



A Review on COVID-19: A Global Pandemic

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ABSTRACT

Human community has encountered viral diseases multiple times, COVID-19 (corona virus disease 2019) is another infectious viral disease that has fetched the attention of the entire world. It is majorly a respiratory tract disease, with SARS-CoV 2 being the etiologic agent. As SARS-cov2 represents genetic similarity to a bat coronavirus, there are chances that it has originated from bats. Initially WHO names the illness-“novel coronavirus infected pneumonia (NCIP)”. On 11 February 2020 WHO officially renamed the condition as corona virus disease -2019 (COVID-19) and the virus was renamed as severe acute respiratory syndrome corona virus (SARS-CoV2) by the international committee on taxonomy of viruses. The symptoms of COVID 19 varies from asymptomatic or mild to severe illness and finally mortality. Out of the reported symptom the most common ones are fever, cough, myalgia, fatigue, pneumonia and complicated dyspnea.

Keywords: Covid-19, sars-cov2, origin, symptoms, comorbidities.

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INTRODUCTION

COVID 19 is basically a respiratory tract disease because of the presence of huge amount of angiotensin converting molecules in the lungs. The etiologic agent behind this pandemic is severe acute respiratory syndrome coronavirus.^{1,9} worldwide there have been 6,373,494 cases and 377,579 deaths till 2nd JUNE 2020 and still the data is increasing day by day¹⁶. Human community has encountered viral diseases multiple times and represent a serious issue to public health says WHO¹⁸. On analysing the data, it was seen that the patient had highest viral load at the time of onset of initial symptoms. It is now evident that human to human transmission of SARS-CoV2 occurs through respiratory droplet or close contact and through the infected surfaces whereas spread through airborne sources, through faeces and vertical transmission is still under review as no concrete evidence are available till now^{1,4,5,7,20}. The mortality rate is reported to be 3.7% whereas the fatality rate is 6.3%²¹. SARS-CoV2 is increasing its number exponentially and has a mean reproduction number of 2.5 as the range lies from 1.4 to 6.5²¹. Global impact of COVID 19 is unknown.

From rest 20% infected people majority of people suffered from comorbid conditions such as hypertension, diabetes

mellitus, cardiovascular disease etc. The virus gains entry into the human body from the ACE-2 receptors⁷. The disease proves to be fatal when the patient develops complications such as acute respiratory distress syndrome, sepsis and septic shock, ultimately leading to death.¹³

COVID-19 is not first human encounter to a life-threatening virus. In the last 20 years, time to time deadly viruses have emerged. In 2002-2003 severe acute respiratory syndrome coronavirus (SARS-CoV) was witnessed. In 2009, H1N1 influenza outbreak occurred. Most recent encounter had been recorded with middle east respiratory syndrome coronavirus (MERS-CoV) in 2012, first identified in Saudi Arabia^{7,17,22}. SARS-CoV the initial cases of COVID 19 were reported from hubei province, wuhan, china with pneumonia of unknown aetiology^{21,22}. It is believed that the origin of SARS-COV2 was from the seafood market in wuhan. Till date it is guessed that the disease originated from bat but has not been proven^{21,24}. Initially WHO names the illness-“novel coronavirus infected pneumonia (NCIP)”. On 11 February 2020 WHO officially renamed the condition as corona virus disease -2019 (COVID-19) and the virus was renamed as severe acute respiratory syndrome corona virus (SARS-CoV2) by the international committee on taxonomy of viruses^{15,19}.

Origin of corona virus

Corona virus, enveloped single stranded RNA viruses, have been named so because of the presence of crown like spikes on their surface.^{12,14}

In humans presence of 6 known strains of corona virus have been documented other than SARS-cov2. These



include HCOV-229e, HCOV-0c43, SARS-COV, MERS-COV, HCOV-HKU1, HCOV-HKU1.¹³

MERS-CoV, SARS-cov2 types of beta coronavirus are the previously encountered life-threatening viruses.

On January 30, 2020, world Health Organization (who) declared COVID 19 as a global health emergency but as the number of cases increased uncontrollably it was declared a global pandemic on March 11, 2020. COVID 19 has a mortality rate of approximately 3.7%. The case fatality rate was reported to be 6.3% but it varies from country to country and is different among different age groups. It may be as high as 15%.²¹

Target of SARS-COV2

Studies have shown that COVID19 protein have strong tendency to interact with human ACE-2 molecules despite of its dissimilarity with SARS-COV⁷. It targets the physiological pathway known as renin angiotensin system (RAS) whereas RAS is intimately linked to hypertension. SARS-COV 2 affects the lower respiratory tract of humans¹⁴. The spike proteins of SARS-CoV2 bind to the cellular receptor, angiotensin converting enzyme 2 (ACE2) and affect human cells and gain entry into the human body.

According to the structural studies, the S glycoprotein has 2 subunits: S1 subunit and S2 subunit, composed of 1253 amino acids. On comparing SARS-CoV2 with previously encountered viruses it was found that the resemblance was about 75 percent with SARS-CoV in terms of amino acids. The S1 subunit is linked to receptor binding whereas S2 domain is linked to cell membrane fusion. Further, the functional domain of S2 included 3 parts namely the fusion peptide (FP), heptad repeat 1 (HR1), heptad repeat 2 (HR2).²

Some studies state that a SARS-CoV had more affinity for ACE-2 as compared to SARS-CoV2 whereas others state the vice versa, that is the SARS-cov2 has 10-14 times more affinity for ACE-2 than SARS-CoV.

Transmission pattern

Corona viruses have well known host reservoirs such as cats (civen cats – SARS-COV1), camel (dromedary camels-MERS-COV), cattles, bats etc.¹⁷

Mainly till now three routes have been spotted for the transmission of COVID19 - Droplet transmission, Contact transmission, Aerosol transmission.^{4,7,12}

Respiratory transmission happens when an infected person produces respiratory droplets (sneezing coughing) and when these droplets are inhaled by individuals nearby, they are susceptible to the infection. Usually, the droplets cannot travel more than 6 feet. Contact transmission occurs through fomite when individual come in contact with infected surfaces. In a study that was conducted on transmission of the virus, it was found that the virus is present on a surface in detectable levels up to 72 hours although with decreased activity. When infected

respiratory droplets mix with air, aerosol transmission occurs.

The incubation period of SARS-COV2 is 1 -14 days which for most of the patients ranges from 3 to 7 days.

In china scientists isolated live SARS-COV2 from the faecal matter of a COVID19 patient on 10th February 2020. Even the virus was found when a patient was subjected to biopsy. Even the patients showed GI symptoms like diarrhoea and abdominal discomfort which were not present in SARS-COV. Hence these evidences show that other than the three respiratory routes a fourth route i.e the digestive system may also transmit the virus⁵. According to the data from studies conducted on a group of nine women and another group of 38 women there is no evidence of transmission of the virus from mother to the baby till now.^{8,20}

When a COVID 19 patient is symptomatic he/she acts as a active transmitter whereas according to some studies a person is potent in transmitting even in the latent phase that is when there are no symptoms.¹³ The prevalence of asymptomatic disease was reported at all ages but the count was reported more in younger children.

CDC and the assistant secretary for preparedness and response (ASPR) releases certain parameter values for the disease

Table 1: Data related to corona virus

Infectiousness of asymptomatic individuals relative to symptomatic individuals	100%
Percentage of transmission prior to symptom onset	40%
Asymptomatic SARS-COV2 rate	35%
Basic reproductive rate(R0)	2.4
Time from exposure to symptom onset	Mean of 6 days

Host of the virus

On conducting genetic studies after isolation of virus SARS-cov2 showed phylogenetic similarity to SARS like bat virus, hence indicating that bat could act as a primary reservoir for the virus^{4,24,25}. It has been demonstrated that SARS-COV2 possesses 96% nucleotide similarity with a bat coronavirus⁷. As COVID 19 is a zoonotic disease, the intermediate host between the primary host and the terminal host is still a mystery but the closest idea is of pangolins to be the intermediate hosts¹³. Through studies the reproduction rate (Ro) of the SARS-COV2 is estimated to be around 2.2 or more (range lies from 1.4 to 6.5²¹). The R0 value depicts that the number of people infected with SARS-CoV2 will be doubled every 6 -7 day. A stational analysis was conducted in USA and CHINA in which it has been reported that there is effect of temperature and humidity on the reproduction number of the virus. It stated that 1-degree Celsius increase in temperature reduces the R value by about 0.023 in china and 0.020 in united states of America whereas 1-degree relative



humidity rise reduces R value by 0.0078 in china and 0.0080 in the USA⁶.

Clinical manifestations of COVID 19

The symptoms of COVID 19 varies from asymptomatic or mild to severe illness and finally mortality. out of the reported symptom the most common ones are fever, cough, myalgia, fatigue, pneumonia and complicated dyspnea.^{2,12,13}

Some symptoms which were not so common but were reported in patients are headache diarrhea, hemoptysis, runny nose, phlegm producing cough, nasal congestion, conjunctivitis, sore throat. The rarest prevalent symptoms are loss of taste and smell, rash, discoloration of fingers and toe.

Rate of symptoms observed in COVID-19 patients

Table 2: Rate of symptoms observed in COVID-19 patients.

SYMPTOM	RATE
Fever	82.2%
Cough	61.7%
Fatigue	44.0%
Dyspnea	41.0%
Anorexia	40.0%
Productive sputum	27.7%
Myalgia	22.7%
Sore throat	15.1%
Nausea	9.4%
Dizziness	9.4%
Diarrhoea	8.4%
Headache	6.7%
Vomiting	3.6%
Abdominal pain	2.2%

Risk factors^{2,3,10,11,13,14,23}

Table 3: Comorbidity Rate with Covid-19

COMORBIDITY	Rate %
Hypertension	30.7
Diabetes mellitus	14.3
Cardiovascular disease	11.9
Cerebrovascular disease	6.6
Malignancy	4.3
Chronic liver disease	2.8
Chronic lung disease	2.4
Chronic kidney disease	2.1
Human immunodeficiency Syndrome (HIV)	1.4
Immunodeficiency	0.2

In the current scenario COVID 19 may hit anyone. Each and every person is susceptible to acquire it but few people are at a greater risk.

Age, BMI, comorbid conditions, sex, smoking habits and the profession are the major risk factors for covid-19. Comorbidity rate with COVID 19 cases

CONCLUSION

COVID 19 has proved to be a challenge for healthcare system and economic growth of many countries around the world. In India there have been 199,343 lakh cases and 5610 death still 2nd JUNE 2020 and the data is increasing exponentially¹⁶. Day to day life has been drastically affected and with no idea what the time will bring to us we should take all the protective measures to avoid the graph to rise sharply. Hence for the time being the main goal is to identify the clinical characteristics, recognizing and spotting the symptomatic and asymptomatic patients and isolating them to prevent further spread of infection.

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