



# Diagnosis, Prevention and Plasma Therapy as a Treatment of COVID-19 and Comparison with Pakistan

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## Abstract

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) that instigates COVID-19 has caused the pandemic. In its epicenter China it was evoked in December-2019. The (SARS-CoV-2) belongs to family coronaviridae. In addition, it is the novel strain of beta coronavirus. The (SARS-CoV-2), name was given to this newly discovered strain by the World Health Organization (WHO). The COVID-19 as the sixth public health emergency of international suffering was declared by WHO in January-2020. The fundamental reason to global outbreak of this infection is lack of knowledge regarding etymology, precautionary measures, and selected drug and vaccination. This pandemic situation has forced scientists to rework strategies to combat infectious diseases through drugs, treatment, and control measures. Therefore, worldwide the scientist societies are intensely needed to work on this emerging epidemic. Likewise, some effective inhibitors are suggested to probably treat COVID-19 infected individuals. Correspondingly a new technique plasma therapy has been proved prolific in treatment of COVID-19. Contextually, the aim of this review is to recapitulate the diagnosis, treatments, and preventive measures of COVID-19. Besides, different steps in field of diagnosis and therapies are required in order to overwhelm this pandemic.

**Keywords:** COVID-19; SARS-CoV-2; Virology; Pandemic; Plasma therapies

## Introduction

COVID-19 is a pandemic disease which causes infection in the respiratory system of Human. It was first spotted in the city of Wuhan in December 2019 Republic of China and then spread throughout the world [1].

The causative agent of COVID-19 is Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), commonly called as Corona virus, which is a ssRNA virus. World Health Organization (WHO) has accredited the COVID-19 pandemic as public wellbeing emergency of worldwide concern [2]. COVID-19 symptoms range from fever, dry cough, fatigue to respiratory congestion, Diarrhea, Nausea and degeneration of alveoli. Its transmission initially likely to be from animal to human as it was first diagnosed in people associated with animal and Meat Street. Now it is reported that it is transmitting through person to person. Currently no vaccine is available for it however certain supporting treatments are adapted by the health care centers [3]. Current Census for COVID-19 suggests 1,359,050 patients worldwide out of them 75,906 are the deaths and 293,454 are recovered patients [4]. In Pakistan overall patients of COVID-19 are 4,004 out of them 54 are the deaths and 429 are recovered patients [5].

## Diagnosis

Diagnosis of COVID-19 is based on following two basic steps because of population burden

### Clinical diagnosis

#### Laboratory diagnosis

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**Clinical diagnosis:** COVID-19 triggers wide-ranging clinical spectrum as of asymptomatic patients and ultimately failure of multiorgan system. Although the general symptoms were fever, fatigue in 98.6% and 69.6% respectively, dry cough but furthermore it is ordered into mild, may be moderate, and leads to severe symptoms [6].

**Mild disease:** Majority of the cases are fall in this category with symptoms like nasal congestion, muscle pain, sore throat, mild fever, dry cough and headache. Radiograph highlights are missing in such type of cases [6].

**Moderate disease:** In case of moderate disease patients having respiratory symptoms like shortness of breath, cough and may be tachypnea. Some patients undergo diarrhea and nausea [6].

**Severe disease:** Those patients who fall in this category presents through pneumonia which is severe, Acute Respiratory Distress Syndrome (ARDS), septic shock, sepsis, dyspnea, tachypnea (respiratory rate >30/min), respiratory distress, SpO<sub>2</sub> ≤ 93%, PaO<sub>2</sub>/FiO<sub>2</sub> <300, and/or more than 50% lung infiltrates from 24 h to 48 h [6].

**Critical disease:** In this case small group of patients faces of respiratory failure, septic shock, RNAemia, cardiac injury, or multi organ failure. CDC suggests that mortality rate of those patients which fall under this category is 49% [6].

## Laboratory diagnosis

### Laboratory diagnosis may include following Techniques

**Polymerase chain reaction (PCR):** PCR remains the primary COVID-19 diagnostic testing throughout the world. The upper and lower respiratory tracts sample collection is recommended by WHO, samples were further processed for viral RNA expression by using real-time PCR [6]. Positive test repeated through PCR for further confirmation. Negative test will be further screen out through PCR with a robust clinical suspicion [7].

### Diagnosis by irregularities in body fluids and enzymes

In laboratory results for COVID-19 Include C-Reactive Protein (CRP), LDH, elevated prothrombin time, D-dimer and creatine kinase, significant reduction in CD4 and CD8 lymphocytes in the early stages can also be noted. High levels of Granulocyte Colony-Stimulating Factor (GCSF), Interleukin-7 (IL) 2, IP10, and L-10, interferon gamma-induced protein 10, Monocyte Chemotactic Protein1 (MCP1) also observed in critical patients. Other abnormal findings include Myocardial injury, cellular immune deficiency, renal and hepatic injury. Increase level in procalcitonin are not COVID-19 feature. Elevated level of procalcitonin may suggest No COVID-19 [6].

**CT scan:** Some reputed hospitals in the world suggest chest CT scan in order to get quick and clear view of how and where the corona virus has spread [6,7]. Some of the recent research articles support that for COVID-19 screening in particular cases where RT-PCR result is negative, chest CT with clinical and epidemiologic features is recommended [8,9].

**Other types of test:** The Food and Drug Administration (FDA) also recommended the use of following test

- Rapid corona virus diagnostic test [10].
- Point-of-Care (POC) testing devices made by California-

based molecular diagnostics company Cepheid [11].

The test is currently reserved for clearing healthcare staff to return to work following exposure to COVID-19 [11].

## Plasma Therapy as Possible Treatment of COVID-19

On the onset of 2020, world is comforting a pandemic named as COVID-19. Virus emerging for human beings as a new pathogen. At that time there were no vaccines for COVID-19, no monoclonal antibodies or any other therapeutic agent available to treat these infections. However, many hematologists and researchers suggest the use of human convalescent serum as an emergency treatment of COVID-19 (Figure 1) [12].

### Plasma therapy

Plasma therapy comprises the applications of antibodies to encounter the harmful agent to a susceptible individual in order to treat an infectious disease. In contrast, active vaccination takes time to develop antibodies and differs depending on the patients as it requires induction of an immune response thus plasma therapy is the only immediate immunity to prone persons [12].

In the case of COVID-19, viral neutralization is the proposed mechanism of action by which passive antibody therapy would provide mediate protection. However, other possible mechanisms such as phagocytosis and antibody-dependent cellular cytotoxicity provides a valuable tool as a therapeutic remedy [12]. The only currently available efficient source of antibody for treating COVID-19 may be recovered patient's convalescent sera. Cows that are genetically engineered produce human antibody may also be used in near future as a treatment option [12].

### Conditions for plasma therapy

The following 6 conditions applied in order to imply plasma therapy [12].

- Availability of donors who were recovered from disease and willingly donate convalescent serum.
- For processing of serum donations there must be availability of blood banking facilities.
- Availability of various assays such as serological assays, for detection of SARS-CoV-2 in serum and also virological assays to quantify viral neutralization.
- Presence of virology laboratory to perform various assays.
- Therapeutic and Prophylaxis and protocols, which ought to perfectly comprise randomized clinical trials to evaluate the effectiveness of any intrusion and measure immune responses.

## Preventions

The best way of prevention is to no exposure of the viral pathogen, until vaccine is not available against COVID-19, thus following precautionary measures must be taken in order to prevent you from COVID-19.

- As virus spread through mouth, nose and eyes therefore avoid touching these regions with unwashed hands [14].
- Wash your hand with Soap and water for 20 sec [13].
- In the absence of soap and water use alcohol-based sanitizer [14].

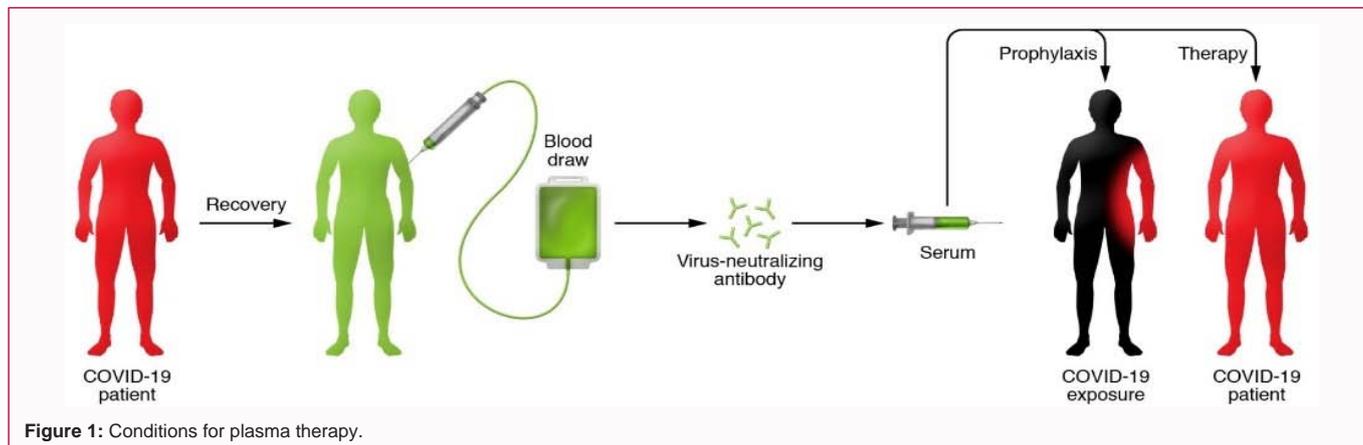


Figure 1: Conditions for plasma therapy.

- Keep social distancing in order to stop the spread of virus [13,14].
- Avoid close contact and keep yourself at 1 meter a part [13,15].
- Must be cover your nose and mouth with an N-95 mask, cover yourself when you coughing or sneezing [14].
- Discard the used tissues properly [15].
- If you're a sick then must use a facemask when you are around other healthy people and must be quarantined and inform the health care officials.
- Properly disinfect the contaminated surfaces on daily basis i.e. tables, doorknobs, desk, phones, keyboards, sinks, toilets etc. via alcohol-based detergents and diluted household bleaches [13,14].
- Always check your temperature [14,15].

## Diagnosis, Prevention and Treatment in Pakistan as compared to Rest of the World

Pakistan being a developing nation has some infrastructure flaws which bound us to certain limitations in every field and same is the case when we cope with the situation created due to COVID-19.

### Diagnosis

Initially when the corona started to spread in the neighbor countries of Islamic republic of Pakistan, our government took it light by announcing Pakistan is a corona free country. Moreover, we have allowed the Pakistanis from Iran and other countries to come to Pakistan and in this way, situation become worsen [A]. It is now highlighted there must be proper and screening procedures for passenger's arrival from abroad which will protect us from the newly emergent viral strains [16].

After the outbreak of COVID-19 in Pakistan, Pakistan has no diagnostic facilities, and samples were sent to other countries for inspection but as the time have passed with the aid of China and Japan, Pakistan later received test kits and primers respectively [17]. Currently with the ongoing trend of COVID-19 transmission Pakistan has capability (although insufficient) of screening samples of suspected individuals inside the country at National institute of Health Islamabad (NIH) and WHO-designated COVID-19 test centers in 7 hospitals works across the country. Currently Pakistan is using PCR technique for the detection of COVID-19 which is still to be enhanced as situation getting worsens day by day [17].

We have 1 central quarantine center and many regional isolation wards, however in wards we face basic administrative issues which leads to the mismanagement of resources, overcrowded wards as well as insufficient facilities for the patients. Some report suggests that management of few of the teaching hospitals designated as isolation wards are violating the basic guidelines given by the government [17].

### Treatment

When we talk about the treatment then we have no hesitation to say all the countries of the world including Pakistan find themselves in a dark. Meanwhile, in Pakistan Punjab and Sindh government officially permit the use of Palma therapy as an emergency treatment of COVID-19 patients. On March 31<sup>st</sup>, 2020 Dr, Tahir Shamshi officially requested the recovered COVID-19 patients to donate their plasma in order to cope with registered COVID-19 patients on emergency basis [18]. First recovered patient of COVID-19 donated his plasma in Karachi for therapy [19].

### Prevention

Lack of resources and other administrative matters is another debate but, in this emergency, we failed as a nation. Public is not getting it serious and not avoiding the crowded places. Citizens constantly violating the lockdown orders. Countries like china have beaten the corona just because of positive public response. I am not losing my hope as now handsome population of public are playing their role and start realizing that corona is pandemic and self-isolation is the only way of prevention in a current scenario [19].

We will also face trouble in long term continuation of lock down as we are a poor country and will have no tolerable economic crises. PM Imran khan repeatedly refuses the curfew just because of Economic crises by arguing that we are unable to feed out citizen at door their steps. In this case Curfew will have adverse effects [19].

## Recommendations

- Government should pay sincere efforts towards corona.
- Public should follow the health guidelines.
- Public should not violate the government instructions regarding lockdown and other safety measures.
- Research institutes should play their part in the research regarding diagnosis, treatment and Preventions.
- Media should play their positive role in the awareness.
- As an individual we should follow health measures given

by WHO.

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