

Recent Advances and Potential Effects of Coronaviruses Family Groups on Different Body Organs and Modulatory Efficacy of Different Vaccines

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Abstract

Coronaviruses as the most infectious group of viruses and their mode on action on respiratory tract and borne on other diseases are major risks for new disorders associated with the respiratory system. One of the biomarker in progression of pathogenesis of COVID-19 is the Granulocyte-macrophage colony-stimulatin (GM-CSF). This makers appears to more in high concentrations as compared to those normal cell. The major feature about the cellular mechanism of the COVID-19 is the changing shape of the strain that becomes difficult to control easily. Different symptoms and preventive measures are needed to exploit them. COVID-19 has influenced on the mental health by suppressing the different functions of neurons thus increasing the chances of brain disorders. Other neurological disorders symptoms are loss of smell in the form of anosmia, weakness, fatigue and a change in taste dyspepsia. ACE2 receptors are mainly involved in responses in case of entry of coronaviruses in the host cell. Airways have more ACE2 receptors than the rest of the respiratory tract. Nucleic acids vaccines are designed to target the spike proteins of the coronaviruses by inactivating of the antigen that can be injected into the cells of the human body. . There are many vaccines available for targeting the antigen behind the cellular responses to the nucleic acids. It implicate the immune responses once the vaccine injected into the body by producing the antibodies.

Keywords: COVID-19, Infections, ACE2 receptors, vaccines, treatments, drugs, mental health.

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INTRODUCTION

Coronaviruses are the most infectious group of viruses that infect the respiratory tract thus blocking the air respiratory passage ways [1]. These viruses have different target proteins that distinguish from other viruses on the basis of spikes that helps the viruses to attach the source of the host cells and causing the severe infections of nervous, cardiovascular and other problems. These viruses have greater chances of spreading of infections from one person to the other. The droplets may land on another person on an item such as a door handle. Once the attack on the host cells, replicate and then causing the breathing difficulties in addition to other nonspecific symptoms, including headache, dyspnea, fatigue, and muscle pain [2, 3].

COVID-19 is the most leading cause of blocking the socioeconomic barriers and transportation due to lockdown in order to control the rate of infections by following the preventive measures of masking, drugs, ventilators and vaccinations [4]. It is also obvious that besides their disastrous effect on human morbidity and mortality, there are equally distressing the socio-economic consequences for the affected countries and the whole world. There are more steps needed that overcome the fear of infections rate of coronaviruses as these viruses have more chances of attack to the people with older age and those with compromised immune system [5].

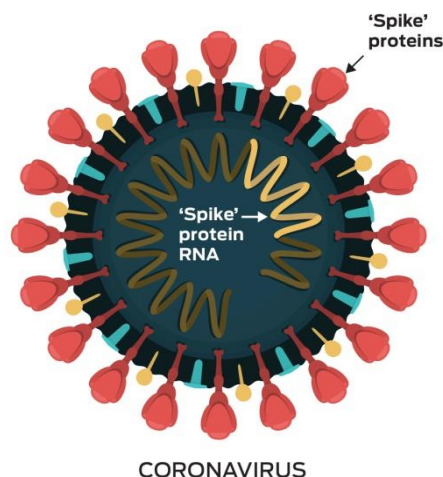


Fig-1: Shows the spike proteins involvement for attachment to host

COVID-19 also influenced on those people who are belonging to the poor families or sources of income are limited. Their mode on action on respiratory tract and borne on other diseases are major risks for new disorders associated with the respiratory system. This will increase the burden of more infections in

hospital, transportation sectors, industrials and other sources are major cause of spearing of infections. The source of origination and transmission are important to be determined in order to develop preventive strategies to contain the infection [6, 7].

Table-1: Shows the effects of COVID-19 on different body cells

| Biological Effects | Proteins/Receptors | Mechanism of action | References |
|---|---|--|------------------|
| Brain cells | Ganglion cells | Infects the brains cells epically ganglion cells. | [18] |
| Respiratory system | Respiratory tract | Blocking the air respiratory passage ways | [15, 16, 17] |
| severe infections of nervous, cardiovascular and other problems | spikes | spikes that helps the viruses to attach the source of the host cells | [10, 1, 12] |
| Breathing difficulties | PRRs/ cytokine release syndrome | Once the attack on the host cells, replicate and symptoms including headache, dyspnea, fatigue, and muscle pain. | [18, 19, 20] |
| COVID-19 | GM-CSF | This makers appears to more in high concentrations as compared to those normal cell. | [10, 11, 12,] |
| Brain | neurological disorders | symptoms are loss of smell in the form of anosmia, weakness | [19] |
| Respiratory system | ACE2/Asthma and other related respiratory | increases when virus blocks the respiratory tract. | [27] |
| COVID-19 | Vaccines | Vaccines are used to develop the immunity against the specific disease. | [35, 26, 27, 28] |
| Immunization | Nucleic acids vaccines are | to target the spike proteins of the coronaviruses by inactivating of the antigen that can be injected into the cells of the human body | [38, 39] |

Coronaviruses attack on the different systems of the noses of the body such as respiratory major system, nervous systems and cardiovascular system. As respiratory tract major part of the respiratory system, once blocked due to more infections, suffocation, coughing especially chances of deaths increases in those with respiratory tract diseases. It also infects the brains cells epically ganglion cells that are main cells of

the nervous system, once virus infects these cells leads the problems of Alzheimer disease[8, 9].

Biochemical Role of Inflammatory Markers & Immune Responses

One of the biomarker in progression of pathogenesis of COVID-19 is the Granulocyte-macrophage colony-stimulatin (GM-CSF). This makers

appears to more in high concentrations as compared to those normal cell. It increases the chances of detection of COVID-19 patients than those from other patients with suffering from influenza. Most probable response is from the innate immunity with activation of different receptors and recognition proteins such as pattern recognition receptors (PRRs). Activated PRRs involve multiple signaling adapters to activate transcription factors [10-12].

Nuclear Factor kappa-light-chain-enhancer of activated B(NF- κ B) which regulates the expression of genes that are involved in immunity and inflammation. Some patients that suffering the infections of COVID-19 showed the activation of different types of excessive chemokine's production, known as cytokine release syndrome (CRS). It causes the destruction of the tract that causing the fatal pneumonia and acute respiratory distress syndrome. Different biochemical signals promoting the cellular signaling in order to produce the effective response against the cocornronvisres. The major feature about the cellular mechanism of the COVID-19 is the changing shape of the strain that becomes difficult to control easily. Different symptoms and preventive measures are needed to exploit them [13, 14].

Different Effects of COVID-19 on the Mental Health

COVID-19 has influenced on the mental health by suppressing the different functions of neurons thus increasing the chances of brain disorders. Other neurological disorders symptoms are loss of smell in the form of anosmia, weakness, fatigue and a change in taste dyspepsia [15-17]. Various factors that increase the risks for mental health include overwhelming situations, social disruption of daily life, feeling vulnerable, at risk of getting infected, fear of transmitting the disease to families, and loved ones. Biological factors affecting the neurological functions included the stress that increase the level of hormones by passing the normal signals produced in brain cells. Defects or alterations in neuronal cells have high

tendency to replicate than the brain cells thus increasing the mutational disorders [18].

Major impact on the public health carries by disrupting the contacting barriers from each other. One of the disease that increases at risk during the pandemic of COVID-19 is the Anosmia that leads to weakness appeared in more than 30% of the patients the studies. This disease leads to defect in the olfactory sense organs by releasing the pathways that in increases the process of metastasis. This disease also leads to poor quality of sensing due to the more infections in nasal cavities thus causing the cold. Some studies showed that nasal polyps small abnormal growths in the nose and sinuses that block the nasal passage. It resulted the high chances rate in those people with compromised respiratory system or those suffering from inflammatory respiratory tract disease. Asthma and other related respiratory propels also increases when virus blocks the respiratory tract [19-21].

Different Effects of COVID-19 on the Respiratory Tract

Angiotensin converting enzyme 2 (ACE2) is the main enzymes that catalyzing the reactions in lower of blood pressure and also showed responded in entry of coronaviruses also infect the respiratory system and different aspects of casing the infections in respiratory showed that it has effect n nose, lungs as major organism for inhalation [22]. ACE2 receptors are mainly involved in responses in case of entry of coronaviruses in the host cell. Airways have more ACE2 receptors than the rest of the respiratory tract. Binding of the spike S1 protein of SARS-CoV and SARS-CoV-2 to the enzymatic domain of ACE2 on the surface of cells results in endocytosis and translocation of both the virus and the enzyme into endosomes located within cells. These phenomena lead the different changes in cells in resins to entry and laid key role in cell membrane endocytosis process. Sometimes, defect in the ACE2 leads to recognition of the proteins associated with coronaviruses family leads the increase chances of viral attack [23-26].

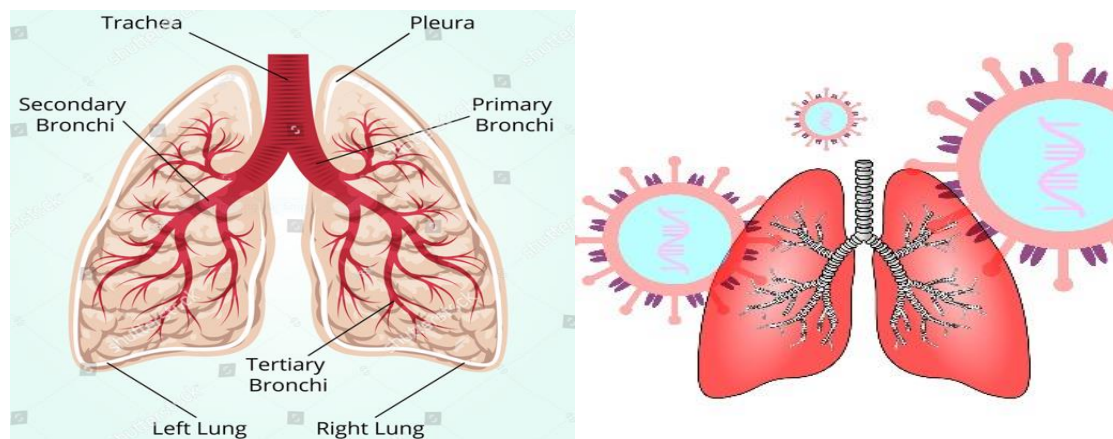


Fig-2: Shows the left side figure normal lungs and right shows the coronaviruses attack affected lungs

There are different aspects of human coronaviruses for activating the inflammatory responses in respiratory system. Human coronaviruses also infect the by influencing the mechanism of exchange of gases as a result lungs might become inflamed, making it tough for you to breathe. This can lead to pneumonia, an infection of the tiny air sacs. Human coronaviruses are the main cause of exacerbation of lower respiratory diseases [27]. There are different methods for the detection of human coronaviruses in order to control their infection from extreme level. Different molecular biology techniques and microscopically analysis are suitable for helpful for early detection diagnosis of disease by decreasing the incidence ratio. COVID-19 infection can be detected through microscopy of light reflected from the epithelial surface used as an indicator of ciliary activity. This detected helpful as the movement of cilia pulls the force into the cells, once the virus attached to the cells of cilia, ciliary movements inhibit and measuring the waves like movement of cilia [28-30].

Efficacy of Different Vaccines against COVID-19

Vaccines are used for the treatment of different therapies as they are more promising than synthetic drugs and traditional medicines. There are different types of vaccines used for different diseases. Each vaccine has its action on the specific target cells [31]. Vaccines are used to develop the immunity against the specific disease. Once the immunization can be passes through different trails and approved for use in the market. Vaccines that used for human body should be safe and responsive to the particular antigen. There are different industries that produced the vaccines in order to deliver safe and more reliable production. Different factors include the on market growth of vaccination [32, 33].

RNA vaccines are usually delivered in complex with additional agents, such as protamine or lipid- and polymer-based nanoparticles, to increase its efficacy. There are different types of vaccines used for COVID-19 and each vaccine design in order to control the mortality and morbidity. Existing data suggest that new vaccine candidates may be instrumental in protecting individuals and reducing the spread of pandemic. In addition, RNA vaccines need to be kept at ultra-cold temperatures, -70C or lower [33, 34].

Nucleic acids vaccines are designed to target the spike proteins of the coronaviruses by inactivating of the antigen that can be injected into the cells of the human body. There are many vaccines available for targeting the antigen behind the cellular responses to the nucleic acids. It implicate the immune responses once the vaccine injected into the body by producing the antibodies. Since the antigen is produced inside our own cells and in large quantities, the immune reaction

should be strong. There are more advantages using the vaccines that act cellular level [35-37].

Sinofam and Sinovac was developed in China and safe vaccines used into the host especially human. Both types of vaccines are developed in the form of inactivated virus vaccines to stimulate a stronger immune response. There is another vaccine made in Pakistan locally produced single-dose CanSino COVID-19. Another vaccine that developed in UK is Oxford AstraZeneca vaccine. There are many other vaccines used such as the Pfizer-BioNTech COVID-19 vaccine, Moderna COVID-19 vaccine [39, 40].

CONCLUSION

Different biomarkers such as Granulocyte-macrophage colony-stimulatin(GM-CSF), Nuclear Factor kappa-light-chain-enhancer of activated can be used as potential therapeutics. Vaccines are also available in order to control the COVID-19 but the preventive measures are needed and early diagnosis helpful to control the viruses attack's the COVID-19 affected the population all around the world, social distances and wearing masks, vaccination and drugs are different ways to exploit the infections replication.

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