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**PANDEMIC VIEW OF QUADRUPLE REASSORTMENT
VIRUS-(SARS-CoV2)**

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ABSTRACT

The Covid 19 became the most dread full disease of this 20th century shaking the whole world and still fights for the precise cure apart from natural immunological response. Shifting from epidemic to pandemic nature of this virus within a short duration exhibits the severe nature of its threat to the man kind. Animal viruses have their genetic material copied by the host cell after which they are released into the environment to cause disease. Animal viruses mainly infects animal cells and causes different diseases in animals including humans. Some animal viruses are so deadliest in this world. COVID-19 is a disease caused by one of the deadliest viruses called (Severe Acute Respiratory Syndrome Corona Virus 2) SARS-CoV2. It is a positive sense single-stranded RNA virus causing respiratory illness. This strain was first discovered in Wuhan, China and so called as Wuhan virus. In this review article, we discussed about the general overview of COVID-19 including their mutations, transmissibility, clinical manifestations, diagnosis, and treatment.

Keywords: COVID-19, SARS-CoV2, Single-Stranded RNA, Respiratory Illness.

INTRODUCTION

The novel coronavirus is pandemic and infectious in humans. It is similar to that of SARS but has subtle differences. This virus spread between humans through direct close contact and also through respiratory droplets when an infected person coughs or sneezes. It enters human cells by binding to angiotensin converting enzyme 2 (ACE2) receptor[1]. The strain became pathogenic after spillover event. The researchers discovered that a pangolin sample with a viral nucleic acid sequence 99% identical to that of SARS-CoV2. The receptor binding domain of the S protein of the newly discovered Pangolin CoV is virtually identical to that of 2019-nCoV, with one amino acid difference. The S protein is responsible for entry of virus into the host cells. Mainly six types of coronaviruses which are active to infect human beings include α genus (229E, NL63), OC43, HKU1, MERSr-CoV and β genus (SARSr-CoV). By 12th January 2020, 5 genomes of SARS-CoV2

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had been isolated from Wuhan and reported by the Chinese centre for disease control and prevention (CCDC) and other institutions, the number of genomes increased to 42 by 30th January 2020. The spike (S) protein is the protein which is responsible for allowing the virus to attach and fuse with the host cell's membrane. SARS-CoV2 binds to ACE2 receptor on human cells to use them as a mechanism of cell entry. SARS-CoV2 has higher affinity to ACE2 receptor than the original SARS virus strain.

COVID-19 MUTATIONS

When a virus mutates, it may produce deadlier as well as weaker strains. Generally mutation occurs when a DNA gene gets damaged or changed in such a way to alter the genetic message carried by that genetic material. Since SARS-CoV2 is a RNA virus, these are more prone to the changes and mutations compared to DNA viruses. SARS-CoV2 virus mutates at a very slow rate, which may be more contagious. Vaccines tend to target an early version of the virus. According to Researchers, the new mutations are

similar to that of original virus which appeared in Wuhan, China and so it will not be much aggressive[2].

TRANSMISSION

COVID-19 is primarily transmitted between people through respiratory droplets and contact routes. Transmission of COVID-19 occurs by direct contact with the infected person and indirect contact with the surfaces in the immediate environment or with objects used on the infected person. SARS-CoV2 could remain viable on surface such as cardboard for up to 24hrs, and on plastic and steel for 2 to 3 days. There is no evidence that the virus can be transmitted through food. Shedding of the COVID-19 virus is highest in upper respiratory tract early in the course of the disease. The incubation period of COVID-19, which is the time between exposure to the virus and symptom onset, is on average 5-6 days, can be upto 14 days. It is possible that people infected with COVID-19 could transmit the virus before significant symptoms develop. An asymptomatic laboratory-confirmed case is a person infected with COVID-19 who does not develop any symptoms. There are few reports of laboratory-confirmed cases who are truly asymptomatic. The Studies reported that the basic reproduction number of COVID-19 around 1.9 to 6.5 and rapidly growing by human to human transmission[3].

SIGNS AND SYMPTOMS

Older adults and people who have severe underlying medical conditions seem to be at higher risk for developing more serious complications from COVID-19 illness. Illness may range from mild symptoms to severe illness and may also result in death with confirmed COVID-19 cases. These symptoms may appear 2-14 days after exposure to SARS-CoV2. Symptoms include fever, cough, shortness of breath[4]. Symptoms may start with a fever, followed by a dry cough. After a week, it can lead to shortness of breath with about 20% of patients requiring hospital treatment. The mild symptoms may last for 2 weeks. Severe or critical disease lasts upto 3-6 weeks. The novel corona virus case mortality rate has been estimated as 3.4% by WHO on March 3. According to epidemiologists, fatality rate can change as a virus can mutate.

DIAGNOSIS

To test for COVID-19, a nasal sample of an infected person is taken in a long swab and sent to laboratory for testing. There are two types of rapid diagnostic test (RDT) kits. One type of rapid diagnostic test (RDT) detects the presence of viral proteins (antigens) expressed by the COVID-19 virus in a sample from the respiratory tract of a person. The antigens detected are expressed only when the virus is actively replicating. Therefore, such tests are used to identify acute or early infection. Another type of rapid diagnostic test (RDT) detects the presence of antibodies in the blood of the people believed to be infected with

COVID-19. This is more common type of rapid diagnostic test marketed for COVID-19. Antibodies are produced over days to weeks after infection with the virus. In some people with COVID-19 disease confirmed by molecular testing (Eg: Reverse Transcription Polymerase Chain Reaction RT-PCR), weak, late or absent antibody responses have been reported. A diagnosis of COVID-19 infection based on antibody response will often only be possible in the recovery phase[5].

Antibody detection tests targeting COVID-19 may also cross-react with other pathogens, including coronaviruses and give false-positive results. Molecular testing (PCR) of respiratory tract samples is the recommended method for the identification and laboratory confirmation of COVID-19 cases. It is the primary method and a qualitative detection of nucleic acid from SARS-CoV2 in upper and lower respiratory specimens collected from individuals suspected of COVID-19. The COVID-19 RT-PCR is only for use under the Food and Drug Administration's Emergency Use Authorization. The test uses three primer and probe sets to detect three regions in the SARS-CoV2 nucleocapsid (N) gene and one primer and probe set to detect human RNase P (RP) in a clinical sample[6].

BREAK THE CHAIN OF INFECTION

To prevent the spread to many people, breaking the chain of infection is essential. Mass gatherings should be avoided so that the spread of COVID-19 infection can be prevented. There are 6 points at which the chain can be broken and the microorganism can be stopped from infecting another person. These are infectious agents, reservoir, portal of exit, mode of transmission, portal of entry, and susceptible host. The way to stop germs from spreading is by interrupting this chain at any link[7].

PREVENTIVE MEASURES

- Wash the hands frequently with soap and water or using alcohol-based hand rub kills viruses that may be present on the hands.
- Maintain at least 1m distance between people while coughing and sneezing. When an infected person coughs or sneezes they spray small liquid droplets from their nose or mouth. Maintain physical distancing.
- If there is any close contact with an infected person, one can breathe in the droplets.
- Avoid hands touching on the surfaces, nose, and mouth. This can prevent the entry of virus on to the nose and mouth while touching the contaminated surfaces using hands [8].
- Practice respiratory hygiene by covering the mouth and nose with bent elbow or tissue while coughing or sneezing. The tissue must be disposed immediately after usage.
- Using protective equipment the right way like mask that may reduce the transmission.

- CDC recommends the use of cloth face coverings where it is difficult to maintain social distancing.

FLATTENING THE CURVE

The curve refers to the projected number of people with COVID-19 over a period of time. The faster the infection curve rises, the quicker the local health care system gets overloaded beyond its capacity to treat people. The flatter curve indicates the same number of people ultimately gets infected over a longer period of time. As there is currently no vaccine or specific medication to treat COVID-19, the only way to flatten the curve is through collective action. The plateau level is achieved by washing the hands frequently, self-isolating when one feel or suspect sick and start social distancing[9].

TREATMENT

There is no specific medicine to prevent or treat COVID-19. No drugs or vaccines or biologics have been proven to be effective for the prevention or treatment of COVID-19. Numerous antiviral agents, immunotherapies, and vaccines are being investigated and developed as potential therapies. Searching for effective therapies for COVID-19 infection is a complex process. Some of the investigational drugs included are EIDD-2801, Remdesivir, Favipiravir, Hydroxychloroquine. Remdesivir has been shown to inhibit replication of other human coronaviruses associated with high morbidity in tissue cultures, including SARS-CoV in 2003 and MERS-CoV in 2012. It is provided as a compassionate use for severe COVID-19 patients[10].

Favipiravir is also being studied to treat a number of other viral infections including COVID-19. It shows promising outcomes in treating atleast mild to moderate cases of COVID-19. It has a high degree of safety and is clearly effective in treatment. It significantly shorten the time that people had fevers or coughs. It selectively inhibit viral RNA-dependent RNA polymerase. Both Remdesivir and Favipiravir shows the reduction of SARS-CoV2 infection in vitro. Chloroquine could quell the spread of SARS-CoV when applied to infected human cells in culture. SARS-CoV is closely related to the novel coronavirus, SARS-CoV-2, and caused an outbreak of severe acute respiratory syndrome in 2002.

Chloroquine has been reported to inhibit the replication of SARS-CoV2 especially 229E type in epithelial lung cultures. The mechanism of action of hydroxychloroquine is not clearly known, but it changes the pH of endosomes and believed to prevent viral entry, transport and post-entry events. Azithromycin is added to hydroxychloroquine for more efficient virus elimination from the body. Hydroxychloroquine shows significant reduction in viral loads in COVID-19 patients and its effect is reinforced by azithromycin[11].

IMMUNE BOOSTERS

With the recent COVID-19 outbreak, immune boosters helps in providing defenses against virus and other pathogens. Chronic stress depresses the immune system and increase the risk of several types of illness including respiratory illness like cold, flu, and novel coronaviruses. Antioxidants protect against free radicals[12]. Free radicals may damage DNA and other cell components. Antioxidants boosts overall health and immunity. Some compounds in herbs and supplements can potentiate immunity. Garlic, astragalus, ginseng, green tea, black cumin may produce immune boosting effects. Frequently washing the hands is a simple and effective method to prevent the spread of respiratory infections like flu, cold, novel corona viruses and diarrhoeal illness.

KABASURA CHOORNAM

‘Kabam’ indicates one of the three subtle physiological principles existing in our body(Vatham, Pitham, Kabam), which need to be maintained in an equilibrium state for physical and mental well being and when there is an imbalance between these principles it will cause diseases. Derangement of ‘Kabam’ correlates with signs and symptoms of respiratory tract. Simply, Kaba Sura Kudineer(KSK) means a decoction indicated for the management of fever due to the derangement of ‘Kabam’[13].

It is used for reducing fever caused by respiratory illness. Siddha doctors community recommends Kaba Sura Choornam for the management of the signs and symptoms of COVID-19. It is used for the prevention and treatment(reduction in symptom intensity) of COVID-19. It contains only herbal ingredients. The efficacy of Kaba Sura Choornam against SARS-CoV2 is yet to be established. Kaba Sura kudineer choornam is used when fever is associated with Kapha dosha. Kapha dosha usually afflict the respiratory system. It is especially useful when fever is associated with cough, cold, and difficulty in breathing[14].

CONVALESCENT PLASMA THERAPY

- ✧ As there is no specific treatment or vaccine for the prevention of COVID-19, the only option for the infected patients is to manage the symptoms with oxygen support and ventilators in severe cases.
- ✧ Work on developing a preventative vaccine is on progress. Besides research, the use of convalescent plasma therapy may be helpful in prevention and treatment of COVID-19.
- ✧ Convalescent plasma has shown to be effective against some infections including ‘spanish flu’. The US military used convalescent plasma to treat flu patients[15].
- ✧ More importantly, plasma transfusion can be associated with severe adverse reactions, especially among patients with respiratory failure.

CONCLUSION

COVID-19 is a life threatening respiratory disease and is more contagious. COVID-19 outbreak became one of the pandemic diseases like SARS, MERS, Ebola. This virus mutates at a very slow pace and this maybe more contagious. The information regarding the implication of virus has yet to be established. Future COVID-19 vaccine should protect the people against the original strains of SARS-CoV2 as well as the new strains. This virus mutates at a very slow pace and this maybe more contagious. The information regarding the implication of virus has yet to be established. Future COVID-19 vaccine should protect the people against the original strains of SARS-CoV2 as well as the new strains. Transmission of this virus primarily occurs through respiratory droplets and contact routes. We suggest that social distancing and keeping oneself hygiene may reduce the transmission of the virus through respiratory droplets and contact routes.

Molecular testing (PCR) of respiratory tract samples is the recommended method for the identification and laboratory confirmation of SARS-CoV2 cases. COVID-19 can be prevented by breaking the chain of infection

between the links. Mass gatherings should be denied to break the chain of infection. Remdesivir may be used as compassionate drug for the treatment of COVID-19. This drug has shown to be quite effective against COVID-19. SARS-CoV2 effect on the human cells can be naturally prevented by boosting the immunity.

Even Kaba Sura Kudineer can potentiate the immunity in the human body. Convalescent plasma therapy can be used as a substitute for treating COVID-19. But it may be too laborious. Last, but not least. Newly, Dr. Sudha Seshayyan, the Vice-Chancellor of the Tamil Nadu Dr. MGR Medical University stated that they identified a vaccine candidate against COVID-19 which is synthetic polypeptide with the help of the SARS-CoV2 genome.

They made it sooner based on the gene map data of SARS-CoV2 from the bioinformatics. This vaccine candidate seems to be subjected to preclinical studies within few days. An increased immunity can fight against SARS-CoV2. This can be achieved by immune boosters like Kaba Sura Kudineer and Nilavembu kudineer, Pepper, Vitamin C. Even there is a possibility for the virus to become weaker.

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