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Plasma Therapy: Cure for COVID-19

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Abstract

COVID-19 has been proved to be biggest disaster of 21st century and it is quite different from any other calamity on human beings. Lockdown strategy has been implemented by almost all countries to stop transmission of this deadly novel corona virus. Till the date, no vaccine is available to achieve permanent cure of COVID-19. Although, many research groups are engaged in continuous search of the promising treatment but still it needs long stand. Among the techniques of medical sciences, plasma therapy has come up with optimistic solution and showed tremendous recovery of corona affected patients under small trials. Plasma of recovered patients has saved many lives from deadly infections like HIV, Ebola and Corona. In the present article, efforts have been made to elaborate effectiveness of plasma therapy with its convenience and limitations.

Introduction

COVID-19 (Corona virus Disease 2019) is a transmissible disease caused by novel corona virus and commonly known as severe acute respiratory syndrome CoV-2 (SARS-CoV-2). Human corona virus was first described by Tyrrell and Bynoe in 1965; it caused upper respiratory tract infection and common fever. Till 2003, five new corona viruses were recognized and more than 8,000 peoples were infected and 774 deaths were occurred worldwide. According to experts, SARS-CoV-2 developed in bats where as some experts has denied the origin of corona virus from bats. Recent novel corona virus has taken thousands of lives and still world seems disabled to find out cure. Several options are being analyzed to find out cure for COVID-19. There are few antiviral treatments are available, which has limited potency on COVID-19. However, oldest techniques are being examined likes plasma therapy. Plasma was firstly discovered by W. Crookes in 1879 and later in 1929; Irving Langmuir named it as "plasma". Plasma therapy is based on antibodies found in the blood of individuals who have recovered from an infections, use of this plasma to treat infected patients is refers to plasma therapy.

COVID-19 and Plasma Therapy

COVID-19 was firstly identified in Wuhan City, China. On 30th January 2020, World Health Organization (WHO) announced outbreak of COVID-19 as a global health emergency. Corona viruses are the vast group of viruses belonging to the Nidovirales order, Coronaviridae family and subfamilies viz. Coronavirinae and Torovirinae. Corona viruses contain non-segmented, positive-sense RNA genome of about 30 kb. S protein (spike) of the virus interacts with receptors of the host cell that helps allowing genetic material of virus to get inside the cell. After the insertion, production of viral proteins

get started with the help of host's translation machinery and afterwards takes rule of the host cell thereby making the host sick. Till 30th May 2020, 60 million positive cases have been reported and unfortunately 3.66 lakhs deaths have occurred worldwide. In India, more than 1.73 lakhs persons have been affected and 4,980 lives were taken by this novel virus as on 30th May 2020.

Several countries are taking efforts to develop vaccine against COVID-19 but still it needs time for development and clinical trials. Although plasma therapy is not new in medical science, it has come as eminent strategy to combat corona virus at current situation. Plasma is a yellowish liquid component of the blood. Plasma constitutes around 55% of human blood volume, whereas rest 45% of blood includes RBCs (red blood cells), WBCs (white blood cells) and platelets. Plasma of blood is itself made up of 90% water and carries protein, minerals, hormones and nutrients. The lead function of plasma is to maintain normal blood pressure and to supply proteins to various body parts for blood clotting and immunity development. But, plasma therapy is based on the presence of antibodies that show resistance to the specific disease. Success of plasma therapy has precedence during the 1918 Spanish flu pandemic, SARs and H1N1 outbreak during 2003 and 2009, respectively. The outcome of treatment of SARs patients with convalescent plasma therapy was surprisingly good during 2003. In 2009, H1N1 was at its high outbreak level so for the experimental study out of ninety three high risk individuals twenty patients were treated with plasma therapy and it significantly lowered the mortality than untreated patients. Moreover, WHO has suggested to use convalescent plasma therapy to cure Ebola virus disease. Like UK many countries have initiated plasma therapy trials to control COVID-19 outbreak. Indian council of medical research has allowed 21 institutions to be part of plasma therapy trials. As per the report by Hindustan Times dated 22nd May 2020, Sassoon hospital claims first successful plasma therapy for corona affected patient in Pune. Furthermore, private hospital from Delhi said that they have treated patient having severe symptoms of COVID-19 with plasma therapy and initial improvement was observed. Moreover, according to the report of The New Indian Express dated 2nd June 2020, critically ill COVID-19 patient in Karnataka cured after plasma therapy. Similarly, there have been reports of ending this novel disease by plasma therapy worldwide.

The procedure of therapy is easy to understand and it solely based on transfer of antibodies from donor to recipient. When an individual is negative after infection with any disease implies such individual has developed antibodies to resist that causative agent. In case of COVID-19, similar approach has been figured out using plasma therapy. For the application of plasma treatment, firstly donor of plasma is got selected and this donor should test negative twice for COVID-19. Then

two weeks interval is necessary to consider individual as a donor followed by standard testing of blood for hepatitis B, hepatitis C and HIV, if donor found negative for these tests too then third test for COVID-19 is been carried out which must be negative. Complete medical history of that person must be clear. Now, Donor is connected with machine known "Plasmapheresis" for the procedure called "Plasma Exchange". This procedure split out plasma content from the blood. Generally, 200 ml of plasma is transferred to the patient. Separated plasma can be stored in -30°C and given to patient whenever necessary. Response of given plasma therapy can be seen within one or two days in patient. In India, cost of this therapy is around 10-12 K including consumables. Plasma is collected on voluntary basis.

Regarding success of plasma therapy, it is not magic and doesn't have 100% success rate but it seems to be one of the better available options to fight with current situation. Besides benefits some risk are also associated with this technique like adverse reactions, transfer of unknown or intentional blood substances that increase in infection and suppression of natural immunity. The most common challenges to plasma therapy are transfusion related events, involving chills, fever, anaphylactic reactions, transfusion related acute lung injury, circulatory overload and hemolysis. Although it is not well established medical strategy but its result on small scale has showed its prominent effectiveness. Still further studies are needed to establish its efficacy at large scale. As of the date no method shows absolute accuracy and 100% recovery rate for COVID-19. Hence, it is always suggested that prevention is better than cure.

Conclusion

As novel corona virus has pulled down the world. Research personnel and healthcare at all extends are working on it to develop appropriate treatment but few major hurdles are blocking their way. As its name indicates, virus is novel, so no human being has natural immunity to fight with it. Instead of currently available solutions, plasma from recovered patient is seems as ray of hopes to cure COVID-19. Several nations have initiated their trials of plasma therapy to examine the effectiveness of it on corona affected persons and the results of their experimental trials has showed successful outcome. Along with effectiveness of plasma therapy, its limitations and challenges for large scale application must be taken into consideration. Likewise history and results of this treatment on several infections, plasma therapy is a hopeful cure for novel corona virus.

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