteur of Shanghai showed that bats might be the natural hosts of SARS-CoV-2. However, later studies[12] found that no evidence showed that snakes are the hosts of SARS-CoV-2. The similarity of gene sequence between SARS-CoV-2 and bat coronavirus is as high as 96.2% by sequencing technology is displayed on website wuhan institute of virology.[13] This also shows that bats are the possible source of SARS-CoV-2. By using macrogenomic sequencing, molecular biological detection and electron microscopic analysis showed that the similarity of SARS-CoV-2 isolated from pangolin and the virus strains currently infecting humans is as high as 99% apart from those, Xu. et al.[14] The team also observed the typical novel coronavirus granules collected from the pangolins are the potential intermediate host of the SARS-CoV-2. Although the results of current research have not yet fully elucidated the potential natural host and the intermediate host of the SARS-CoV-2, adequate evidence has proved that this virus might be sourced from wild animals. At present, it is considered that the main infectious source of SARS CoV-2 is COVID-19 patients in the population. However, there is still a debate about whether SARS-CoV-2 patients in the incubation period are infectious, which needs further study.

3.2. Route of transmission

Transmission and close contact are the most common ways of transmission for SARS-CoV-2. Aerosol transmission might also be a way of transmission. In addition, researchers also detected SARS-CoV-2 in the

samples of saliva, gastrointestinal tract, and urine, stool. Digestive tract might be a potential route of SARS-CoV-2 infection according to the bioinformatics evidence.[15] Consistently, SARS-CoV-2 was detected in the tears and conjunctival secretions of covid-19 patients.[17] Moreover, SARS-CoV-2 RNA was also dectected in gastrointestinal tissues from COVID-19 patients.[16] A retrospective study based nine pregnant women with COVID-19 had for the first time indicated that the possibility of intrauterine vertical transmission between mothers and infants in the late pregnancy was temporarily excluded.[18] However, available data on pregnant women infected with SARS-CoV-2 were inadequate, and hence further studies are required to verify the potential vertical transmission of SARS-CoV-2 in pregnant women.

3.3. From the perspective of viral latency

Elderly citizens are susceptible groups for SARS-CoV-2, the median age of death was 75 years, and most of them had comorbidities or a history of surgery before admission.[19] Zhong. *et al.* found that, based on clinical features of 1,099 COVID-19 patients, the median incubation period was 3.0 days (range, 0 to 24.0), the median time from the first symptom to death was recent studies show 14-28 days. For SARS, the median latency of SARS is 4 days, the average duration of first symptoms to hospital admission was 3.8 days, and admission to death was 17.4 days for casualties[20] and the median latency of MERS is 7 days.[21] From the median incubation period, COVID-19 is shorter than SARS and MERS. However, the maximum latency of SARS-CoV-2 currently observed is as high as 24 days, which may increase the risk of virus transmission. Moreover, it also found that people 70 years or older had shorter median days (11.5 days) from the first symptom to death than those with ages below 70 years (20 days), demonstrating that elderly people have faster disease progression than younger people[19] is shown in epidemiological investigation report. From the above, the public should pay more attention to elderly people who might be more vulnerable to the SARS-CoV-2.

4. CLINICAL CHARACTERSTICS

An acute viral infection in humans with median incubation period was 3.0 days is an Clinical characteristics of SARS-CoV-2 infection COVID-19[7], which is similar to the SARS with an incubation period ranging from 2–10 days.[22] The presenting features of COVID-19 infection in adults are pronounced. The most common clinical symptoms of SARS-CoV-2 infection were fever (88.9%), cough (75.7%), fatigue (38.1%), vomiting (5.0%) and diarrhea (3.9%) were rare[15, 31], which were similar to others coronavirus. Some COVID-19 patients have arrhythmia, acute heart injury, impaired renal function, and abnormal liver function (50.7%) at admission.[25,26] Moreover, severe patients are prone to a variety of complications, including acute respiratory distress syndrome, acute heart injury and secondary infection.[9] In a study of 214 COVID-19 patients, 78 (36.4%) patients had neurological manifestations.[23] In addition, there is already evidence of ocular surface infection in patients with COVID-19, and SARS-CoV-2 RNA was detected in eye secretions of patient.[24]

Chest CT scan is important tool to diagnose this pneumonia. Nevertheless, several typical imaging features are frequently observed in COVID-19 pneumonia, including the predominant groundglass opacity (65%), consolidations (50%), smooth or irregular interlobular septal thickening (35%), air bronchogram (47%), and thickening of the adjacent pleura (32%), with predominantly peripheral and lower lobe involvement.[27]

5. Treatment of SARS-CoV-2

At present, the treatments of patients with SARS-CoV-2 infection are mainly symptomatic treatments. Physicians found that hydroxychloroquine(HCQ) has an immune-modulating activity and could effectively inhibit in this virus in vitro Cultres.[29] Clinical controlled trials have shown that Hydroxy Chloroquine was proved to be effective in the treatment of patients with COVID-19.[30] Most of the patients are recovered from covid-19 upon on administration of HCQ.[29] The antiviral drug Remdesivir was recently reported as a promising against a wide array of RNA viruses. Holshue et al. for the first time reported that treatment of a patient with COVID-19 used remdesivir and achieved good results.[28] Then, Xiao et al. findings reveal that remdesivir effectively in the control of 2019-nCoV infection. Clinical controlled trials have shown that Hydroxy Chloroquine was proved to be effective in the treatment of patients with COVID-19.[30] Remdesivir is undergoing a large number of clinical trials in several hospitals, and found that the the final efficacy of the drug is uncertain. A small indole derivative molecule, Arbidol, might be a choice for COVID-19 treatment as it was found to block viral fusion against influenza A and B viruses and hepatitis C viruses[31] and confirmed to have antiviral effect on SARS-CoV in cell experiment.[32] The randomized controlled study on treatment of novel coronavirus by Arbidol and Kaletra had undergone undertaken randomized controlled study for the treatment of novel coronavirus showed that Arbidol had better therapeutic effect than Kaletra. Apart from the above, nucleoside analogues, lopinavir/ritonavir, neuraminidase inhibitors, and peptide EK1 could also be the choices of antiviral drugs for COVID-19 treatment.[33] Favipiravir has demonstrated good results against influenza viruses is also used for the treatment for covid-19 in china and Japan.

5.1. Plasma therapy

The effective way to alleviate the course of disease for severely infected patients is convalescent plasma therapy as there were no sufficient vaccines and drugs to treat the disease.[34] Retrospective analysis, showed that the convalescent plasma therapy is more effective than severe doses of hormonal shock in patients with severe SARS, by reducing the mortality and shortening hospital

stays.[35] Moreover, from the perspective of immunology, most of the patients recovered from COVID-19 would produce specific antibodies against the SARS-CoV-2, and their serum could be used to prevent reinfection. At the same time, antibodies can limit the virus reproduction in the acute phase of infection and help clear the virus, which is conducive to the rapid recovery of the disease.[37] Therefore, the plasma of some patients recovered from COVID-19 could be collected to prepare plasma globulin specific to SARS-CoV-2. However, the safety of plasma globulin products specific to SARS-CoV-2 deserves further consideration As COVID-19 causes lower respiratory tract infection, some of the Studies had showed that vitamin C may prevent the susceptibility of lower respiratory tract infection under certain conditions[38], Therefore, a moderate amount of vitamin C supplementation may be a way to prevent COVID-19. In addition, the decrease in vitamin D and vitamin E levels in cattle could lead to the infection of bovine coronavirus.[39] This suggests that proper supplementation of vitamin D and vitamin E may enhance our resistance to SARS-CoV-2.

Patients with primary basic diseases, especially those with chronic diseases such as diabetes, hypertension, coronary heart disease and tumor, are more susceptible to SARS-CoV-2 as these were the chronic diseases which causes the risk of poor prognosis and will significantly increase after infection, because they have low systemic immunity as a result of the disease itself and treatments.[40] Therefore, it is particularly important to enhance self-resistance. The main way to boost personal immunity is to maintain personal hygiene, a healthy lifestyle and adequate nutritional intake.[41.42] For individuals, taking protective measures can effectively prevent SARS-CoV-2 infection, including improving personal hygiene, wearing medical masks, adequate rest and good ventilation.[10]

6. CONCLUSION

In conclusion, COVID-19 is a serious infectious disease caused by the novel coronavirus, SARS-CoV-2. Its main initial symptoms, fever, cough and fatigue, are similar to that of SARS.[10] The most likely source of SARS-CoV-2 is bats. This virus is highly infectious and can be transmitted through droplets and close contact. At this time, the specific mechanism of the virus remains unknown and there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments. At present, it is important to control the source of infection, cut off the transmission route, and use the existing drugs and means to control the progress of the disease proactively. We should also strive to develop specific drugs, promote the research and development of vaccines, and reduce morbidity and mortality of the disease, so as to better protect the safety of people's lives.

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