USMAN ZULIAT YAKUB

16/SCI05/008

ASSISIGNMENT: In not less than three pages write on the virology, epidemiology, pathogenesis and control COVID19

INTRODUCTION

At the end of 2019, a clustered pneumonia patient was identified with an unfamiliar diseases at the south-east part of china, Wuhan, Hubei Province China. Due to sporadic human infection have brought in more than 80,000 laboratory confirmed cases, through analysis of sequence the unfamiliar pneumonia considered to be caused novel (CoV) named 2019-nCoV. The coronavirus diseases was announced world health organization as COVID-19.

VIROLOGY

Base on the clinical investigation, blood test and chest radiographs, this diseases was diagnosed as virus-induced pneumonia. As expected, SERS-CoV-2 was isolated by China Center for Diseases Control and Prevention. It was found that at least two strains of SERS-CoV-2 had occurred and was officially reported.SARS-CoV-2 was first isolated in the bronchoalveolar lavage fluid (BALF) of three COVID-19 patients, they observed that SERS-CoV-2 consists of four sub families CoVs in the enveloped family, positive-sense single-stranded RNA viruses having an extensive range of natural roots. These viruses can cause respiratory, enteric, hepatic, and neurologic diseases, subfamilies are α,β,γ, and δ. α,β,γ, and δ-CoVs.Human CoV infections are caused by α- and β-CoVs, α,β,γ, and δ-CoVs.Human CoV infections are caused by α- and β-CoVs. However, there is 94.6% sequence identity between the seven conserved replicase domains in ORF1ab of SARS-CoV-2 and SARS-CoV, and less than 90% sequence identity between those of SARS-CoV-2 and other β-CoVs, implying that SARS-CoV-2 belongs to the lineage B (Sarbecovirus) of β-CoVs. Therefore,β-CoVs, the SARS-CoV-2 virion with a genome size of 29.9 kb possesses a nucleocapsid composed of genomic RNA and phosphorylated nucleocapsid. The nucleocapsid is buried inside phospholipid bilayers and covered by two different types of spike proteins: the spike glycoprotein trimmer (S) that exists in all CoVs, and the hemagglutinin-esterase (HE) only shared among some CoVs.

**Physicochemical Properties**

The virus particle has a diameter of 60~100 nm and appears round or oval. Most of the knowledge about the physicochemical properties of CoVs comes from SARS-CoV and MERS-CoV. SARS-CoV-2 can be inactivated by UV or heated at 56◦C 30 min, and also sensitive to most disinfectants such as diethyl ether, 75% ethanol,chlorine, peraceticacid, and chloroform. It has been reported that SARS-CoV-2 was more stable on plastic and stainless steel than on copper and cardboard, and viable virus was detected up to 72 h after application to these surfaces.

Cell Entry and Receptor Interactions is Human angiotensin-converting enzyme 2 (ACE2) is a functional receptor hijacked by SARS-CoV-2 for cell entry and ACE2 is a membrane protein expressed in lung,heart, kidney, and intestine mainly associated with cardiovascular diseases.

Evolutionary Insights into the Ecology of SARS-CoV-2

Genetically diversified SARS-like CoVs were then found in Chinese Rhinolophid bats, and two novel bat CoVs from Chinese horseshoe bats, bat habitats are far from human activity areas, and the virus was probably transmitted to humans by another animal host.

EPIDEMIOLOGY

The Source of COVID-19 is main from a severe patients are considered to be more contagious than mild ones. However, infected persons or patients in incubation who show no signs or symptoms of respiratory infection proven to shed infectious virus.

Spectrum of Infection

COVID-19 has been considered as a type of self-limiting infectious disease, and most cases with mild symptoms can recover in 1–2 weeks.

Clinical Features

In the initial 41 patients, fever (98%), cough (76%), and myalgia or fatigue (44%) were the most common symptoms. Less common symptoms were sputum production (28%), headache (8%), hemoptysis (5%), and diarrhea (3%). More than half of patients developed dyspnea.

PATHOGENESIS

SARS-CoV-2 is transmitted predominantly via respiratory droplet, contact, and potential in fecal-oral. Suggestive of early-phase acute respiratory distress syndrome (ARDS).

Pathological Findings

The first report of pathological findings from a severe COVID-19 showed pulmonary bilateral diffuse alveolar damage with cellular fibromyxoid exudates. The right lung showed evident desquamation of pneumocytes and hyaline membrane formation, indicating acute respiratory distress syndrome. The left lung tissue displayed pulmonary edema with hyaline membrane formation, suggestive of early-phase acute respiratory distress syndrome (ARDS). Interstitial mononuclear inflammatory infiltrates, dominated by lymphocytes, could be observed in both lungs. Multinucleated syncytial cells with atypical enlarged pneumocytes characterized by large nuclei, amphophilic granular cytoplasm, and prominent nucleoli were identified in the intra-alveolar spaces, indicating viral cytopathic-like changes.

ARDS(Acute Respiratory Distress Syndrome) is a life-threatening lung condition that prevents enough oxygen from getting to the lungs and into the circulation, accounting for mortality of most respiratory disorders and acute lung injury.

CONTROL OF COVID19

Currently, there are no specific antiviral drugs or vaccines for the control of SARS-CoV-2.

. Potential Antiviral Compounds

Ribavirin. During the outbreak of SARS in Hong Kong, ribavirin was broadly used for patients with or without concomitant use of steroids Ribavirin and IFN-βcould synergistically inhibit

SARS-associated CoV replication in vitro.Due to adverse reactions, the proper dose of ribavirin in clinical application should be given carefully.

It has been reported that the use of lopinavir/ritonavir with ribavirin has a good therapeutic effect in SARS and MERS Lopinavir/ritonavir has been recommended for clinical treatment for COVID-19.

Remdesivir. Remdesivir (RDV) was previously reported to restrain SARS-CoV in vivo and the antiviral protection of RDV and IFN- βwas found to be superior to that of lopinavir or ritonavir-IFN- βagainst MERS-CoV in vitro and in vivo. In addition, remdesivir was used in the treatment of the first COVID-19 patient in the United States and was shown to have antiviral activity against SARS-CoV-2 in vitro.

Chloroquine: Chloroquine has many interesting biochemical properties including antiviral effect. Chloroquine can effectively inhibit SARS-CoV-2 in vitro and is recommended for the clinical control of viral replication.

Convalescent Plasma

Recently, convalescent plasma has been widely recommended to be used for COVID-19 but the effect of convalescent plasma cannot be discerned from the effects of patient comorbidities, stage of illness, or effect of other treatments. Convalescent plasma is currently under trial in treating infested patients in United States.

Conclusively, it is wide stated that SARS CoV-19 does not have any approved vaccine, it is very important for us to take necessary preventive measures such as washing your hands regularly, maintain social distance, self-isolation of infected patients and most importantly go test if you notice any kind symptoms.