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A Global Catastrophe of Coronavirus Outbreak: History, Pathogenesis, Signs, Diagnosis and General Precautions

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Abstract **Review Article**

The year 2020 began with normal joy and enthusiasm like every New Year. People were busy with their jobs, works, and students with their schools and colleges. Everybody was engaged with their routine duty for the initial two months. Everything was so smooth, straight and easy. Nobody was aware of forthcoming biological hazards. A coronavirus outbreak! A small virus is believed to came from Wuhan, China and spread like a speed of light thought-out the world within a month. India was also no exception. Therefore, it is known as the coronavirus pandemic. People started coughing, having fever, tiredness, difficulty in breathing or having shortness of breath. When tested in government laboratories, affected patients found coronavirus positive having coronavirus disease (COVID-19). Other people, who came in contact with the infected patients, were also found positive. Meantime, the people who arrived in India from abroad also found to have the infection. The main route of spreading the virus is from nasal and oral droplets by the patient. In no time, the virus spread drastically. It was globally widespread. The US, Italy, Spain, Brazil, China were on the top list of the infection. In India, the national lockdown was declared on 25 March 2020 following a public curfew to prevent the further spread of coronavirus. Many suspected people or passengers after travel are quarantined. At that time, corona affected people were approximately 500. The present review is planned to make people aware of the spread, pathogenesis, signs, diagnosis of viral infection and most important precautions to be taken to restrict the spread of this coronavirus.

Keywords: Pandemic, COVID-19, Quarantine.

INTRODUCTION

Coronaviruses is having subfamily Orthocoronavirinae, family Coronaviridae and order Nidovirales. They contain positive mRNA genome, envelope proteins, M Protein, S Protein and E Proteins. Each of these proteins is having an important role in spreading infections [1]. The newly discovered virus, the Coronavirus causes infectious diseases called as COVID-19 which stand for coronavirus disease. In December 2019, the outbreak of COVID-19 caused by novel Severe Acute Respiratory Syndrome (SARS-Cov-2) began in China in Hubei Province. Mostly city affected was Wuhan. On 30 January World Health Organization (WHO) has declared this outbreak as an health emergency in the world and declared pandemic on 11 March [2]. This infection is zoonotic meaning it can be transferred from animal to human being. Coronaviruses (CoVs) were found causing infections in mammals and birds but recently it causes infections to humans also. In 2003, when coronavirus are transferred from animal species to human beings, then the outbreak of Severe Acute Respiratory Syndrome (SARS) and, Middle-East Respiratory Syndrome (MERS) has shown the mortality [3]. The COVID 19 is diagnosed based on Real Time Polymerase Chain Reaction (RT-PCR) by collecting nasopharyngeal swab. Various known treatment options are provided to the patient for alleviating symptoms. There is no confirmed medication approved for the COVID-19. The Covid-19 impact was dire in the world. Depending on the current information available, the present review focuses on the history, epidemiology, spread, clinical features of infections and also throws light on various precautions that should be taken in order to prevent infection of Covid-19.

HISTORY

In fact, the SARS coronavirus (SARS-CoV) was discovered in 2003. SARS-CoV is believed to be a virus of animal origin from an unknown species, most probably bats and civet cats. In 2002, the first infection to human by this virus was observed in Guangdong

province of South China. Later in 2012, a respiratory tract disease called as Middle East Respiratory Syndrome (MERS) was discovered in Saudi Arabia which was caused by a novel coronavirus. It is also called Middle East Respiratory Coronavirus Syndrome or MERS-CoV. Novel coronavirus (nCoV) was officially referred to as SARS-COV-2 by WHO attributed to the genetic similarity of the SARS Coronavirus. nCoV-19 is an on-going outbreak of the Coronavirus triggered by SARS-CoV2 [4]. In December 2019, The COVID 19 outbreak was then observed in Wuhan. in the Hubei Province of China and it is rapidly spread in the city. Later on 30 January, 2020, the first case of the COVID-19 pandemic in India was reported. It was originated from China. By the month May, major cities of India such as Mumbai, Pune, Chennai, Delhi, Kolkata has reported a large number of cases [5, 6].

Coronavirus Outbreak in India

In India, since March 2020, the coronavirus cases were gradually increasing. To prevent the spread of novel coronavirus infection, nationwide schools, colleges, swimming tanks, gymnasium, multiplexes were shut down. Social gatherings get-togethers, celebrations, parties, weddings and other religious ceremonies and were banned to maintain social and physical distancing among people. Various interstate borders were sealed and railways, roadways, airways, waterways travels are restricted. Important tourist destinations were locked. All religious places were closed. Important programs were either postponed or canceled. Teaching, meetings, important announcement from offices were conducted online. In order to prevent further expansion of coronavirus, on 22 March 2020, government of India declared 14-hour voluntary public curfew throughout the India. On 24 March, Indian government announced lockdown throughout the country for 21 days restricting movement of the entire 1.3 billion peoples. This lockdown was extended till 31 May and executed in four phases one by one consecutively. The government of India announced to download the Arogya Setu app to the population to assess the people and to know the active cases in the nearby areas. These things were new to the population of India and never observed before [7].

Pathogenesis

In the Coronavirus there is genetic coding that helps the virus for capturing host cells and converting them into virus factories. S and HE proteins 12 are found on the surface of the virion. The mutation of the SARS-CoV is the composition of Novel Coronavirus 2019. The exact mechanism for this is not clear but coronaviruses enter cells by using "spike" proteins, but these proteins have different shapes in various coronaviruses. The virus uses large S glycoproteins and bound with cell membrane receptors to gain access to human cells. The human cells absorb the virus by endocytosis. This attachment persuades the cell that the virus is not a threat and allows the virus to join. After entering into human cells, they release their contents into the cytoplasm. Inside the cytoplasm, the genetic material of the virus is exposed with single-stranded RNA. The virus manipulates cellular machines to duplicate the N proteins and RNA utilizing the endoplasmic reticulum to construct the outer membrane of its M protein and the all-important S protein. Upon replication, the virus is expelled from the cell by the Golgi by exocytosis, further infecting other cells [3, 8].

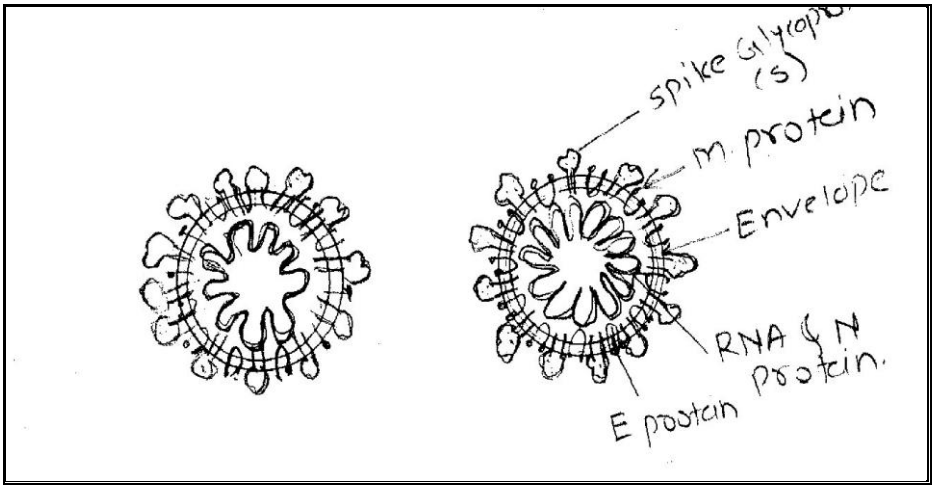

Fig-1: Coronavirus

Transmission of virus

The researchers and scientist are yet to discover the mode of transmission but here are few channels through which it happens

- Through droplets expelled after coughing or sneezing of an infected person
- Consumption of animal products having viruses and contact with infected animals.
- Touching infected fingers to eyes, nose, mouth
- By coming in a company of infected person in public places, transport, social occasions etc [9].

Clinical Features

Novel Coronavirus-19 commonly causes initial symptoms as common cold and flu or cough. In a lack of medical attention, these symptoms may gradually turn into serious complications such as Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV). The worse thing about this virus is that in some cases, it shows no conspicuous symptoms. It has mild symptoms starting from coughing, sneezing, fever, fatigue, chills, nausea, diarrhea, loss of appetite, body aches, dyspnea and sometimes not at all. The infected person is a carrier of virus and transfers to another person which he comes in contact with. The infected person may develop pneumonia, kidney failure, septic shock, acute respiratory syndrome, respiratory failure and even death [8]. Severely affected people may need respiratory support to sustain life. The cases become complicated with irregular heart rhythm, heart damage, shock, an older person with inherited diseases such as hypertension and diabetes are at higher risk of possible complications. Other risk factors are obesity, cigarette smoking, respiratory diseases, liver, kidney diseases and transplanted persons [10].

Diagnosis

COVID-19 was provisionally diagnosed using Reverse Transcription-Polymerase Chain Reaction (RT-PCR) of infected secretions or by Computerized Tomography (CT) imaging of the chest [11].

1. Diagnostic Test: Molecular RT-PCR test, Antigen Test
2. Serological Test: Antibody Test

In molecular and antigen testing, the sample is collected through nasal or throat swab whereas antibody testing is blood is required [1].

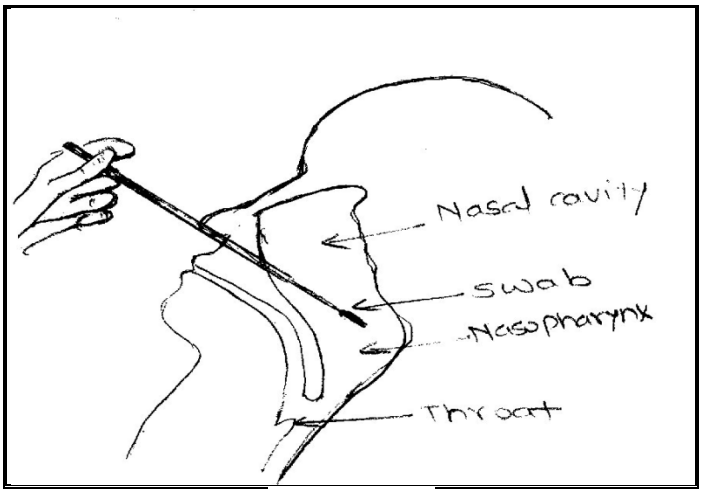

Fig-2: Nasal Swab

Molecular RT-PCR test

Polymerase chain reaction often abbreviated as PCR is scientific technique used commonly and widely in research and medicine to detect the genetic material. Polymerase chain reaction amplifies a small segment of DNA to detect and analyze it. SARS-CoV-2 does not contain DNA. It contains the only RNA. RT-PCR is nothing but Real Time Polymerase Chain Reaction. It is conducted based on nucleic acid extraction, primer and probe mixture preparation, real time PCR instrumentation and finally analyzing the data. (RT-PCR) is a method in which reverse transcription is used to convert the extracted RNA into DNA with using PCR later to amplify a piece of the resulting DNA, to know whether if it matches the SARS-CoV-2 genetic code. The fluorescent markers are also used at the end to bind amplified DNA and produce light which can be read by specific PCR machine to draw suitable results. It the intensity of light reaches certain threshold it is called positive test. Respiratory samples such as saliva or nasopharyngeal swab or sputum are required for this test [1].

Antigen

Using nasal or throat swab, fluid sample is collected and antigen test is performed. Antigen shows immune response. It is the part of pathogen. The antigens detect proteins. In case of coronavirus it protein is present on surface spikes [1].

Antibody Test

Several companies and laboratories are continuously engaging in various serological tests including tests that detect antibodies produced in response to certain infection by the body. Blood samples are collected by simple finger prick method or drawing blood from vein. Antibodies are produced by immune system are are proteins. They are produced in response to an infection. They are found in serum or plasma, depending on the presence of clotting factors. This test is basically conducted after full recovery from COVID 19. If antibodies are found in serum, it indicates that body is exposed previously to coronavirus. So some immunity is developed. But level of immunity and duration of immunity is uncertain and

difficult to predict whether body will fight with infection in future or not [12].

Precautions and Prevention of Covid-19

- **Cleaning the hands:** It is advised by the WHO to regularly clean the hands with hand wash or alcohol to remove viruses from hands.
- **Physical and social distancing**: it is advised to maintain 1 meter (3 feet) distance between two persons to avoid any infected droplets to enter in body.
- **Avoiding crowd**: it is advised not to conduct any social programs, gatherings, ceremonies to avoid coming in contact with any COVID 19 positive person. On such occasions, it is difficult to maintain 1 meter distance also.
- **Avoiding touching to nose, mouth and eyes**: This may cause the infected hand to come in contact with eyes, nose or mouth and thereby virus enters the body.
- **Maintaining good respiratory hygiene:** It is advised to always cover the mouth with handkerchief or mast when person coughs, sneezes. The tissue, handkerchief, the mask must be washed after use.
- **Staying home**: Advised to stay home as far as possible. Wear mask and maintain physical distancing if leaving home for emergency work.
- **Seeking medical attention**: If cough, flu, breathing problem is noticed, it is advised to seek medical attention immediately.
- **Updating knowledge**: It is advised to keep knowledge updated with latest information from World Health Organization or local and national health care authorities.
- **Cleaning the surfaces**: all surfaces in offices, electronic equipment which are commonly shared among people like tablets and computers, bathrooms, common areas, staircase reiling, bike handle, computers, remote controls, touch screens, lift buttons, keyboards, and ATM machines which are used by the infected persons, should be disinfected with the disinfectant.
- **Self isolation:** Self isolation (quarantine) is recommended to prevent the exposure of virus from one person to other.
- **Boosting Immunity:** It is advised to boost immunity with the directions given by health care providers such as exercising, engaging in Yoga & Meditation, sleeping for 8-10 hours, taking healthy and fresh meals, etc. it is better to engage with hobbies such as reading books or novels, playing indoor games, singing, etc. This will also keep mental condition healthy and helps to relieve anxiety and depression.
- **Avoid**: Eating unhealthy, stale, junk food, soft drinks, smoking, excess alcohol, sedentary lifestyle [12].

Treatment Options

There is not any approved therapy or vaccine for COVID 19 currently. Over The Counter (OTC) medications, fluids and rest may help to relieve symptoms. The aim of the management of the condition of patients mainly based on stabilizing the vital signs of patient, breathing support, using analgesics, antiviral drug therapies, steroids to reduce lung inflammations and blood plasma transfusions. Various compounds that has already approved for the treatment of other viral diseases are being examined for treating COVID-19 infection. Several kinds of research and studies are extensively conducted globally to discover the vaccine of the COVID-19 [13].

Role of Pharmacist

The pharmacist is playing a major role in the healthcare sector in the country. Pharmacists are helping

- To prepare and draft guidance of professional service and to teach it to chemists, druggists in pharmacies.
- To supply emergency drug regimens as per their guidelines of treatment.
- To co-ordinate with drug manufacturies industries and drug distributors to ensure orders, enough supply, transport and storage of drugs and to keep record of same.
- To reduce the chances of infections among human by making aware the public about infection prevention, management and to make them aware of possible risks.
- To involve in research of clinical trials to isolate, screen, evaluate and ascertain antiviral medications according to international and national guidelines.

With immense will power & dedication to the profession, the Pharmacists will overcome all the obstacles. Contributing to his dedicated work, pharmacists will be recognized globally in the healthcare sector [14].

CONCLUSION

Coronavirus pandemic is the biggest catastrophe in the year 2020 and extremely dreadful condition ever observed. It resulted in mortality and morbidity globally including China, US, France, Italy, Spain and Brazil and India. There is currently no any effective antiviral drug therapy or specific vaccine against SARS-CoV-2. Scientists all over the world are working day and night for the development of remedial therapy for this greatest pandemic & hopefully as per the latest report some positive way to fight Corona is coming soon to save the world. Since then it is always recommended by healthcare providers and government health regulations of each country to follow the rules and regulations specified above as precautionary measures to combat the infection among the population. Scientist are using different combinations of antibiotics and antiviral drugs for the development of vaccine and

extensively studying their effects on corona viruses. Currently, hydroxychloroquine (HCQ) and certain antibiotics are used for prophylaxis. HCQ is believed to inhibit the infection of SARS-CoV-2 cells in-vitro. Stabilization of vital signs, relieving symptoms and boosting immunity are primary goal of treatments.

CONFLICT OF INTEREST

The authors declare that there is not any conflict of interest in the publication of this paper.

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