

COVID-19 OUTBREAK, TRANSMISSION, DIAGNOSIS, POTENTIAL TREATMENT AND SITUATION IN PAKISTAN

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ABSTRACT

The Coronavirus disease 2019 (COVID-19) that originated in Wuhan, China in December 2019 has become a pandemic. In comparison to its ancestors the SARS-CoV and MERS-CoV, the novel corona virus SARS-CoV-2 has a faster spread. The transmission of disease is through inhalation of infected droplets. Fever, sore throat, dry cough, body pain and malaise are the common symptoms. Shortness of breath leading to acute respiratory distress syndrome is observed in worse situation. Diagnosis is made through detection of the virus in respiratory secretions. Treatment is symptomatic. COVID-19 has badly affected over 209 countries including Pakistan. According to WHO there are 8,006,427 cases and 436,899 deaths reported due to COVID-19, as of 16th June 2020. Prevention includes isolating the suspected cases while the strict infection control measures must be employed at the hospitals. Being a neighbor to China and Iran, Pakistan was most vulnerable to COVID-19. In Pakistan first case of COVID-19 was reported on 25 February 2020. 78% COVID-19 positive cases were the pilgrims returning from Iran. To control the spread of the disease, the Government of Pakistan announced the suspension of international and domestic flights. All the educational institutions were closed and a partial lockdown was imposed across the country. Hand hygiene, wearing of face masks and the social distancing was stressed upon. Until now, no vaccine against COVID-19 is reported. However, clinical trials are being conducted all over the world. The article throws some light on the origin, pathogenicity, symptoms, diagnostics along with possible therapeutic strategies of the virus and situation of COVID-19 in Pakistan.

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INTRODUCTION

On 31st December 2019, China, informed the WHO regarding increasing pneumonia cases of unknown etiology. A probable zoonotic origin of COVID-19 was suggested as most of the cases were exposed to the wet market in Wuhan, China.^{1,2,3} Studies were done to identify the host and intermediate carriers which led to the spread of the disease in humans. The analysis of

COVID-19 genomic sequence revealed that it has 88% similarity with the bat derived coronaviruses causing severe acute respiratory syndrome (SARS).³ COVID-19 infection was widely detected in many people who had not even visited Wuhan's wet market indicating a rapid person to person transmission of the virus.⁴ Infecting and causing thousands of deaths in China, the virus rapidly spread to Iran, Italy, Europe UK and the USA.^{5,6} Over 209 countries around the globe including Pakistan are under its attack. As of 16th June 2020, 8,006,427 confirmed cases of COVID-19, and 436,899 deaths have been reported to the WHO.⁷

PATHOGENESIS

Corona virus is an enveloped virus with a single RNA strand. Four sub types of Coronaviruses are: alpha, beta, gamma and delta. Each sub type has various serotypes.

Some infect the humans while the other affect animals including mice, pigs, bats, dogs and cats.⁸ Humans can also acquire the infection by an infected person. SARS-CoV-2, the novel coronavirus, hails from the same family of coronaviruses with which we are familiar to for years or even decades.^{9,10} These include the SARS virus, SARS-CoV-1, that originated in 2003 in China and was transmitted to human beings from civets and the MERS virus, that emanated in 2012 in Arab with transmission to humans from dromedaries. MERS and SARS, both have a high mortality rate around 10% and 35 % respectively.^{11,12}

The SARS-CoV-2, new corona virus spreads via airborne droplets. The epithelial cells of the lung are the prime target of the virus. The virus first binds to the receptor present on the ciliated epithelial cells and later fuses with their cell membrane. Human-to-human transmission of SARS-CoV is reported via binding to the angiotensin-converting enzyme 2 (ACE2) receptor.^{13,14}

CLINICAL SYMPTOMS:

The symptoms of COVID-19 infection vary from mild to extreme. Some cases worsen leading to death. In about 80–90% of cases, the infection is mild or even asymptomatic. The common symptoms reported include dry cough, flu like symptoms, fever, headache, myalgia, conjunctivitis, pneumonia, and complicated dyspnea.¹⁵ The patients with mild symptoms usually recover within a week. Gastrointestinal symptoms including diarrhea, nausea and vomiting are also experienced by the patients. In about 5% of cases, critical conditions pneumonia, shock, respiratory distress and multiorgan failure may develop which can end up in death.^{16,17} Neuroinvasive potential of the SARS-CoV-2 has also been reported. Anosmia and dysgeusia experienced by COVID-19 patients indicate a possible neurotropic effect of this virus that may the adversely affect the olfactory and the vagus nerve.¹⁸ The mortality rate is varies from 2% to 5%. This is lower than the mortality rates for SARS-CoV (10%) and MERS-CoV (35%). However, due to rapid global spread of COVID-19, it is still too nascent to comment on its mortality rate. High risk factors for the poor outcome include old age, comorbid conditions including diabetes mellitus, hypertension and lung diseases.¹⁹

DIAGNOSIS:

RT-PCR is the most commonly used diagnostic test. Nasopharyngeal swabs from the upper respiratory tract is the most reliable method.²⁰ Studies have reported the presence of SARS-CoV-2 RNA in blood and stool samples.²¹ RT-PCR has a very high specificity,

however, false-positive results may be due to swab contamination. The sensitivity rate is about 66–80%. A single negative test does not negate the SARS-CoV-2 infection, particularly in exposed individuals. Therefore, it is advised to collect a deeper respiratory tract sample.^{22,23} The common laboratory findings seen in infected patients include lymphopenia and raised alanine aminotransferase and aspartate aminotransferase levels.²⁴ Raised inflammation indices like raised C-reactive protein (CRP) levels, are linked to disease severity. Ferritin and D-dimer levels are also elevated in critical cases. It is also reported that troponin can be a strong indicator of prognosis.²⁵ CT findings of COVID-19 reveal ground glass opacities. The number of pulmonary segments infected are related to the severity of the infection. Plain X-ray chest has a low sensitivity.^{26,27} Ultrasonography has a very low specificity, although, it can help in monitoring the disease progression by detecting lung disease features, B lines and sub pleural consolidation.²⁸

TREATMENT

Till present no drug is registered to cure COVID-19 disease and no vaccine is available. Treatment involves relieving the symptoms.²⁹ However, some studies report that Remdesivir alone or in combination with chloroquine and interferon beta blocks the SARS-CoV-2 replication.^{30,31} Various combinations, of antiviral and antibiotics along with herbal medicines are being evaluated against SARS-CoV-2 induced infection in humans and mice.^{32,33} Tocilizumab, a monoclonal antibody has also shown some hopeful effects. However, the current data is still too limited to draw any conclusion about the viability of these therapies.^{34,35} Oxygen through nasal prongs, face mask, or non-invasive ventilation is indicated in hypoxic patients. In serious patients mechanical ventilation may be needed.^{36,37,38} Recently doctors are isolating the plasma from COVID-19 recovered patients and injecting it to the infected patients and promising results are being reported.^{39,40,41}

COVID-19 SITUATION IN PAKISTAN

All over the world Pakistan is the fifth most popular country where human population is more than 212 million therefore the risks of any pandemic in this country is very high. Pakistan share boundaries with India to the east, Afghanistan to northwest, Iran to west and china into northwest.⁴² Unfortunately, main two source for COVID-19 in Pakistan is Iran and China region.⁴³ so, the risk of COVID-19 spread through these neighbors cannot be ignored. In Pakistan first case of COVID-19 was reported on 25 February 2020.⁴⁴ 78%

COVID-19 positive cases were the pilgrims returning from Iran. The COVID-19 positive cases reached to 148,921 with 2,839 deaths as of 16th June 2020.⁴⁵ In Punjab maximum numbers of COVID-19 patients were observed that is the most populated province of Pakistan (Table 1).

In Pakistan the leading source of COVID-19 transmission was the return of Pakistanis from foreign countries having pandemic. Local spread (more than 75%) of COVID from infected person to healthy person through social contacts which is also a main source of transmission.⁴⁶ The Epidemiological characteristics of first 100 deaths attributed to COVID-19 in Pakistan is given in Table 2. Male population is more prone linking their social activities and work for earning bread in a male dominant society.^{47,48}

Table 1: Confirmed COVID-19 cases in different provinces of Pakistan

Location	Confirmed COVID-19 patients
Sindh	55,878
Punjab	55,581
Baluchistan	9,162
KPK	20,790
Islamabad	10,662

Table 2: Epidemiological characteristics of first 100 deaths attributed to COVID-19 in Pakistan

Characteristics	Numbers (%)	
Median Age (range)	64.5	(22-84)
Male cases (%)	75	(75%)
History of documented Co-morbidity	71	(71%)
History of international travel	13	(13%)
History of local travel/contact with a cases	49	(49%)
No travel history	38	(38%)

The WHO reports that the new cases are rise.⁴⁹The federal and provincial governments are daily monitoring the situation. The kits for testing the virus are being imported and the number of tests are being increased. Still, the number of tests being conducted is inadequate. While writing this review, most of the country is under a partially locked down. However, in countries like Pakistan which have a huge congested population, limited medical facilities and face poverty it is difficult to totally confine the people.⁵⁰

To limit the spread of coronavirus, all educational institutes were closed on 13th March 2020 by the government of Pakistan. Quarantine houses were set up at borders as well as in major cities. Lockdown was imposed in the country. Self-quarantine was practiced in

the entire country. However, for their basic needs such as diet and medicine, people were permitted to go outdoors. Shops including fruit and vegetable marts, general stores and medical stores remained open. Hotels, restaurants, marriage halls remained close.⁵¹ Pilgrims returning back from Iran were a major threat for the spread of the disease. In March, Pakistan received about 6000 pilgrims and thereafter, Taftan was main source of epidemic in Pakistan.⁵² Health ministry said that 78 % cases were traced from Iran. Testing for COVID-19 in Pakistan is being done for symptomatic as well as asymptomatic people.⁵³ on 18th March 2020, the first death was reported with a gradual increase in Case Fatality Rate (CFR) to 1.67% till first 100 deaths were observed. Age group above 60 years is the most vulnerable age group in Pakistan. Children and young age groups are seem to be protected while middle age group having highest community exposure are mildly affected. An increased CFR has been observed with increasing age.⁵⁴ Fever, cough and breath shortness are the most reported signs and symptoms. However, severe acute respiratory syndrome seems the hall mark of mortality. Patients above 60 years have a high CFR and this is relatable to their low immunity and comorbidities. Comorbidities like Ischemic heart diseases, diabetes and hypertension seems to play a critical role in the disease progression.^{55,56}

The COVID-19 will remain until a vaccine comes it way. Government of Pakistan must take care of its population and there is a need to take religious organizations in self-confidence and to use the machinery in a much planed manner to combat this beast of COVID-19.

CONCLUSION

The COVID-19 has spread like wild fire affecting over 208 countries including Pakistan. The global consequences of the pandemic are severe. No vaccine is available to date however, new therapies are underway to treat the disease. The intervention currently viable to reduce the spread of contagion is strict quarantine. Hopefully and by grace of God, Pakistan will successfully overcome the beast of COVID-19.

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