

Practique Clinique et Investigation

Treatment Options Being Explored for Corona Virus Infection

Gurmeet Singh Sarla*

Department of General Surgery, Military Hospital Devlali,
Devlali, Nasik, Maharashtra, India

***Correspondence:** Gurmeet Singh Sarla, Senior Advisor
Surgery, Department of General Surgery, Military Hospital
Devlali, Devlali, Nasik, Maharashtra, 422401, India, Email:
rijak1@gmail.com

ABSTRACT

The world has come together to fight a virus of the diameter of 0.125 microns and the fight is still on and the virus is not ready to give up. The clinical spectrum of COVID-19 varies from being asymptomatic to clinical conditions characterized by respiratory failure. Social distancing, staying indoor, avoiding mass gatherings and strict hand hygiene are few simple, practical, economical ways of fighting the spread of the virus. Management of the disease is mostly supportive in the form of oxygen supplementation, non-invasive ventilation and in severe cases, mechanical ventilation. There is no specific antiviral treatment available nor is there any vaccine available. The world is a changed world until a vaccine or a drug becomes available against the infection. Numerous anti-viral drugs including anti-retrovirus drugs and anti-malarial like Chloroquine and Hydroxychloroquine have been tried and have been of unproven benefit. Role of Tieceoplanin, BCG vaccine and numerous Ayurvedic and Chinese herbal preparations is also being explored. This review article enumerates various treatment options which are being developed and tried world over to combat the corona virus infection.

Keywords: *Corona-virus; COVID-19; Drugs; Vaccine; BCG; Hydroxychloroquine; Tieceoplanin*

INTRODUCTION

The 2019 novel coronavirus (2019-nCoV) infection has spread to more than 180 countries and has been declared as a global pandemic. It was first reported to the WHO Country Office in China on 31 December 2019. As they were unable to identify the causative agent, these first cases were classified as "pneumonia of unknown etiology which is now attributed to a novel virus belonging to the coronavirus (CoV) family." "COVID-19" is the acronym of "coronavirus disease 2019" and the causative virus seems to be very contagious and has quickly spread globally [1]. Coronavirus (coronavirus) is an envelope, positive-stranded RNA virus. Under the electron microscope, it has protrusions that resemble the corona, and looks like a crown, so it is called a corona virus. Six human corona viruses (HCoVs) have been identified, amongst which four (HCoV-229E, HCoV-NL63, HCoV-HKU1, HCoV-OC43) cause mild respiratory infections and the other two viruses cause Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus (MERS Coronavirus) causing severe respiratory diseases. Corona viruses causing SARS and MERS are transmitted from animals to humans.

Citation: Gurmeet Singh Sarla, Treatment Options Being Explored for Corona Virus Infection. *Prac Clin Invest* 3(2): 54-60.

©2021 Tridha Scholars

DISCUSSION

The sequence of 2019-nCoV is relatively different from the six other coronavirus subtypes but can be classified as beta-coronavirus. Studies have shown that SARS-CoV and MERS-CoV can be transmitted directly to humans from civets and dromedary camels respectively and both viruses originate in bats, but the origin of 2019-nCoV needs further investigation [2,3].

Symptoms

Corona viruses shows clinical symptoms of mild upper respiratory tract infections such as common cold, fever ($>38^{\circ}\text{F}$), headache, shortness of breath, fatigue, dry cough, hemoptysis, diarrhoea, vomiting and pneumonia. Other serious complications are acute respiratory distress syndrome, arrhythmia, shock, acute kidney and cardiac injury, liver dysfunction and associated secondary infection [4,5]. Covid- 19 infections cause more severe diseases amongst children, elderly, pregnant women and patients having co-morbidities such as diabetes mellitus, cardiovascular diseases, and cancer. In elderly patients, COVID-19 may infect the lower respiratory tract with the risk of leading to fatal pneumonia [6] which may subsequently lead to hypoxemia, breathing problems and acute respiratory distress syndrome (ARDS) [7].

The most commonly reported clinical symptom in laboratory-confirmed cases is fever (88%), followed by dry cough (68%), fatigue (38%), sputum production (33%), dyspnoea (19%), sore throat (14%), headache (14%) and myalgia or arthralgia (15%) [8].

Prevention of spread of infection

There is no specific antiviral treatment available nor is there any vaccine available. The most important step to curb this disease is prevention of the spread by social distancing and strict hand hygiene. Hand washing with a foaming soap and copious amounts of water for at least 20 seconds has been found to be effective and use of an alcohol-based hand rub preparation for hand hygiene has been defined as the standard of care and is one of the essential means to prevent the spread of infection [1]. It is recommended that the general population, sick people with respiratory symptoms and people who are working in health care facilities who are not in direct contact with patients may wear a cloth mask, people who are involved in patient care should wear surgical masks and N95 masks be worn by medicals like Anaesthetists and Internal Medicine Specialists who are exposed to respiratory secretions of infected people during endotracheal intubation and other invasive procedures [9]. Healthcare workers caring for infected individuals should utilize contact and airborne precautions to include PPE such as N95 masks, eye protection, gowns, and gloves to prevent transmission of the pathogen [9].

Management

The treatment is symptomatic and oxygen therapy represents supportive treatment for patients with severe infection [1]. Mechanical ventilation may be necessary in cases of respiratory failure refractory to oxygen therapy whereas hemodynamic support is essential for managing septic shock as fluid management is of utmost importance as a measure to reduce pulmonary oedema. The next step if the patient doesn't respond to oxygen supplementation is Non- invasive ventilation (NIV) followed by intubation and invasive mechanical ventilation [1]. WHO recommends extracorporeal membrane oxygenation (ECMO) to patients with refractory hypoxemia and respiratory failure from acute respiratory distress syndrome

(ARDS) secondary to coronavirus disease 2019 (COVID-19). Rescue treatment with convalescent plasma and immunoglobulin G are delivered to some critical cases according to their conditions [10,11].

Drugs

Researchers across the world are trying repurposing the already available drugs. Antiviral drugs such as Ribavirin, Lopinavir / Ritonavir have been used based on the experience with SARS and MERS. Experiments are also underway with Interferon and Plasma from patients during recovery period from the infection.

Teicoplanin

Teicoplanin, a glycopeptide antibiotic was found to be active in vitro against SARS-CoV, has joined the list of molecules that could be used as therapeutic arsenal against COVID-19. This antibiotic currently used in the treatment of Ebola, influenza virus, Flavivirus, Hepatitis C virus, HIV virus and in coronavirus infections such as MERS-CoV and SARS-CoV [12].

Remdesivir

Remdesivir a nucleotide analogue prodrug found to inhibit the replication of SARS-CoV and MERS-CoV in tissue cultures. Brown AJ found that Remdesivir potently blocks SARS-CoV-2 infection at low micromolar concentrations and has a high selectivity index [13]. Holshue et al. also reported promising results of Remdesivir in the treatment of COVID-19 [14].

Lopinavir

Lopinavir is a human immunodeficiency virus 1 (HIV-1) protease inhibitor. It is usually used in combination with Ritonavir to increase the half-life of Lopinavir by inhibiting cytochrome P450. Combination of these anti HIV drugs have shown anti-SARS-CoV activity in vitro and in clinical studies [15]. The results of in vitro experiments also proved that Lopinavir / Ritonavir inhibit coronavirus replication to a certain extent.

Favipiravir

Researchers believe that Favipiravir may have potential antiviral action on SARS-CoV-2, which is a RNA virus. Darunavir, a second-generation HIV-1 protease inhibitor has been reported to inhibit the SARS-CoV-2 in vitro. IFN- α is a broad-spectrum antiviral that is usually used to treat hepatitis, though it is reported to inhibit SARS-CoV reproduction in vitro. Favipiravir and Ribavirin represent nucleoside analogues. Favipiravir is a RNA-dependent RNA polymerase inhibitor capable of blocking the replication of RNA viruses [16]. It converts into an active form (Favipiravir-RTP) in cells and is recognized as a substrate by viral RNA polymerase, thus inhibiting RNA polymerase activity [17].

Chloroquine and hydroxychloroquine

Hydroxychloroquine and Chloroquine are oral antimalarial drugs that have been used to treat malaria and certain inflammatory conditions since years. Chloroquine and Hydroxychloroquine have been found to be effective against SARS-CoV-2 and are under investigation for the treatment of COVID-19. Studies found that treating patients diagnosed with pneumonia due to novel coronavirus with Chloroquine might improve the success rate of treatment, shorten hospital stay and improve patient outcome [18,19]. Experimental studies have also suggested that Chloroquine has the capability of inhibiting the replication of several intracellular micro-organisms including corona viruses in vitro.

Recovery Plasma

It has been reported that plasma therapy in the recovery phase can reduce the mortality of patients with severe influenza A and SARS-CoV infection [20]. Evidence shows that convalescent plasma from the recovered patient can be used as a treatment without the occurrence of severe adverse events [21]. Researchers across the world expect that convalescent plasma would help to increase survival rates in infected people as in the case with other emerging viral infection. However the efficacy and safety of convalescent plasma therapy for patients with 2019-nCoV infection should be further evaluated in well-designed clinical trials.

Protective monoclonal antibody

With the rapid development of genetic engineering antibody technology, monoclonal antibody drugs have made great progress. Since monoclonal antibodies can only recognize a single epitope, the anti-infection effect of monoclonal antibodies is limited. Secondly, the development of monoclonal antibodies require a certain period of time and monoclonal antibodies are difficult to develop for new pathogens.

Alternate Medicine

In the wake of the Covid-19 outbreak, enhancing immunity plays an important role in maintaining optimum health. In India Chyavanprash, an ayurvedic immune boosting preparation is being recommended in the fight against Covid-19. Also use of herbal tea / decoction (Kadha) made from Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black pepper), Shunthi (Dry Ginger) and Munakka is recommended to increase the immunity [22, 23]. Green tea has also been studied to have immunostimulant effect and is being studied for use against the fight against the corona virus [24].

Chinese traditional medicines and homeopathic medicines are also being tried for the treatment of corona virus infection. Herbal Chinese medicines also have a role in the prevention and treatment of new and sudden respiratory infections such as H1N1 influenza. However its efficacy for 2019-nCoV needs further evaluation. A probable list of 30 agents along with Chinese herbal medicines such as Rhizoma Polygoni Cuspidati and Radix Sophorae Tonkinensis with potential antiviral activity against SARS-CoV-2 has been reported after thorough drug screening and an enzyme activity test performed by team of the Shanghai Institute of Materia Medica and Shanghai Tech University against SARS-COV-2.

BCG Vaccine

The Bacillus Calmette Guerin vaccine, which was first developed to fight tuberculosis is being studied in clinical trials around the world as a way to fight the novel coronavirus. Few researchers postulated that until a specific vaccine is developed, SARS-CoV-2 vulnerable populations could be immunized with BCG vaccine to attain protection from the new coronavirus [25].

Covid 19 Vaccine Update

SARS-CoV-2 and 2019-nCoV exhibit a high degree of genetic and clinical similarity. The rapid genomic sequencing, together with advanced vaccine technology will provide the right path for Covid-19 vaccine in the near future [26]. The recent research work for the vaccine technology are whole virus vaccines, recombinant protein subunit vaccines, and nucleic acid vaccines [27].

Quest for vaccine

It is difficult to make a vaccine against a virus due to frequent viral mutations but we need to find a potent vaccine at the earliest. Imagine an era where hugs and even hand-shakes would be impolite, pubs and musical performances would be banned, audiences in cricket and football stadiums would be things of the past and digital schools and on-line classes would be preferred over traditional schools if soon a vaccine is not available and we perform have to follow social distancing to fall victim to the viral disease.

CONCLUSION

COVID-19 has affected the whole world and the world has united to battle this deadly infection.

Following social distancing and strict hand hygiene have been found simple, effective and economical ways of preventing the spread of infection.

Use of soap and water to wash hands frequently after an outing and use of an alcohol base hand sanitizer are beneficial.

Masks have a role to play in preventing the spread of infection. Home-made cloth masks made from clean, cotton fabric is recommended to be used by the general population when going outdoors. Health care workers involved in patient care may use surgical masks and Anaesthetists and Respiratory Physicians treating infected patients and performing interventions on them may use N-95 masks.

Researchers all over the world are on the job to find an effective cure against the virus. Tieceoplanin is a broad spectrum antibiotic under trial in the treatment of the virus and so are numerous anti-viral drugs like Ribavirin, Lopinavir and Favipiravir. Anti-malarial drugs: Chloroquine and Hydroxychloroquine have been found to be effective against SARS-CoV-2 and are under investigation for the treatment of COVID-19. Convalescent plasma from the recovered patients and genetic engineering antibody technology to develop monoclonal antibodies are being tried as an option. Researchers have postulated that vulnerable populations could be immunized with BCG vaccine to attain protection from coronavirus. Alternative and complementary medicines like Chyavanprash, tulsi, green tea have been found to have immune stimulating effects and so are Chinese herbs and have an unproven role in the treatment of this viral infection. Researchers are trying their best to develop a potent vaccine.

REFERENCES

1. Gurmeet Singh Sarla (2020) COVID 19: Myths and Facts. Research & Review: Management of Emergency and Trauma Nursing 2(2): 5–8.
2. Tao Y, Shi M, Chommanard C, et al. (2017) Surveillance of bat coronaviruses in Kenya identifies relatives of human coronaviruses NL63 and 229E and their recombination history. Journal of Virology 91(5): e01953-e02016.
3. Cui J, Li F, Shi ZL (2019) Origin and evolution of pathogenic coronaviruses. Nature Review Microbiology 17(3): 181-192.
4. Wang D, Hu B, Hu C, et al. (2020) Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA 323(11): 1061-1069.
5. Huang C, Wang Y, Li X, et al. (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 395(10223): 497-506.

6. Chan JF, Yuan s, KoK Kh, et al. (2020) A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet* 395(10223): 514-523.
7. Chen Y, Liu Q, Guo D (2020) Emerging coronaviruses: genome structure, replication, and pathogenesis. *Journal of Medical Virology* 92(4): 418-423.
8. World Health Organization (WHO) (2020) Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19).
9. Sarla GS (2020) Coronavirus pandemic: An Indian perspective. *Research & Review: Management of Cardiovascular and Orthopedic Complications* 2(2): 1-4.
10. WHO (2020) Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected. Interim Guidance, WHO, USA.
11. Chen L, Xiong J, Bao L, et al. (2020) Convalescent plasma as a potential therapy for COVID-19. *Lancet Infectious Diseases* 20(4): 398-400.
12. Colson P, Raoult D (2016) Fighting viruses with antibiotics: an overlooked path. *International Journal of Antimicrobial Agents* 48(4): 349-52.
13. Brown AJ, Won JJ, Graham RL, et al. (2019) The broad spectrum antiviral remdesivir inhibits human endemic and zoonotic deltacoronaviruses: A highly divergent an RNA with an RNA Polymerase dependent. *Antiviral Research* 169: 104541.
14. Holshue ML, DeBolt C, Lindquist S, et al. (2020) First case of 2019 novel coronavirus in the United States. *The New England Journal of Medicine* 382(10): 929-936.
15. Chu CM, Cheng VCC, Hung IFN, et al. (2004) Role of lopinavir/ritonavir in the treatment of SARS: Initial virological and clinical findings. *Thorax* 59(3): 252-256.
16. Delang L, Abdelnabi R, Neyts J (2018) Favipiravir as a potential countermeasure against neglected and emerging RNA viruses. *Antiviral Research* 153: 85-94.
17. Furuta Y, Komeno T, Nakamura T (2017) Favipiravir (T-705), a broad spectrum inhibitor of viral RNA polymerase. *Proceedings of the Japan Academy. Series B, Physical and Biological Sciences* 93(7): 449-463.
18. Zhonghua Jie He He Hu Xi Za Zhi (2020) [Expert consensus on chloroquine phosphate for the treatment of novel coronavirus pneumonia. 43(3): 185-188.
19. Gao J, Tian Z, Yang X (2020) Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. *Bioscience Trends* 14(1): 72-73.
20. Mair-Jenkins J, Saavedra-Campos M, Baillie JK, et al. (2015) The effectiveness of convalescent plasma and hyperimmune immunoglobulin for the treatment of severe acute respiratory infections of viral etiology: a systematic review and exploratory meta-analysis. *The Journal of Infectious Diseases* 211(1): 80-90.
21. Chen L, Xiong J, Bao L, et al. (2020) Convalescent plasma as a potential therapy for COVID-19. *The Lancet Infectious Diseases* 20(4): 398-400.
22. Gurmeet Singh Sarla (2019) Complementary and alternative medicine. *Research & Reviews: A Journal of Pharmacognosy* 6(3): 1-5.
23. Ministry of AYUSH (2020) Ayurveda's immunity boosting measures for self care during COVID 19 crisis.

24. Sarla GS (2019) Consuming tea: A healthy habit or a health hazard. *Journal of Medical Science and Clinical Research* 7(5): 771-75.
25. Gursel M, Gursel I (2020) Is Global BCG vaccination coverage relevant to the progression of SARS-CoV-2 Pandemic? *Medical Hypotheses*:109707
26. Prompetchara E, Ketloy C, Palaga T (2020) Immune responses in COVID-19 and potential vaccines: Lessons learned from SARS and MERS epidemic. *Asian Pacific Journal of Allergy and Immunology* 38(1): 1-9.
27. Chen WH, Strych U, Hotez PJ, et al. (2020) The SARS-CoV-2 Vaccine Pipeline: an Overview. *Current Tropical Medicine Reports*. 1-4.