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Corona Virus "Ghastly pandemic" – A comprehensive literature

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ABSTRACT

Coronaviruses consist of enveloped viruses. The easily transmittable coronavirus disease 19 (COVID-19) is a viral infection originating from Wuhan, China. The World Health Organisation (WHO) announced that the SARS-Cov-2 virus caused a global pandemic, resulting in certain consequences of which are currently evident however there will continue to be consequences even after the pandemic has finished.

Keywords:
Coronavirus, Pandemic, Bats, Infection, respiratory infections

Introduction

Coronaviruses (CoV) are a member of the genus Coronaviridae. CoVs are pleomorphic in nature. Peplomers consist of 80-160 nM in size and 27-32 kb with positive polarity which are contained by RNA viruses which are crown shaped. Coronaviruses are zoonotic pathogens with high mutation rates that exist in humans and animals causing infections related to respiration, the gastrointestinal system, hepatics and neurology.[1,2,3]

In the province of Guangdong China in 2002 and 2003 for the first time a highly pathogenic virus called SARS was found in humans. When this infection had spread further both as CoV OC43 and CoV 229E even mild infections caused symptoms in populations with weakened immune systems.[3,4,5,6,7] On December 12, 2019, the first unknown case of pneumonia was detected and other coronaviruses were investigated. On January 7th, 2020, a new type of Coronavirus named the novel Coronavirus was isolated and declared by Chinese authorities. The virus was titled as the Novel Coronavirus by WHO January 12th, 2020 and COVID-19 on February 11th, 2020. On February 12th, 2020, a total of 43.103 COVID-19 cases and 1.018 deaths had been declared.[8] This was the third outbreak of a Coronavirus in the first two decades of the 21st century, thus human to human transmission occurs and ensuing to an increase in global concerns on the topic. On March 11th, 2020, the COVID-19 pandemic caused 80955 cases of COVID-19 as well as 3162 deaths in China. Meanwhile with 1130 deaths in 113 other countries WHO worried about the surging number of cases. In the following perspectives of the pandemic will be highlighted as well as the pathological indications of COVID-19. Various new therapeutic methods are still emerging, some of which are overviewed. [9]

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Epidemiology

In December 2019, many new pneumonia cases were recorded in Wuhan which were linked to the Huanan Seafood Market, the main origin for COVID-19. A pneumonia case of COVID-19 was first discovered on December 12th, 2019 and the other 27 viral cases were officially declared on 31st of December 2019.[10,11] Finally On 22nd of January 2020, it was declared that the novel CoV originated from wild bats. The virus was imported from different sources and easily able to proliferate in the crowded market. The pandemic began during one of the most culturally significant times of year in Chinese culture, the Spring Festival in which nearly 3 billion people travel within China. These conditions were highly responsible for causing favorable mediums for the transmission of the contagious disease. Earlier in the spring season the Spring Festival of China occurred from January 17th to February 23rd in 2003, when SARS spread. Similarly, this festival occurred between January 10th and February 18th in 2020 when the COVID-19 epidemic began its spread. The center of the COVID-19 epidemic is Wuhan with a population of 10 million. [9]

Origin, Virology and Pathogenesis

Coronavirus belongs to a subfamily orthocoronavrinae of the coronaviridae family. Among two-thirds of RNA genome encodes viral polymerase (RdRp), two large nonstructuralpolyproteins and RNA synthesis materials.While other one-third of the genome encodes four structural proteins and the other helper proteins. The spike protein is the first to interact with a human sensitive cells. Thus leading to the expression of the genes takes place once entry into the cell occurs where genomic encoding starts.[13,14] Various changes occur including gene exchange, gene insertion, deletion or recombination are frequent among CoVs. The CoVs family is rapidly multiplying and expanding. Four genera of 38 unique species were found by The International Committee on Taxonomy of Viruses (ICTV) .[1516]

Once they enter the cell, the viral RNA manifests itself. Genomic RNA is encapsulated and polyadenylated. Further polyproteins are split by proteases thus resulting in RNA production both by transcription and replication. During replication, full-length (-) RNA copies of the genome are produced. When transcription occurs, a subset of 7-9 sub-genomic RNAs are produced by those encoding all structural proteins. Virions are then released which can infect intestines, liver cells, kidney cells, T lymphocytes, as well as the lower respiratory tract. Collapse of the immune system takes place as the virus makes antiviral T –cell response which leads to the stimulation of T-cell apoptosis .[17,18]

Sources and Modes of Transmission

CoVs have been defined as a novel respiratory tract virus from samples which were collected in 1962. [19] The family of viruses include several animal species such as cattle, cats, camels, and bats.[14,15,16,17]Various literature depicts that bat CoVs are of the gene source of alpha-CoV and beta-CoVs, while most bird CoVs are of the gene source of gamma-CoVs and delta-CoVs. [12]

After the first outbreak, few number of cases were increased. Human-to-human transmission was significant as those patients who were affected had no history of contact with humans in Wuhan, despite this there was a rise in the number of cases. COVID-19 spread to populations outside of China, including those in Thailand by January 13th, 2020 and then throughout Asia.[20]

Transmission occurs when a person who has the infection sneezes. The sneeze produces droplets and it is these droplets that settle in the lungs, nasal mucosa or mouth with inhaled air. [21]

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Clinical manifestations

Symptoms of COVID 19 resemble primarily to the symptoms seen in SARS and MERS. In most cases those infected with COVID-19 recovered in a period of two weeks. Acute respiratory distress syndrome (ARDS) progressed in many patients which led to an occurrence of septic shock and multiple organ failure. Males are most commonly susceptible to COVID-19 because of the X chromosome and sex hormones which plays a role in immunity. Symptoms are usually mild fever, dry cough, and shortness of breath. Whereas some of the afflicted have prominent respiratory and gastrointestinal symptoms. Patients were who asymptomatic were left to not quarantine. [9]

Clinical Progression

COVID-19 can present dramatically differently from patient to patient. Various symptoms of COVID-19 have been observed clinically from respiratory infection to septic shock. Symptoms like fever, shortness of breath, cough, were also seen in SARS CoV and MERS CoV. [20] In COVID-19 intestinal issues as a symptom were rarely reported. In another study of 99 patients, diarrhea, chest pain, and nausea-vomiting were observed .[22]

Radiographically or thorax CT imaging, it is observed bilateral multiple lobular and subsegmental consolidation areas.[23,24] In addition patients also presented dyspnea along with abnormal thorax CT compatible. Other complications include secondary infections such as ARDS, pneumothorax, acute heart damage, bilateral multiple lobular and subsegmental consolidation areas. [25] All these symptoms were presented in patients of whom were hospitalized into intensive care units.

Diagnosis of n-CoV 19 infection is based on a case history of travel, contact along and the utilization of diagnostic tools including serology, viral culture, and molecular methods. Other diagnostic methods include molecular methods such as RT-PCR or real-time PCR. Respiratory samples like sputum, deep tracheal aspirate, nasopharyngeal aspirate, oropharyngeal swabs, or broncho alveolar lavage are taken to assist in diagnosis as appropriate or required. It has been observed that lower respiratory tract samples can offer drastically higher viral load. [24]

Emerging of Coronavirus from SARS to MERS

SARS-CoV during 2002-2003 had a considerable number of cases which spread from China to other parts of the world resulting in 8000 people being infected and ultimately a mortality rate of 10%[26] . MERS-CoV, during 2012 originated in the Arabian Peninsula and spread to 27 countries with an observed 35.6% mortality rate.[21] COVID-19 that began in Wuhan had a mortality of 2%. SARS-CoV affects the younger population whereas MERS-CoV affects humans who are above 50 years, COVID-19 by comparison infects humans both above the age of 50 and below.[20]

Treatment Methods and Precautionary Measures

While new therapeutic drugs are marketed various double-blind studies are still needed to test the efficacy of the new drugs that are available. Medical interventions can be categorized into following categories: coronavirus specific treatments, general treatments, and antiviral treatments.

General treatments include immunity enhancers, nutritional interventions, and traditional Chinese medicine. Several immunity boosting agents such as interferon, intravenous gamma globulin and thymosin are recommended. Similarly, chloroquine “chinese old medicine” for curing malaria had proved to be useful. Interestingly Gao et al 2020.Sul et al 2004 found that human monoclonal antibodies could neutralize SARS CoV.

Hoffmann 2020 outlined a cellular protease TMPRSS2 for nCoV that goes into cells and thus the spread of the virus takes place. Various drugs such as lopinavir/ritonavir and abidol showed a clinical improvement in an infection of COVID-19.[9] Numerous precautionary measures can be taken including the timely publication of epidemic information which eliminates the causative agent of infection as well as early diagnosis, supportive treatments, and isolation. All these measures have the added benefit of enabling the avoidance of unnecessary anxiety. [27]

By comparison, the CDC recommends various basic measures such as avoiding contact with patients and hand washing with disinfectant solutions. Precautionary measures such as hand sanitizers, provisions of medicine, the proper use of personal protective equipment, masks and hospital necessities should be made for protection of all patients as well as healthcare professionals.[28]

Conclusion

This review provides a brief description of the current COVID-19 situation and illustrates the impact on public health and its emergency preparedness. Safety measures such as prevention, precautions and vaccination are some of the methods for COVID-19 prevention.

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