# DEPARTMENTAL ACTIVITIES OF ACADEMIC SESSION 2020-2021



# Preparation Of Wall Magazine By Semester III and Semester V Students

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## COVID-19: The world faces yet another pandemic...



#### Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), the causative agent of COVID-19 has emerged as a zoonotic virus, late in 2019 in Wuhan, China, thereafter spread globally within a short period of time and was declared a pandemic on March 11, 2020 by WHO. Coronaviruses, belonging to family Coronaviridae, represent a major group of viruses mainly affecting humans through zoonotic transmission, SARS-CoV-2 in 2020, being the third instance of the emergence of a novel coronavirus, in the past three decades, after SARS-CoV in 2003 and MERS-CoV in 2012. Fortunately, the mortality of COVID-19 is low when compared with SARS and MERS, as majority of its cases lead to recovery. The death toll of COVID-19 is high even after its low mortality owing to the fact that, COVID-19 causes a pandemic while SARS-CoV and MERS-CoV cause epidemics only.

COVID-19, with its substantial pressures on healthcare systems worldwide, alongside have also taken a major toll on the global economy and thus remains a huge challenge to mankind. So far, current medical management has been purely supportive and targeted therapy is still unavailable, thus no other option remains other than strictly paying heed to prevention of the disease, in order to mitigate further spread of the virus. Our present work is an attempt to highlight some key features of the ongoing COVID-19 pandemic, after thorough review of recent scientific literature.

#### **Hosts and Reservoirs**

#### **Routes Of Transmission**

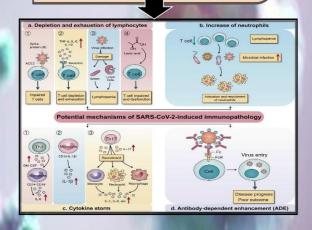
Bats are the probable reservoir of SARS-COV-2 having ~96% ome similarity to human SARS-CoV-2 related coronaviruses but lacks the 6 key residues in RBD sequence essential for successful human infection indicating that there must be an intermediate host facilitating transfer to humans. The sequence of human ACE-2 receptor is found to be more similar to Pangolin than to bats. The six key residues of the RBD domain of the virus are found to be strikingly similar to some Malayan pangolin (Manis imported into Guangdong province suggesting pangolins reservoir of the virus that played an important role in the evolution of the virus required for infecting humans.



Human to Human is the predominant route transmission either by direct contact with infected asymptomatic individuals or through the formation respiratory droplets coughing, sneezing, singing, breathing, and speaking within a 1 m proximity exposing mucosa (nose and mouth) or conjunctiva of the exposed individual to the infecting agent. Other routes of aerosolization of the viral particle. contact with contaminated objects (fomites), however transmission urinary, faecal-oral, ocular, sexual and vertical

#### **Pathogenesis**

The main pathogenesis of COVID-19 infection as a respiratory system targeting virus is severe pneumonia, RNAemia, combined with the incidence of ground-glass opacities, and acute cardiac injury. COVID-19 disease progression can be approximately divided into three phases: I. an asymptomatic phase with or without detectable virus; II. a non-severe symptomatic phase with upper airway involvement; and III. a potentially lethal disease with hypoxia progressing towards acute respiratory distress syndrome (ARDS) with high viral load .It has been shown that SARS-CoV-2 disrupts normal immune responses, leading to an impaired immune system and uncontrolled inflammatory responses in severe and critical patients with COVID-19. These patients exhibit lymphopenia, lymphocyte activation and dysfunction, abnormalities of granulocytes and monocytes, increased production of cytokines, and increased antibodies with predominance of IgG levels, Preexisting neutralizing antibodies enhance virus entry into cells via the Fc region of the antibody bound to the Fc receptor (FcR) on cells by Antibody-dependent enhancement



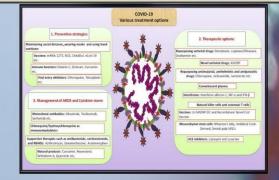
#### Clinical symptoms

The incubation period of COVID-19 infection is approximately 5.2 days depending on the age of the patient and condition of the patient's immune system. The symptoms of COVID-19 are similar to those of previous betacoronavirus inflicted diseases. However, COVID-19 uniquely targets the lower ent by upper respiratory tract symptoms like rhinorrhoea, sneezing, and sore throat. Unlike MERS-CoV and SERS-CoV, patients infected with COVID-19 developed intestinal symptoms like diarrhoea.

# te Cardiac Injury

#### Therapeutic Strategies:

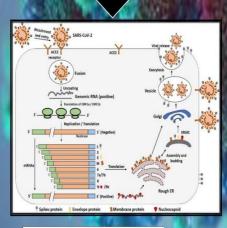
Till now there are no specific approved drugs for treating SARS-CoV-2,thus preventive strategies are adopted. Presently, physicians are using drugs such as Chloroquine/Hydroxychloroquine, Remdesivir, Tocilizumab, Azithromycin, Dexamethasone, Acetaminophen etc., and they are showing plausible results. Immune boosters such as Vitamin C, Zinc and other natural products are suggested in preventing the viral infections. Scientists are developing new antiviral drugs and vaccines and few are under the clinical trials. Medical practitioners are successfully implementing the convalescent plasma therapy to rescue the critically ill patients.



#### Key features and entry mechanism of SARS-CoV-2

The SARS-CoV2 genome comprises of the 5'-untranslated region (5'-UTR), open reading frame (orf) 1a/b encoding non-structural proteins (nsp) for replication, structural proteins including spike, envelop, membrane, and nucleocapsid proteins, accessory proteins such as orf 3, 6, 7a, 7b, 8 and 9b in the SARS-CoV-2 genome, and the 3'untranslated region (3'-UTR). The transmembrane homotrimeric spike (S) glycoprotein protruding from the viral surface mediate entry and attachment of the virus into the host cells. The S protein comprises of S1 subunit, required for host cell receptor binding and S2 subunit responsible for viral and cellular membranes fusion. The RBD domain of SARS-CoV-2 contain 5 distinct Amino acid residues conferring it high affinity towards ACE2 from humans, ferrets, cats and other species with high receptor homology. A polybasic cleavage site located at the junction of S1 and S2, that can be cleaved by furin and other proteases, determines viral infectivity and host range, An additional equisition of three O-linked glycans around this site helps in evading immune surveillance. .

SARS-CoV-2 require angiotensin-converting enzyme 2 (ACE2) as a key receptor. Cell entry of SARS-CoV-2 is preactivated by proprotein convertase furin, reducing its dependence on target cell proteases for entry. Cellular proteases like human airway trypsin-like protease (HAT), cathepsins and transmembrane protease serine 2 TMPRSS2) split the spike protein to establish further penetration changes and thus facilitating entry of the virus. The entire mechanism of pathogenicity of SARS-CoV-2, from attachment to replication is mentioned in the ollowing diagram:

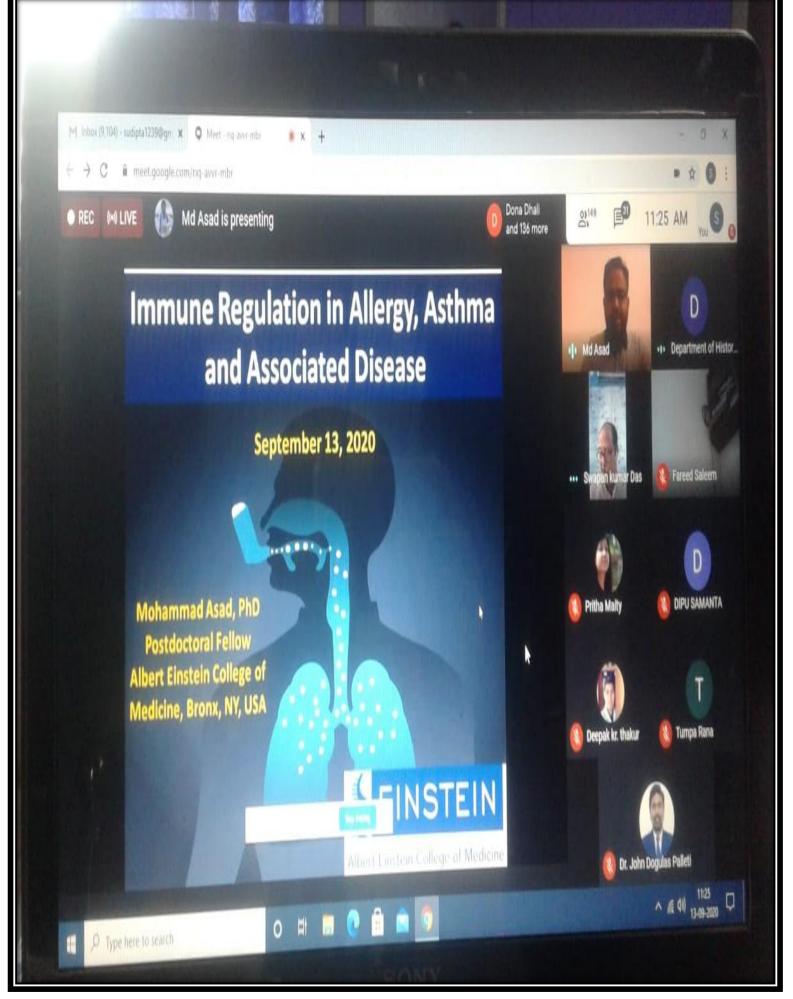


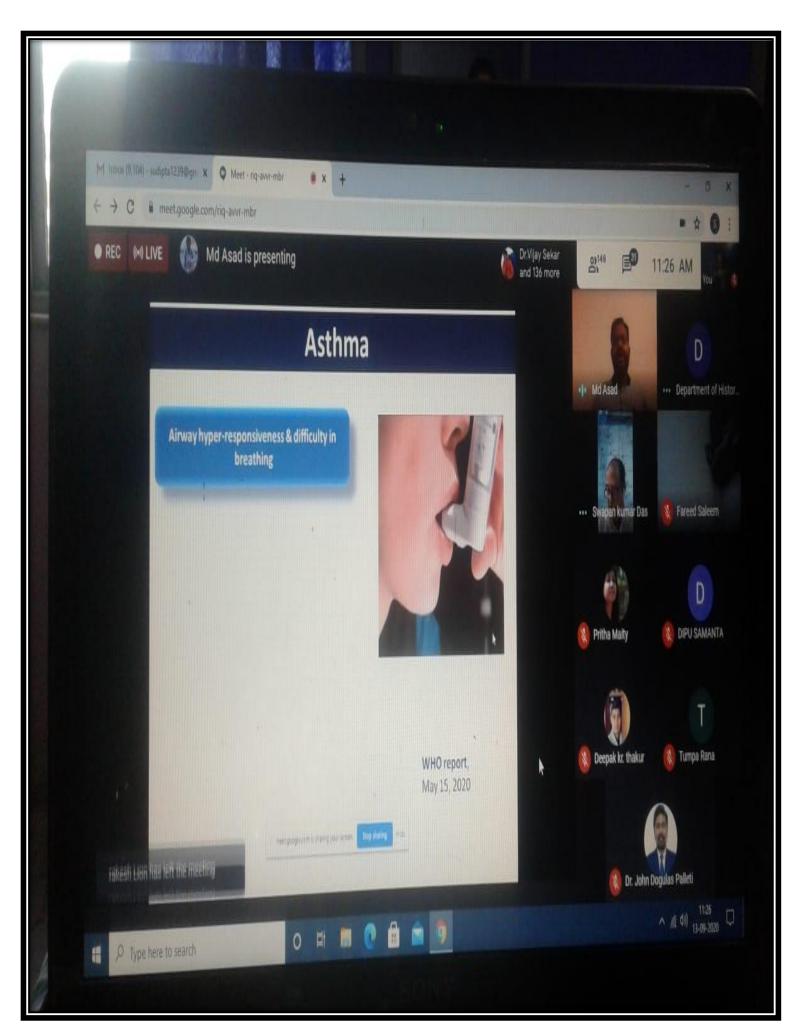
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