PULMONOLOGICAL DISORDERS CAUSED DUE TO COVID-19 PANDEMIC

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ABSTRACT

This paper talks about the new corona virus disease (COVID – 19). The corona virus is highly communicable, which makes it even more dangerous to the mankind. It spreads through water, touch and even when you come in contact with an infected person. Until now, only 30% of the virus has been studied, studies about the virus are yet being done by the scientists of every country in the world. The indications of the virus are very likely to those of common cold and pneumonia, which is why most of the time people neglect it and the virus continues to spread across. The virus has caused more than 5 lakh deaths, 10.1 million cases and around 5.1 million people have been recovered. Scientists and doctors claim that it would take around 6 – 7 months to find an antivirus medicine for the disease. This paper has described about the virus, its causes, prevention and other related diseases this virus can spread. Abstract goes here.

Keywords: ARDS, Pneumonia, SARS, Sepsis, WHO

1. INTRODUCTION

The outbreak of this perilous disease was in China 2019. It is an animal origin disease and it spreads when a noninfected person comes in contact with an infected person (spillover infection). The earlier onset of symptoms was in December 2019.

The first person to get diagnosed was a 55-year-old man in China in 19 November 2019. Gradually, by the end of November, there were around 60 – 70 cases of the new virus. The Wuhan Central hospital, China sent a BAL (bronchoalveolar lavage fluid) to a sequencing company Vision Medicals. The result of the test was back on 24 December 2019, showing a new corona virus.

On 30 December, a company called Capital BioMed Lab stated a new positive case for a disease called the SARS [1].

SARS – Severe Acute Respiratory Syndrome

It is a viral type of respiratory disease originated through animals caused by corona virus (SARS-CoVor SARS-CoV-1), this was recognized as the firststrain of the SARS corona virus species relatedcoronavirus (SARS-CoV). This particular syndrome had caused SARS outbreak during 2002 – 2004. Towards the end of 2017, scientists from China could trace out the virus via the Asian palm civet’s intermediary to cave-dwelling horseshoe bats in Yunnan.

In Wuhan, the virus was isolated from 3 persons suffering from pneumonia and associated to the group of severe respiratory disease cases for the first time. [2]
Working of the corona virus

When we talk about a disease-causing bacterium, the genetic material of the bacteria is DNA which has a specific code. When the bacteria enter our body and start to divide, it replicates its DNA. The DNA code of the progeny is the same as that of the parent. This holds good for all the generations of the bacteria. The metabolic activities of the bacteria have to stop so that its division also stops. We can make an antibacterial medicine (antibiotic) which will retard or stop the metabolic activities completely. As a result, the bacteria stop dividing and die and we are safe from the disease.

Let’s take the example of common cold. Common cold is caused due to a virus which has genetic material as RNA. Every virus of the common cold has a different code for its RNA, which is why it makes it tough to find a permanent antivirus medicine for it.

When we talk about the corona virus, being a virus, its genetic material is also RNA. When the corona virus gets into our body, it enters our skin cells through the lock – key mechanism. The virus has small outgrowths on its outer surface which acts like a lock, our skin layer has very minute receptors (sensors which are used to sense any foreign particle inside our body) which acts like the key. When they are inside our cells, they get attached to the endoplasmic reticulum of our cells rather than the cell nucleus, to fulfill its protein content for dividing. When they divide, the RNA code of the parent doesn’t match with the RNA code of the daughter viruses. In short, we can say that every new corona virus has a different RNA code. It is found that there are more than 143 proteins present inside the virus whereas humans only have 20 types of proteins. Due to the genetic difference of every virus, it is difficult to find a common medicine to stop the division of the virus.

Symptoms

Table 1. Symptoms and Range of COVID

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Range</th>
</tr>
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<tbody>
<tr>
<td>Fever</td>
<td>83 – 99 %</td>
</tr>
<tr>
<td>Cough</td>
<td>59 – 82 %</td>
</tr>
<tr>
<td>Loss of appetite</td>
<td>40 – 84 %</td>
</tr>
<tr>
<td>Fatigue</td>
<td>44 – 70 %</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>31 – 40 %</td>
</tr>
<tr>
<td>Coughing up sputum</td>
<td>28 – 33 %</td>
</tr>
<tr>
<td>Muscle aches and pain</td>
<td>11 – 35 %</td>
</tr>
</tbody>
</table>

Causes

It was found that the primary spread of COVID-19 is when the droplets exhaled by an infected person (via sneezing, singing, coughing or talking) are inhaled by a normal person. It is recommended by WHO to have a 3-feet distance and the U.S CDC recommends to have a 6-feet social distance. An infected person will show the symptoms in an average of 1 – 2 weeks.

If people touch surface where contaminated droplets had fallen upon, and then touch their nose or eyes or mouth with unclean hands might, less commonly, may catch infections. However, how much quantity of virus is needed that will cause infection this way is still unidentified; but the virus can be noticed for the duration of about four hours on copper, almost a day on cardboard, and up to almost 3 days on stainless steel or plastic surfaces. Surfaces can be easily decontaminated with the regular household disinfectants which are used for killing the virus on external human body or on the hands.
The time taken from infection to the symptom onset, in other words, the incubation period ranges for up to 14 days, and period of five days is very common. Some people who are infected but have no symptoms are called as asymptomatic or pre-symptomatic carriers; transmission is possible from such carriers. Emergency symptoms include difficulty in breathing, prolonged pressure or pain in the chest, getting confused suddenly, trouble in walking, and face or lips become bluish; it is recommended to go for immediate medical attention in case of such symptoms. If the disease is developed further may lead to complications such as ARDS, pneumonia, septic shock, sepsis, and kidney failure [3].

**The types of medical complications caused by COVID-19 with respect with Pulmonological Disorders**

a. **Pneumonia**—Pneumonia is an infection and inflammation condition of the lung where the air sacs also called as alveoli are affected. The most common causes of Pneumonia are by infection with viruses or bacteria. It is generally known that Pneumonia is caused by other microorganisms or autoimmune diseases. Risk factors include chronic obstructive pulmonary disease (COPD), asthma, cystic fibrosis, sickle cell disease, diabetes, failure in heart, smoking history, inability of coughing properly, and a weaker immune system. Symptoms and physical examination are mainly considered in the diagnosis. Vaccines that help preventing specific types of pneumonia are available. Other types of prevention methods mainly include washing the hands for 20 seconds and avoid smoking. Pneumonia that is believed to be caused by bacteria is treated with antibiotics [4].

Pulmonary fibrosis can actually develop a kind of chronic inflammation. Pulmonary fibrosis is also genetically influenced and age-related fibro proliferative process as in IPF (idiopathic pulmonary fibrosis). Pulmonary fibrosis is a recognized sequela of ARDS [9].

The author proposes to further check for prophylactic LMWH for preventing thromboembolism for COVID-19 patients. Also, the author suggests to do CT pulmonary angiography for pulmonary embolism which can be a life-threatening disease [10].
b. **Acute** Respiratory Distress Syndrome–(ARDS) is inadequate treatment of respiratory insufficiency which is related to quick and deep infection in the respiratory. Out of breath, breathing rapidly, and bluish skin coloration are some of the common symptoms. Includes sepsis, trauma, pancreatitis, pneumonia, and aspiration. The primary mechanism includes injuries to multiple cells those form the barrier of alveoli in the respiratory, dysfunction of surfactant, natural resistance activation, and clotting of blood due to defective regulatory body. ARDS reduces ability of the respiratory that exchanges carbon dioxide and oxygen. This identification in adults is based on Horowitz ratio which will be less than 300mmHg.

Along with the treatment of underlying cause, the basic method of treatment includes mechanical ventilation. Ventilation is mainly strategized towards using low pressures and volumes. In case of oxidizing is not sufficient, lung recruitment maneuvers and neuromuscular blockers might be used. And if these are also not sufficient, ECMO (extracorporeal membrane oxygenation) is also an option. The death rate observed in this type of syndrome is in between 35% and 50%. It takes just within two hours of provoking event to begin to show the symptoms of ARDS, but usually it takes up to 1–3 days of the syndrome for the diagnostic purpose. Some symptoms may include fast breathing, breathe shortness, and reduced level of oxygen in the blood caused by abnormal ventilation. Low blood pressure (BP), muscle fatigue in the muscles and a common weakness, a dry cough, and fever are also some of the other common symptoms. [5]

c. **Sepsis**–when body responds to an infection but causes injuries to its own tissues and organs causing a life-threatening condition called as Sepsis. Initially, the immune systems get suppressed. Rapid beating of heart, fever, rapid breathing and hesitation are some of the common symptoms. In some cases, there can be symptoms associated with a specific infection like cough with pneumonia, or painful urination with kidney infection. The very young as well as old people having weakened immune system may not have any specific infection rather than having a fever. Severe sepsis is condition caused by poor organ function or blood flow. Poor blood flow is indicated by high lactate levels in blood, low blood pressure and/or low urine output. Septic shock is low BP caused by the sepsis which does not improve after fluid replacement. [6]

### Prevention

- **Hand washing**– In order to prevent the spread of disease, Hand washing is highly recommended. The CDC has recommended that hands should be washed with soap and water for at least 20 seconds, specifically when hands are dirty, after using the toilet, before eating anything. More importantly hands are supposed to be washed as mentioned aforesaid coughing, sneezing or even after blowing one’s nose. Washing the hands with soap for 20 seconds is necessary because household soap bursts the protective bubble of the virus thereby killing it. CDC also recommends using an alcohol-based hand sanitizer where the alcohol contents are more than 60% in case soap and water are unavailable. Touching the nose, eyes or mouth with unclean hands should be avoided as per WHO guidelines.

- **Surface cleaning** - Surfaces should be disinfected with a number of solutions (where for a stainless steel surface, disinfectant is exposed for within a minute), those includes ethanol to 62% to 71%, or isopropanol to

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Table 2. Symptoms Frequency

<table>
<thead>
<tr>
<th>Symptom’s frequency</th>
<th>Symptom</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>79–91%</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>71–75%</td>
<td></td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>67–75%</td>
<td></td>
</tr>
<tr>
<td>Sputum</td>
<td>60–65%</td>
<td></td>
</tr>
<tr>
<td>Chest pain</td>
<td>39–49%</td>
<td></td>
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</tbody>
</table>
50%-100%, sodium hypochlorite to 0.1%, hydrogen peroxide up to 0.5%, and 0.2% to 7.5% of povidone-iodine. Some of the other solutions such as BKC (benzalkonium chloride) and CHG (chlorhexidinegluconate), are less effective. The CDC has recommended that when there is positive case of covid-19, all the facilities in an office like common areas, toilets, bathrooms, common electronic equipment like computer keyboards, tablets, printers, push button controls, cash machines used by infected person must be sanitize.

- **Face masks and respiratory hygiene**-Initially the WHO had recommended to avoid disease spread, people in high risk like those who are taking care of persons infected with COVID-19, should wear face masks. As a precautionary measure, among other countries, China and the United States had encouraged the use of face masks more generally by asymptomatic individuals coming in contact with more people to limit the spread of the virus. Many national and local governments made it compulsory to wear the face masks.

Protective mask must be used by the people who have infection which will limit the quantity and distance travelled by the exhalation globule dispersed while coughing, sneezing or even talking.

In June 2020, the WHO had changed its policy on wearing face masks and recommended to wear them in public places in order to help preventing the spread of COVID-19.

- **Social distancing**-This includes reducing close contact between two persons thereby slowing down the spread of the disease. Various methods of social distancing include quarantines, restriction on travel and the closing public places such as schools, office places, sports complexes and stadiums, theatres and cinema halls, or shopping centres. Individual persons should apply methods of social distancing by preferring to stay at home, reducing travel, avoiding crowded public places, avoiding physical contact while greetings, and maintaining enough distance from any other individuals. Most of the governments are now making it compulsory to maintain social distancing everywhere. In the places where such mandates have not been followed have observed an outbreak of the disease thereby spreading it further. Senior citizens and those suffering with medical conditions like respiratory diseases, diabetes, hypertensions, heart disease, and with a weak immune systems are more prone to complications of serious illness. These people are advised by the CDC to avoid areas of community outbreak as much as possible.

Towards the end of March 2020, the world health organization and other fitness bodies replaced the word “distant socializing” with “physical distancing”. The main purpose for that was to maintain social life with safety distance measures by providing healthy guidelines during pandemic.

- **Self-isolation**–for the people diagnosed positive with COVID-19 and also those people who are suspected to be infected have been advised to isolate themselves at home. Health care agencies have announced definite guidelines for systematic self-isolation. The people who are in close contact with someone diagnosed with coronavirus disease and also the people who have recently made trip abroad have been recommended for the 14-day self-quarantine starting from the time of last exposure. [7]

**CONCLUSION**

The vaccines for COVID-19 are in progression with front line workers and adults with age 45 and above with medical reasons and for age above 60 years. The paper has discussed some of the Pulmonological disorders can rise up with coronavirus. However, Remdesivir(broad-spectrum antiviral medication) might effect on the time taken for recovery from the virus. Emergency use of Remdesivir (GS-5734) was authorized in the United States on 1st May, for the hospitalized patients with critical condition of COVID-19 infection. Since any other specific treatment for the disease was unavailable, authorities had no choice that to grant the interim usage, and its potential risks were outweighed by potential benefits. Taking the OTC medications for cold, drinking lots of fluids, and taking sufficient rest may also help alleviate symptoms. Oxygen therapy, fluids and breathing supports might be essential based on the severity of the infection.[8]
REFERENCES