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IJIST
ISSN : 2618-1630

COVID-19 Pandemic: A Remedial Measure Through Convalescent Serum

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Citation |Abbas.N.A., Rauf. U., Saleem. A., Saleem. N., Basheer.T.,Yaseen.S., Irfan.N., Naushad. A "COVID-19 Pandemic: A Remedial Measure Through Convalescent Serum". International Journal of Innovations in Science & Technology, Vol 02 Issue 02: pp 46-50, 2020.

Received | April 15, 2020; Revised |May 05, 2020; Accepted | June 18, 2020; Published | June 21, 2020.

An acute respiratory syndrome Corona Virus 2 has affected humanity throughout the world. Scientifically, Corona Virus 2 is known as SARS-COV-2 which is abbreviated as COVID-2019. China was the first victim of this outbreaks in December 2019 [1] which was later recognized as pandemic on March 11, 2020 by World Health Organization (WHO) [2,3]. At the time of this writing, about 8.75 million individuals of 188 countries [4] have been effected by COVID resulting in 463000 deaths primarily, corona virus communicates from one body to another body through close contacts via droplets produced by sneezing, coughing or taking by infected badly within a buffer zone of 3 to 6 feet [5,6,7]. These droplets fall onto a surface and can survive up to 72 hours [8]. Various studies have proved that droplets may travel up to 37 feet by an uncovered cough [9,10,11]. Corona virus is not an airborne, however it may transport through respiratory droplets during talking and breathing [12].

It may be spread due to contaminated surface by corona including skin touches to eyes, nose, or mouth. Corona virus reacts differently for different surfaces like a stainless-steel surface and plastic surface make corona virus alive up to 3 days, cupboard for one day and copper for four hours [13]. The survival of corona virus is largely dependent upon humidity and temperature [14] where cold temperatures are considered as favorable for corona virus to survive for long times. Currently there is no vaccine or drug to fight against COVID-19 virus, however rapid developments are on the way and may be available in short

times. The most appropriate option of treatment of COVID-19 disease is human convalescent serum.

About 4.33 million individuals have been recovered from COVID-19 disease who can donate serum containing immunoglobin. Antibody therapy is related to immunotherapy which is applied with actively and passively. A specific amount of drug is applied to infected body agent specific anti-agents to activate immune system to produce long term antibodies while passive antibody therapy is concerned with consistent antibody concentration, therefore, passive antibody therapy provides immediate immunity to an infected person.

Viral neutralization is the most adopted mechanism in passive antibody therapy to cure COVID-19, however phagocytosis and cytologist-based mechanisms are also available convalescent sera obtained from COVID-19 recovered patients is the most appropriate deposit antibodies used for treatment of SARS cov-2. Various efforts are on the way to prepare antibodies again COVID-19 but only antibody which can be used immediately is the human convalescent sera. Antibodies work to neutralize inoculum and to modify the inflammatory response which may be achieved with human immune responses [15]. It is observed that passive antibody therapy is effective to apply immediately as soon as the symptoms appear but it becomes less effective as the time passes like on third or fourth day [16]. An appropriate amount of therapy is applied to suspected person which will circulate in tissues and blood to provide agitation against certain infections.

Convalescent has been widely used for curing viral diseases including measles [17,18] influenza [19], and poliomyelitis [20] and mumps [21]. Convalescent sera behaved differently for a variety of viral diseases and results proved different efficiency for each disease. H1N1 2009 virus was treated through convalescent serum antibody during 2009-2010 [22]. Ebola epidemic was also treated through convalescent serum antibody during 2013. The treatment of H3N1 [23] and avian flu H7N9 [24] outbreaks were also cured by serum transformation which kept alive all patients.

Middle East respiratory syndrome and SARS 1 were two epidemics of twenty first century which resulted in high mortality. There was not any effective therapy for curing both epidemics but convalescent serum was used for their treatments [25]. SARS attacked three patients in Taiwan and all were survived by injecting 500ml of convalescent serum. Similarly, three patients struck by MERS in South Korea were cured by applying convalescent serum which resulted in neutralizing antibody [26]. The titer responses are not same in everybody recovered from viral disease but vary from person to person. An analysis was performed in this regard by collecting 99 samples from recovered persons and found that12 of them had absence of antibody [27]. It suggests that everybody does not have equal number of antibodies, it is also observed that the concentration of antibodies changes with time, as some has high and some has low titer response [22-27]. Convalescent serum has been excessively used in China for treatment of COVID-19 which reduced virus up to the extent that life started running normally after a long-term lockdown.

COVID-19 sera are useable for both treatment of diseases or infections. In prophylactic mode, serum prevent infection to whom who are highly vulnerable to disease such kind of treatment was already used to cure various kind of diseases e.g. rabies and

hepatitis B which were treated with hepatitis rabies immune globulin (HR1G) and hepatitis B immune globulin (HB1G) respectively. Mostly infants are hit by severe Respiratory Syncytial Uirus (RSU) which is also treated by passive antibody administration.

Passive administration is also relay and its risks are categorized in two ways; known and theoretical. The known risks are linked to transportation of blood substance which is associated to infection due to another disease agent, and the reaction of serum constituents such as serum sickness. Such kind of risks has become lower by adopting modern techniques of blood banking that screen out blood-borne pathogens. The theoretical risk includes the Antibody Dependent Enhancement (ADE) infection that involve the enhancement of disease due to existence of certain antibodies. A variety of mechanisms for ADE have been adopted and the results show that one type of corona virus may enhance the infection to viral stain [28]. A major theoretical risk is exposure of antibodies before SARS-COV-2 which prevents disease in such a way that infects the human's immune system and produce such individuals that cause reinfection. Both known and theoretical risks can be avoided once a vaccine is available.

Finally, the anecdotal and historical applications of convalescent serum recommends that it is safe to cure COVID-19, particularly aged persons, however a risk-benefit assessment must be executed before the application of convalescent serum.

Deployment of convalescent serum:

The deployment of convalescent serum is conducted in the sequential steps:

(1) Availability of donors who have recovered from this disease and are ready to donate serum.
(2) Modern blood banking facility to pressure serum.
(3) Availability of serological arrays to identify SARS-COV-2 and the biological arrays to compute viral neutralization.
(4) Laboratory to execute the assays.
(5) Chemical trials to examine immune responses.
(6) Regulatory compliance institutional approval depending upon location. Various pharmaceutical companies are trying to generate purified high titer of neutralizing antibodies against COVID-19 but it would be available after many months and the available human sera is the most immediate solution of COVID-19.

The antibody isolation and the serum preparation may be conducted through apheresis from the blood of the COVID-19 recovered in individual if regulatory permissions are on the way. Today nurses, physicians and the health care providers have to face known COVID-19 cases and are also infected. They are sent to quarantine. If such individuals are treated with convalescent serum, quarantine period may be avoided, and it would be helpful to perform their duties. Finally, convalescent serum is the only option that can be used as the most secure and immediate action before preparation of COVID-19 vaccine.

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