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Review on COVID-19

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Abstract
The SARS-CoV-2 virus is challenging the public health. It is first reported in China. Till June 18, 2021, there have been 176,945,596 confirmed cases of COVID-19, including 3,836,828 deaths, which are reported to WHO. It has mode of transmission is respiratory droplets. We can prevent COVID-19 by following all the preventing measures like vaccination, sanitation, avoiding crowds, etc. The drugs used for the COVID-19 are Favilavir, remedsivir, chloroquine, hydroxychloroquine and many more. The vaccines are given for prevention of the COVID-19. The vaccines which are effective according to the evaluation of WHO are AstraZeneca/Oxford, Moderna, Johnson and Johnson, Pfizer/Bio N Tech, Sinopharm, Sinovac.

Keywords: COVID-19, preventive measures, drug treatment, vaccines

Introduction
The corona virus is originated in Wuhan city of Hubei Province of China in December 2019. The corona virus belongs to the family Coronaviridae and order Nidovirales. It has crown like outer surface. It is caused by severe acute respiratory syndrome corona virus 2. The International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-CoV-2 and the disease as COVID-19.The corona virus has minute size of 65-125 nm in diameter. It has single stranded RNA as a nucleic material. The size of nucleic material is ranging from 26 to 32 kbs in length. The subgroups of corona virus are alpha, beta, gamma, and delta corona virus [1-2].

Epidemiology
China reported the outbreak of pneumonia in December 2019, in Wuhan which is the capital city of Hubei province. The early cases are linked with the Huanan seafood wholesale market where the aquatic animals are sold. Then beta coronavirus was discovered from the sample of patients. The sample is taken from the lower respiratory tract. Epithelial cells of human airways are used to isolate the virus. This was named as 2019-novel Corona virus.

When the virus is observed under electron microscope it has a diameter of 60 to 140 nm. It has spikes of 9 to 12 nm. On February 11, 2020, on the basis of phylogeny and taxonomy, the Corona viridae study group of the International Committee on Taxonomy of Viruses names this virus as SARS-CoV2. Then WHO gives the name of resultant disease as Coronavirus disease (COVID-19). Then WHO declared the COVID-19 as a pandemic on March 11, 2020. [3]

Structural Characteristics of Corona Virus

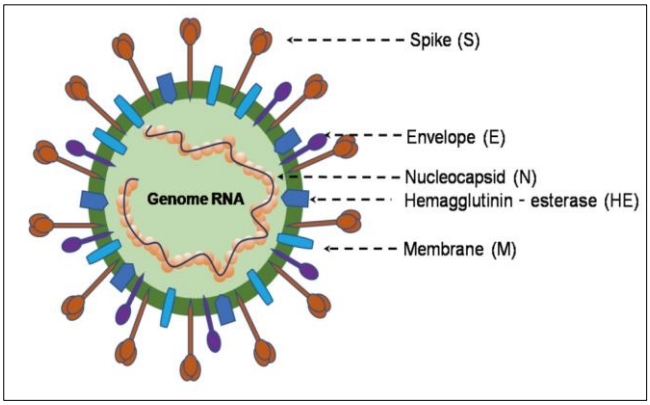

Fig 1

The corona virus has minute size of 65-125 nm in diameter. It has single stranded RNA as a nucleic material. The size of nucleic material is ranging from 26 to 32 kbs in length. It has crown like structure on outer surface which is proteins. It is spherical to pleomorphic in shape. It is enveloped by glycoproteins. The glycoproteins are responsible for attachment to host cell. [4-5]

Multiplication of Corona Virus
The life cycle of corona virus includes following steps-

1. Attachment and entry of virus to host cell
2. Replicase protein expression
3. Replication and Transcription of the virus RNA
4. Assembling of virus body parts

5. Release of virus [6]

Symptoms of COVID-19

Serious COVID-19 symptoms which require immediate medical care are Shortness of breath or difficulty in breathing, Loss of speech or mobility or confusion, Chest pain. If a person develops any of the above symptoms, call your healthcare provider or health facility and seek medical care immediately. Most common symptoms are Fever, Cough, Tiredness, and Loss of taste or smell. Less common symptoms- Sore throat, Headache, Ache and pains, Diarrhea, A rash on the skin or discoloration of fingers or toes, Red or irritated eyes [7].

Diagnosis

The corona virus is diagnosed by specific molecular tests on respiratory samples like throat swab, endotracheal aspirates, nasopharyngeal swab, sputum, bronchoalveolar lavage, etc. The virus culture is detected by electron microscopy. In severe cases corona virus can be detected in blood. We cannot distinguish between the corona virus cold and cold due to rhinovirus. The mostly used laboratory diagnosis method is to collect paired sera from acute and convalescent phases of disease and to test by ELISA for rise in antibodies against OC43 and 229E. Direct hybridization and polymerase chain reaction tests for viral nucleic acid are most sensitive assays currently available for detecting virus [5].

Mode of Transmission

(WHO) World Health Organization currently said that the COVID-19 virus is transmitted primarily through respiratory droplets. Transmission through air is via small aerosols is not a major route of disease transmission. The US Centers for Disease Control and Prevention (CDC) also says that COVID-19 is mainly spread through the close contact from person to person. For the close contact the distance is within 1.8 m. The CDC also says that transmission through inhalation of respiratory droplets is not a primary way. Transmission through airborne way by the smaller droplet of infected individual in more than 1.8 m distance may occur. The SARS-CoV-2 can be viable up to 24 hours on the cardboard and on the plastic or stainless steel it may be viable for 72 hours. The SARS Coronavirus can be killed by heat at 56 degree Celsius at around 10000 units per 15 minutes. There are two modes of COVID-19 transmission. First one is direct which includes transmission by aerosols, tears, saliva, anal secretions and mother to child also. And the second is indirect which includes transmission by fomites [8-10].

Treatment with latest drugs used for COVID-19

For the treatment of COVID-19 firstly the isolation is done. Then in supportive care antibiotics are used, oxygen therapy is also provided.

Inhibition of virus entry: For invasion of the cell membrane SARS-CoV-2 get help from ACE2 as a receptor and Human protease is activator for entry in cell. So, the drugs which can block this entry are used to treat the COVID-19.

1. Umifenovir: The drug approved in Russia and china for treating influenza and some respiratory diseases is Umifenovir (Arbidol). The Umifenovir (Arbidol) blocks the membrane fusion. The Umifenovir is shows more effect than the Lopinavir and Ritonavir for treating COVID-19. Though the effect of umifenovir is not too much clear so, some clinical trials are going on it for evaluating its efficacy for treating the COVID-19.
2. Camostat mesylate- The drug approved in Japan for treating pancreatitis and postoperative reflux oesophagitis is Camostat mesylate. The Camostat mesylate is inhibits the entry of SARS-CoV-2 in the human lung cells.
3. Chloroquine and hydroxychloroquine- The Chloroquine and hydroxychloroquine are also the drugs which can inhibit the entry of SARS-CoV-19. The chloroquine and hydroxychloroquine can also be used in prevention and treatment of, autoimmune diseases, rheumatoid arthritis, systemic lupus erythematous, and malaria. They have many uses like they can inhibit membrane fusion, they can block glycosylation of cellular receptors, they can increase endosomal pH, and they can interfere with virus receptor host binding. But it can increase the risk of death due to high risk of cardiac arrest in the patients who are treated with it. Due to the side effects observed the USFDA revokes the emergency use authorization of chloroquine and hydroxyl chloroquine. On 13 March 2021 clinical trials are confirmed that chloroquine and hydroxychloroquine are not preventing the illness or death of patients with COVID-19.

Inhibition of virus replication: The drugs which can inhibit The Replication of virus are remedsivir, ritonavir, favilavir, lopinavir, and ribavirin.

1. Remedsivir: The remedsivir has activity against SARS-CoV-19 in vitro and in vivo also. The remedsivir is the first approved option of the European Union for treatment of adults and adolescents with pneumonia who are require supplemental oxygen. The FDA has issued an emergency use authorization for remedsivir for the treatment of the hospitalized patients with severe COVID-19.
2. Favilavir: Favilavir is the drug which is developed in the Japan for the treatment of influenza. The favilavir is approved in the India, China and Russia for the treatment of COVID-19. A clinical study is done on favilavir in china which shows that it is significantly reduces the signs of improved disease signs on chest imaging and shortened the time to time viral clearance.
3. Lopinavir and ritonavir: Lopinavir and ritonavir have the in vitro inhibitory activity against SARS-CoV and MERS-

CoV. The combination of lopinavir and ritonavir is not much effective but if we combine other drugs like ribavirin and interferon beta-1b it is more effective. The Randomized Evaluation of COVID-19 Therapy (RECOVERY) trial which is a national trial programme in UK, has stopped the treatment of COVID-19 with lopinavir and ritonavir because it is not have a significant beneficial effect while observed in a randomized trial established on March 2020 with total 1596 patients.

4. Favipiravir - Favipiravir is acts as a purine analogue. It is incorporated in place of guanine or adenine so; it can inhibit the virus replication.

Immunomodulatory agents: The SARS-Cov-2 stimulates the strong immune response. So, the immunomodulatory agents block the inflammatory response which is the therapy for CPVID-19.

1. Dexamethasone: Dexamethasone is the corticosteroid drug which is used to treat inflammation by the anti-inflammatory and immunosuppressant effects. Dexamethasone in RECOVERY trials shows decrease in the mortality rate. The mortality rate is decreased in patients who received the invasive mechanical ventilation by one third and in patients who receiving oxygen by one fifth. It is not have effect in patients without respiratory support. But the use of dexamethasone is done only when the patient needs it most.
2. Tocilizumab and sarilumab: Tocilizumab and sarilumab are interleukin-6 receptor specific antibodies shows effect in treatment of COVID-19. It shows its effect by attenuating the cytokine storm in a small uncontrolled trial.
3. Bevacizumab- Bevacizumab is an anti-vascular endothelial growth factor medication which is potentially reduces pulmonary edema in patients with severe COVID-19.
4. Eculizumab: Eculizumab is a specific monoclonal antibody which inhibits the proinflammatory complement protein C5.
5. Interferon response- For the virus invasion interferon response is a major innate immunity defence. The in vitro study shows that SARS-CoV-2 is more sensitive to type 1 interferon than the SARS-CoV, so it suggests the potential effectiveness for treatment of COVID-19.

Vaccines: The most effective method to prevent and control the disease is vaccination. The list of vaccines evaluated by WHO for COVID-19 which are met the necessary criteria for safety and efficacy, as of 3 June 2021.

1. AstraZeneca/Oxford vaccine
2. Johnson and Johnson
3. Moderna
4. Pfizer/BioNTech
5. Sinopharm
6. Sinovac [7], [11-13]

Preventive Measures

- Use alcohol based sanitizer.
- To use hand sanitizer.
- To use face masks.
- The proper cover the nose, chin and mouth by mask.
- Before putting the mask clean your hands.
- There is a ban on the social events.
- We have to do work from home.
- Maintain a distance of at least 1 meter from others
- For reducing the risk of infection if other person is sneeze, cough or speak.
- Regularly wash your hands.
- Don’t touch your nose, mouth and eyes unnecessary.
- While coughing and sneezing cover your mouth and nose by your bent elbow.
- If you are ill then know the full range of symptoms of COVID-19.
- Take healthy diet every day.
- If you have minor symptoms of like cough, headache, mild fever then keep self-isolate and stay home.
- If you have breathing difficulty, fever and cough then contact to the doctor.
- Do physical exercise daily and stay physically active.
- Do not smoke.
- Get vaccinated [7, 20].

Herbal treatment options for COVID-19

1. Celastrol: It is natural plant-derived product which is found in Celastraceae family. The extract of this plant family is traditionally used for the treatment of fever, joint pain and edema. It has low toxicity. The anti-inflammatory activity of the celastrol is evaluated on animal models for both in vivo and in vitro. And then mechanism of action is published.
2. Ginger (Gingiber Officinale): Ginger have antiviral activity is shown by several studies. The ginger shows activity against the Human Syncytial Viruses (HRSV). It shows activity by preventing the binding of virus to the upper respiratory tract cells. Since long time we know that ginger have activity against common cold and flu by inhibiting the viruses.
3. Garlic (Allium Sativum): The garlic shows antiviral activity against Influenza viruses, both Influenza A and Influenza B. It also has activity against cytomegalovirus, rhinovirus, HIV, herpes simplex virus 2, viral pneumonia and rotavirus.
4. Giloy (Tinospora Cordifolia): Giloy is active against the HIV. The docking studies show that alkaloid extracted from Giloy can bind to active site of HIV 1 protease with a good affinity.
5. Tulsi (Ocimum Tenuiflorum) and Ashwagandha (Somnifera): The report released by Acharya Balakrishna who is MD of Patangali Ayurveda states that when Giloy, Tulsi and Ashwagandha are used in combination it has

potential to inhibit the COVID-19. Their study was further spported by in silico docking studies which revealed that the phytochemicals from ashwagandha would inhibit the ACE2 of the host, which is the major site to which the receptor binding domain of virus attaches with its spike proteins. When the docking studies are done with ACE 2 it shows good results [21-22].

Conclusion

The pandemic COVID-19 is novel disaster. Due to this disease our whole lifestyle is changed totally. In the early days the spread of disease is faster but now the spread is in control due the preventive measures like city lockdowns and home quarantine, etc. The economy of our country gets badly affected. This has very common symptoms so, it is not easily diagnosed. Now vaccination is the way to get rid of disease. For improving the life we have to follow all the preventing measures like vaccination, sanitation, avoiding crowds, etc. The whole world will come out from this pandemic very soon because now we have vaccines.

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