NAME: OLAOYE ESTHER OLUWASEUN

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LECTURER: MR EDEM, EDEM

ASSIGNMENT : Write a comprehensive review of the aetiology of COVID-19. Its pathogenesis, histopathological features and the current potential therapies to address it. Also, comment on the future of COVID-19 on public health.

AETIOLOGY OF COVID-19

COVID-19 is caused by a betacoronavirus named SARS-CoV-2 that affects the lower respiratory tract and manifests as pneumonia in humans which is considered a relative of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) (catrin *et.al.,* 2020). WHO named the disease condition COVID-19.

To date, most SARS-CoV-2 infected patients have developed mild symptoms such as dry cough, sore throat, and fever. The majority of cases have spontaneously resolved. However, some have developed various fatal complications including organ failure, septic shock, pulmonary oedema, severe pneumonia, and Acute Respiratory Distress Syndrome (ARDS) (chen *et.al.,* 2020).

The recent COVID-19 outbreak has been deemed a global health emergency. Globally, the number of confirmed reports has continued to rise, and is currently placed at > 2,083,607 laboratory-confirmed cases with over 13,000 deaths and > 510,666 recovered.

Current studies have seen that transmission of the coronavirus is from human-to human through respiratory fomites.

The human-to-human transmission is during the asymptomatic incubation period of COVID-19 which is estimated to be between 2 to 10 days (C. rothe et.al 2020). The symptoms of COVID-19 infection appear after an incubation period of approximately 5.2 days (Hussin and siddappa, 2020). It is more contagious when a patient is symptomatic.

Various preventive measures have been issued by various bodies including the WHO and US centers for disease control and Prevention (CDC) which are avoiding travel to high-risk areas, contact with individuals who are symptomatic, and the consumption of meat from regions with known COVID-19 outbreak. Basic hand hygiene measures are also recommended, including frequent hand washing and the use of face masks to avoid inhalation of droplets. Eye protection (goggles) or facial protection (face mask) should be worn, and healthcare workers are advised against touching any mucosal membranes (eyes, nose or mouth). Healthcare professionals have been urged to use eye protection when in close contact with patients as a case of the affected healthcare worker in china was still infected despite being fully dressed with protective suit and N95 respirator with the first symptom being unilateral conjunctivitis ( J Peng *et.al.,* 2020).

FEATURES OF COVID-19

Clinical features of COVID-19 include dry cough, fever, diarrhoea, vomiting, and myalgia. (catrin *et.al.,* 2020).

Individuals presented with above symptoms are advised to undergo extensive laboratory tests. Test results show Elevated C-reactive protein, erythrocyte sedimentation rate, lactate dehydrogenase, creatinine, and a prolonged prothrombin time (D.wang *et.al.,* 2020).

There are few data available on histopathological findings, but one study of a patient who died indicated the presence of hyaline membrane formation, interstitial mononuclear inflammatory infiltrates, and multinucleated giant cells, findings not dissimilar from those in SARS or MERS (carloset.*et.al.,* 2020).

PATHOGENESIS

Patients infected with COVID-19 showed higher leukocyte numbers, abnormal respiratory findings, and increased levels of plasma pro-inflammatory cytokines. One of the COVID-19 case reports showed a patient at 5 days of fever presented with a cough, coarse breathing sounds of both lungs, and a body temperature of 39.0 °C. The patient's sputum showed positive real-time polymerase chain reaction results that confirmed COVID-19 infection (J. Lei *et.al.,* 2020). The laboratory studies showed leucopenia with leukocyte counts of 2.91 × 10^9 cells/L of which 70.0% were neutrophils. Additionally, a value of 16.16 mg/L of blood C-reactive protein was noted which is above the normal range (0–10 mg/L). High erythrocyte sedimentation rate and D-dimer were also observed (J. Lei *et.al.,* 2020).  The main pathogenesis of COVID-19 infection which targets the respiratory system was severe pneumonia, RNAaemia, combined with the incidence of ground-glass opacities, and acute cardiac injury (C. Huang *et.al.,* 2020)

TREATMENT / POTENTIAL THERAPIES

There is no effective antiviral treatment or vaccine is available for COVID-19 presently. First-line treatments for fevers include antipyretic therapy such as paracetamol, whilst expectorants such as guaifenesin may be used for a non-productive cough. Patients with severe acute respiratory infection, respiratory distress, hypoxaemia or shock require the administration of immediate oxygen therapy. This should be at 5 L/min to reach SpO2 targets of ≥90% in non-pregnant adults and children, and ≥92–95% in pregnant women (WHO 2014).

 Intravenous fluids should be carefully administered when there is absence of shock (Schultz et.al 2017). Renal replacement therapy (RRT) should be initiated for patients with an acute kidney infection (AKI). Renal function and fluid balance should be used to identify patients that may require RRT (D.wang *et.al.,* 2020).

Broad spectrum antibiotic therapy should also be administered within 1 hour of initial assessment for sepsis (A. Rhodes *et.al.,* 2017). Antibiotic medications must also be followed as Bacterial and fungal infections can develop in the latter stages of the disease (L.kui *et.al.,* 2020).

The National Health Commission of the People's Republic of China recommends the use of IFN-α and lopinavir/ritonavir. This advice is based on prior research showing that these medications lower mortality rates in patients infected with Severe Acute Respiratory Syndrome (SARS) (C.M Chu 2004). Oseltamivir, a neurominidase inhibitor, is currently being used by medical staff in China for suspected infections despite the lack of any conclusive evidence regarding its effectiveness on COVID-19. Glucocorticoids may also be considered for patients with severe immune reactions. In children, methylprednisolone should be limited to 1–2 mg/kg/day for a maximum of 5 days (L. Kui *et.al.,* 2020). It has been reported that both chloroquine and the antiviral drug remdesivir inhibited SARS-CoV-2 in vitro and suggested these drugs be assessed in human patients suffering from COVID-19 (M wang *et.al.,* 2020).

POSSIBLE EFFECTS ON PUBLIC HEALTH

Extensive measures to reduce the rate at which COVID-19 is transmitted are required to control the current outbreak. Special attentions are given to children and elderly people as they are known to have weaker immune system. States and countries on lockdown have shown to follow the measures to reduce person-to-person transmission. Individuals are advised to stay put in their respective houses till the lockdown is called off. Those in need of health services or food supplies call the necessary emergency lines.

Countries who have high percentage of families living below average income are taking measures in providing for the population. Food supplies are taken to their homes by healthcare professionals in support of the government.

The public services and facilities should provide decontaminating reagents for cleaning hands on a routine basis. Physical contact with wet and contaminated objects should be considered in dealing with the virus, especially agents such as faecal and urine samples that can potentially serve as an alternative route of transmission (Assiri *et.al*., 2020).

Number of questions that need to be addressed include details about who and how many have been tested, what proportion of these turned positive and whether this rate remains constant or variable, how many have developed severe disease and how many were tested positive but showed no clinical sign of disease? There are some basic questions that would provide a framework for which more specific and detailed public health measures can be implemented (Hussin *et.al.,* 2020).

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