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Innovation The Research Concept

Is Plasma Therapy Trustworthy for COVID-19?

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Abstract

COVID-19 is highly pandemic disease spreading worldwide. In this disease, most of the people suffered from disease recover at home without any treatment. In present situation, we don't have any specific treatments for COVID-19. In the meanwhile, all over the globe scientists are working hard to develop effective treatments. Therapies that are under exploration include use of drug Hydroxychloroquine and antibodies from people who have recovered from COVID-19. Convalescent plasma - literally plasma from recovered patients - has been used for more than 100 years to take care of a diversity of illnesses from measles to polio, chickenpox, Ebola virus disease, Spanish flu and MERS. After countries like China and the US, India has given a go ahead for conduct a clinical trial for convalescent plasma therapy. The therapy has been used experimentally in the past and so has become a ray of hope in the fight against the novel corona virus pandemic. This therapy's concept is simple and is based on the principle that the blood of a patient who has recovered from Covid-19 contains antibodies with the specific ability of fighting novel corona virus. The theory is that the recovered patient's antibodies, once ingested into somebody under treatment, will begin targeting and fighting the novel corona virus in the second patient. But this treatment is in very initial stage associated with some risk factors like inadvertent infection might get transferred to the patient along plasma and making Covid-19 patient more susceptible to subsequent re-infection. However, researcher's thoughtfulness that it's too early to think of plasma therapy as an effective treatment.

Keywords: COVID-19, Plasma Therapy, Treatment, World, India.

Introduction

According to WHO recent reports SARS-CoV-2 virus induced corona virus disease 2019 (COVID-19) is highly pandemic disease influencing more than 200 countries worldwide. According to recent reports of John Hopkins University (cited 2020 June 5) approximately 6.6 million peoples are suffering from SARS-CoV-2 virus all over the globe, causing 391,261 deaths according to recent updates. The viral disease which has started from Wuhan city of China (Rothan & Byrareddy, 2020) has affected almost all the countries of the continent and according to recent updates, twenty eight percent cases are reported from USA alone followed by Brazil and Russia, most of the cases from European countries like United Kingdom, Spain and Italy (John Hopkins University, cited 2020 June 5). In India total numbers of cases reported are 226,770 and 6348 deaths, number of cases increasing day by day (Ministry of India, cited 2020 June 5). Most of the people suffering from this virus don't require any treatment but also in the serious cases no proper treatment protocol is present. Nowadays Convalescent plasma therapy is new ray of hope in the treatment. More recently, plasma-derived therapy was used to treat patients during outbreaks of Ebola and many viral disease in past also.

Objective of the Study

Following are the objective of the study:

1. To recognize the history of plasma therapy used in other viral infection.
2. To understand how plasma therapy is effective and beneficial for covid-19 patients
3. To understand the limitation associated with it.

Plasma Therapy from The Past

From the history of medical treatment, we can found that it is not the first time convalescent plasma therapy is being considered for any viral infection treatment. In 1918, when H1N1 influenza virus (Spanish flu) pandemic was reported (Garraud, *et.al.,* 2016), the therapy was used

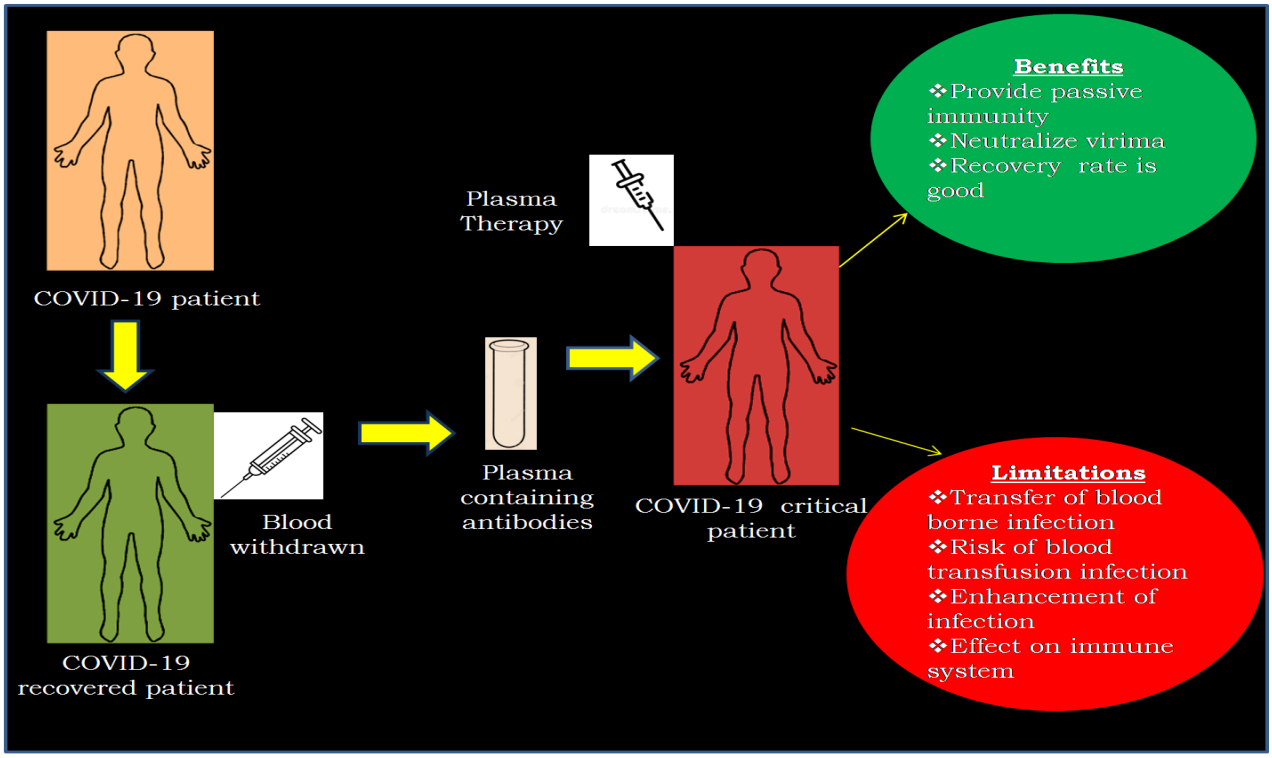
experimentally. During the SARS outbreak in 2002, several studies have shown that convalescent plasma therapy resulted in earlier recoveries in patients compared to regular drugs (Cheng *et.al*., 2005). Similarly, during the H1N1 outbreak in 2009, plasma therapy studies revealed that it helped to reduce respiratory troubles and lowered the risk of mortality (Hung *et.al.,* 2011). In 2014, the World Health Organisation (WHO) had recommended the use of convalescent plasma therapy to treat patients of Ebola virus disease. But this therapy did not turn out to be of much help in the case of Ebola virus (Van Griensven *et.al.,* 2016). In 2015, Middle East respiratory syndrome (MERS), which is also caused by a coronavirus patients were treated with convalescent plasma therapy (Aarbi *et.al.,* 2011). Beside that plasma can also be used in treating many health hazards, especially autoimmune diseases where body produces antibodies against its cells (Nydegger & Sturzenegger, 2001). Scientists are working on vaccine but it may take some time, but the present scenario required treatment. Plasma therapy found to be ray of hope from the previous studies.

How Plasma Therapy Works?

Plasma is the liquid component of the blood that holds the various type blood cells in suspension. Plasma is important for maintain normal blood pressure, pH balance in the body, key role in blood clotting and immunity (Component of blood). Antibodies are the glycoproteins present in the plasma of the blood, which protect us from foreign pathogens, some blood cells act as memory cell and store information for the future. Later on when they encounter the same kind of pathogens over again they recognize and take less time to produce the same antibodies (Antibody Basics).

The symptom of covid-19 varies from mild to severe depending upon patient to patient (Cascella, *et.al.,* 2020). Some of the patient who fought and recovered from coronavirus might have developed antibodies in their body, which can be a boon for others. Vaccination may take time to develop, but the call for the hour is to treat the patient, which can be potential by using these antibodies by plasma therapy (Figure 1).

Figure1: Diagrammatic representation of convalescent plasma therapy with its benefits and limitations.



Plasma therapy in Covid-19

Plasma therapy's has already under trials in many countries for the treatment for covid-19. China where covid-19 patient were reported first time, clinical trials of convalescent plasma therapy were performed (Chen et.al.,2020; Duan et.al.,2020; Syal, 2020; Ye *et.al*.,2020; Zeng *et.al*.,2020) and found to be helpful to reduce virema and mortality rate. Other Asian country where this therapy was used was Korea (Ahn *et.al.,* 2020) and found to be successful. In USA also FDA approves the use of convalescent plasma therapy for critical covid-19 patients (Tanne, 2020).

After successful clinical trials of convalescent plasma therapy in China and USA, Indian government has given a permission to conduct clinical trial for convalescent plasma therapy in critical covid-19 patients. On the other hand, some state governments of India, including Rajasthan, Punjab, Maharashtra and Delhi have shown enthusiasm for plasma therapy treatment, and Indian government has permitted to execute plasma therapy on a limited trials.

Demerits Associated With Plasma Therapy

Above and beyond speaking about the achievement of the convalescent plasma therapy, the study by John Hopkins immunologists stated some of the risks associated with it:

1. The most common disadvantage includes the transfer of blood borne infectious diseases like Human immunodeficiency virus (HIV),hepatitis A, B & C, Methicillin-resistant *Staphylococcus* aureus (MRSA), dengue etc (Marano *et.al., 2016).*
2. It can increase the risk of blood transfusion infections like acute lung injury, dyspnea, hypotension, non-hemolytic febrile, infectious transfusion reaction, etc (MacLennan & Barbara, 2006).
3. The incidence of allergic transfusion reactions (ATR) may increase with plasma transfusion during this treatment etc (MacLennan & Barbara, 2006).
4. During plasma transfusion another associated problem include circulatory overload which characterized by acute respiratory distress, hypoxia, and pulmonary edema temporally associated with transfusion (Skeate & Eastlund, 2007).
5. If plasma therapy fail in some patients and can result in an advanced type of the virus.
6. This passive immunization through this therapy can suppress body's natural immune response, leaving a Covid-19 patient susceptible to consequent re-infection (WHO, Immunity passport, 2020).
7. Pathogen inactivation method can also reduce in the number of coagulation factors which may affect the bleeding time (Minno et.al., 2017).

Conclusion

Other treatment protocols like hydroxychloroquine, azithromycin (Gautret *et.al.,* 2020) and many more are still in clinical trials. Convalescent plasma therapy has sparked a ray of optimism. On the other hand, scientist's trust that it's too early to believe of plasma therapy as a successful treatment. In India the Health Ministry is against the use of convalescent plasma therapy, treatment of coronavirus patients is at an experimental stage and has the potential to cause life-threatening complications. Beside that some questions are still going on, for example what is the most select dose of antibodies? At what point during a patient's illness should treatment be given? Which patients will be benefited?

The sample sizes in the Covid-19 plasma therapy trials are too small to disembark at exact conclusions.

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