



Role of convalescent plasma therapy in new Coronavirus disease (nCOVID-19): A review

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ABSTRACT

Hitherto, there is no proper line of treatment for the new Coronavirus (nCOVID19). The development of unique antiviral drugs has taken precedence. Therapeutic neutralising antibodies (NABs) will be a significantly beneficial agent against nCOVID-19. Here the host immune responses to new Coronavirus discussed in this review provide strategy and further treatment and understanding of clinical interventions against nCOVID-19. Plasma therapy uses the antibodies found in the blood of people recovering (or convalesced) from an infection to treat infected patients. When an infection occurs, the body begins producing proteins specially made to kill the germ, called antibodies. Those antibodies coat specifically plasma in the blood of survivors, the yellow transparent liquid blood portion for months or even years. Recent research assesses plasma use from Convalescent patients of infected with nCOVID-19 as a possible preventive treatment. But it is not yet recommended as a line of treatment, and it is used as a clinical trial in the new Coronavirus in Indian population.

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INTRODUCTION

Several cases of unknown aetiological pneumonia have been confirmed in Wuhan, Hubei Province, China. Many of the patients worked or lived in

the wholesale market of local Huanan seafood, where live animals were also on sale. Extreme acute respiratory infection signs occurred during the early stages of this pneumonia, with some patients developing quickly acute respiratory distress syndrome (ARDS), severe respiratory failure and other serious complications. In January Coronavirus was identified in the central disease control and prevention, China. Isolates from the swab sample from the throat and labelled as coronavirus-2019. "A novel coronavirus was isolated from those patients who met the SARS case description" (Ksiazek *et al.*, 2003). This new Coronavirus is the primary pathogen of respiratory infection, which is spread globally within a few months. Now, many pieces of evidence said there is no treatment for this virus. In this review, we will plan to observe the role of plasma in Coronavirus. Though Plasma therapy is

not an established mode of treatment, it may evolve as one and increase the survival rate of those who get infected by Coronavirus. Plasma therapy may prevent either by viral disassembly from the host cells or by viral release when the virus enters the body. It is still not known how convalescent plasma enhances the outcome of the patients.

A severe-associated epidemic Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), Worldwide called as Coronavirus 2019 (COVID-19) by the World Health Organisation (WHO) emerged in India. "In December 2019, Wuhan City, China's capital of Hubei Province, became the centre of an unexplained cause of virulent pneumonia disease" (Evans *et al.*, 2020).

Within three months, the infection spread around the world and was characterised by WHO as a pandemic on 11 March 2020. For more than a century, Convalescent plasma treatment, successful adoptive immunotherapy, has been used to cure several viral infections. The CP therapy has been successfully used over the last two decades Treatment of the H1N1 pandemic with SARS, MERS and Effective implementation and safety (Ko *et al.*, 2018; Mingxiang *et al.*, 2020).

"As long as COVID-19 continues to spread, its power to modify the genome would likely increase. What concerns us more is that the 2019-nCoV, through the process of genome structure modification, may become fitter for humans to have a profound effect on those who have already escaped children and young people without a pre-existing condition" (Evans *et al.*, 2020; Li *et al.*, 2020; Saghazadeh and Rezaei, 2020).

According to WHO (Chen *et al.*, 2020a) "management of COVID-19 has mainly focused on infection prevention, case detection and monitoring and supportive care."

Research shows that convalescent plasma from patients who have recovered from viral infections can be used as a therapy without significant adverse effects occurring. Hence, evaluating the safety and efficacy of convalescent plasma transfusion in patients infected with SARS-CoV-2 may be worthwhile (Chen *et al.*, 2020b). There are rumours regarding plasma therapy as one of the lines of treatment in the patient of new Coronavirus. This review we will observe whether really the convalescent plasma can be used in the management in the patient of new Coronavirus.

MATERIALS AND METHODS

Study type observational

We retrospectively review the role of Convalescent plasma therapy in the new coronavirus myths. Facts of convalescent plasma therapy and many trials conducted in worldwide settings from new Coronavirus (nCovid -19).

RESULTS AND DISCUSSION

How the convalescent plasma work

Those who have recovered from COVID-19 have their blood containing antibodies to the disease. Doctors call the plasma convalescent. Researchers hope that persons with severe COVID-19 can be given convalescent plasma to boost their ability to fight the virus. The blood about 800 ml or so is obtained from the donor via the standard withdrawal process, screened for other pathogens, and if healthy, the plasma portion is extracted and then used for patient transfusion. Someone who has suffered from a disease that transport what are called neutralising antibodies that can help their immune system fight it off when extracted via plasma and transfused to those with the infection.

"The use of convalescent plasma was suggested as an observational treatment during Ebola virus outbreaks in 2014, and in 2015 a protocol was developed for the treatment of Middle East coronavirus respiratory syndrome with convalescent plasma" (Shen *et al.*, 2020).

Convalescent plasma therapy

Convalescent plasma therapy, commonly referred to as plasma therapy, is an experimental technique for the treatment of infection with Coronavirus. This is similar to passive immunisation, which is based on the idea that a healed coronavirus patient's blood contains antibodies capable of battling an infection. During this procedure, blood from a recovered patient with Coronavirus is transfused into a COVID-19 patient with a severe condition that may help to produce antibodies to the infection.

"Convalescent patients eligible for plasma donation should be invited to undergo plasma apheresis, pending general eligibility such as age 18 to 65 and weight not less than 50 kg. They recommend collecting plasma not earlier than 14 to 28 days after resolution of the symptoms. In most countries, eligibility criteria call for such a delay between cessation of the COVID-19 disease and donation of blood to ensure that infectiousness is not present. Moreover, as described earlier, such spacing will benefit Ab with increased affinity and therefore, hopefully, an optimised convalescent plasma" (Tiberghien *et al.*, 2020).

Can plasma therapy prevent Coronavirus?

There is multimillionaire question comes in the people's mind world-widely that, is this plasma therapy prevent the new Coronavirus and how it acts. In this treatment, a blood sample is received from a person who recovered from illness. The serum of the sample is isolated and screened for virus-neutralising antibodies. When infected by a pathogen, the immune systems develop antibodies, and these antibodies from healing patients are used in this cycle to cure other diseased people. Depending on the level of seriousness of the Covid-19 infection, immunity evolves at the Fortis Memorial Research Institute in Gurgaon according to Infectious Diseases Consultant. Resistance occurs early in asymptomatic patients or those with mild symptoms, and then persist in patients with Covid-19 who are severely and critically ill. The presence of high Neutralising Antibody Titer (NAT) was found in the patients who had recovered from this infection. This presence of NAT provided an opportunity to research its role to treat critically ill Covid patients (Wu *et al.*, 2010).

How Convalescent Plasma therapy effective

Many studies are claiming convalescent plasma therapy can be used in the patient of Coronavirus effectively. "The Chinese study found the therapy to be effective in treating coronavirus patients, albeit on small sample size. In this trial, ten adult COVID-19 patients with severe symptoms were administered a 200 ml dose of convalescent plasma. With the disappearance of the virus reported among seven patients, the patients experienced significant improvement without any serious adverse side-effects. The sick person only gets temporary passive immunisation through this therapy" (Xu *et al.*, 2020).

The extraordinary thing is that three severely ill COVID-19 Indian-American patients in Houston also show signs of improvement after they have been transfused from recovered patients with the blood plasma. "According to the US Food and Drug Administration (FDA), based on previous experience with respiratory viruses and data from China, the therapy has the potential to reduce the severity or shorten the length of disease caused by COVID-19" (Ksiazek *et al.*, 2003).

Few studies show convalescent plasma treatment can be used in the treatment of the patient having severe H1N1 infection. In their research, they show that it reduced a load of virus effectively and reduce mortality by damping the cytokine response (Hung *et al.*, 2011).

The Indian Medical Research Council (ICMR) gave Kerala the nod for the plasma therapy. Kerala is the first state in India to get permission to a clinical

trial on this patient. ICMR has not recommended this as a treatment option outside of clinical trials so far. Globally, close to five lakh successful cases have entirely recovered. Therefore, if the therapy is proven to be effective, a sufficient supply of antibodies could be available to critically ill patients. As the world expects a vaccine with bated breath against nCOVID-19, this remains to be seen if this approach will provide a much-needed shortcut in seeking a cure.

Reality of line of management regarding new Coronavirus

No specific treatment is recommended on new Coronavirus (nCOIVD19) because of the absence of evidence. Most importantly, the current guidelines emphasise that systematic corticosteroids should not be given routinely for the treatment of nCOVID-19, which was also the recommendation in a Comment in The Lancet (Russell *et al.*, 2020).

Neutralising Activity of Convalescent Plasma therapy against new Coronavirus (COVID-19). "The neutralising activity against SARS-CoV-2 was evaluated by classical plaque reduction test using a recently isolated viral strain" (Zhou *et al.*, 2020). "Among the first batch of CP samples from 40 recovered COVID-19 patients, 39 showed high antibody titers of at least 1:160, whereas only one had an antibody titer of 1:32. This result laid the basis for our pilot clinical trial using CP in severe patients" (Duan *et al.*, 2020).

The effect of the immune response to antibodies in protecting against SARS-CoV pulmonary pathogenesis is controversial (Zhou and Zhao, 2020).

CONCLUSION

The proper response to the virus is unique to each individual; some may have more antibodies in their blood than others. So not all convalescent plasma from different donors can be seen as equally useful. Furthermore, the fewer antibodies in one's blood, the longer it has been since one healed from the infection. This is conducted as clinical trials not the line of treatment in the patients of new Coronavirus (nCOVID-19).

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Conflict of Interest

The authors declare that they have no conflict of interest.

REFERENCES

- Chen, H., Guo, J., Wang, C., Luo, F., Yu, X., Zhang, W., Li, J., Zhao, D., Xu, D., Gong, Q., Liao, J., Yang, H., Hou, W., Zhang, Y. 2020a. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *The Lancet*, 395:30360–30363.
- Chen, L., Xiong, J., Bao, L., Shi, Y. 2020b. Convalescent plasma as a potential therapy for COVID-19. *The Lancet Infectious Diseases*, 20(4):398–400.
- Duan, K., Liu, B., Li, C., Zhang, H., Yu, T., Qu, J., Zhou, M., Chen, L., Meng, S., Hu, Y., Peng, C., Yuan, M., Huang, J., Wang, Z., Yu, J. 2020. Effectiveness of convalescent plasma therapy in severe COVID-19 patients. *Proceedings of the National Academy of Sciences*, 117(17):9490–9496.
- Evans, A. G., Mwangi, J. M., Pope, R. W., Ivanic, M. G., Botros, M. A., Glassman, G. E., Pearce, F. B., Kassis, S. 2020. Platelet-rich plasma as a therapy for androgenic alopecia: a systematic review and meta-analysis. *Journal of Dermatological Treatment*, pages 1–14.
- Hung, I. F., To, K. K., Lee, C. K., Lee, K. L., Chan, K., Yan, W. W., Liu, R., Watt, C. L., Chan, W. M., Lai, K. Y., Koo, C. K., Buckley, T., Chow, F. L., Wong, K. K., Chan, H. S. 2011. Convalescent Plasma Treatment Reduced Mortality in Patients With Severe Pandemic Influenza A (H1N1) 2009 Virus Infection. *Clinical Infectious Diseases. Oxford Academic*, 52(4):447–456.
- Ko, J.-H., Seok, H., Cho, S. Y., Ha, Y. E., Baek, J. Y., Kim, S. H., Kim, Y.-J., Park, J. K., Chung, C. R., Kang, E.-S. 2018. Challenges of convalescent plasma infusion therapy in Middle East respiratory coronavirus infection: a single centre experience. *Antiviral Therapy*, 23(7):617–622.
- Ksiazek, T. G., Erdman, D., Goldsmith, C. S., Zaki, S. R., Peret, T., Emery, S., Tong, S., Urbani, C., Comer, J. A., Lim, W., Rollin, P. E., Dowell, S. F., Ling, A.-E., Humphrey, C. D., Shieh, W.-J. 2003. A Novel Coronavirus Associated with Severe Acute Respiratory Syndrome. *New England Journal of Medicine*, 348(20):1953–1966.
- Li, Y., Ding, H., Liu, L., Song, Y., Du, X., Feng, S., Wang, X., Li, Xiaobing, Wang, Z., Li, Xinwei, Li, J., Wu, J., Liu, G. 2020. Non-esterified Fatty Acid Induce Dairy Cow Hepatocytes Apoptosis via the Mitochondria-Mediated ROS-JNK/ERK Signaling Pathway. *Frontiers in Cell and Developmental Biology*, 8:245–245.
- Mingxiang, Y., Dian, F., Ren, Y., Wang, F., Wang, D., Zhang, F., Xia, X., Tangfeng, L. 2020. Treatment with convalescent plasma for COVID-19 patients in Wuhan, China. *Journal of Medical Virology*.
- Russell, C. D., Millar, J. E., Baillie, J. K. 2020. Clinical evidence does not support corticosteroid treatment for 2019-nCoV lung injury. *The Lancet*, 395(10223):473–475.
- Saghazadeh, A., Rezaei, N. 2020. Towards treatment planning of COVID-19: Rationale and hypothesis for the use of multiple immunosuppressive agents: Anti-antibodies, immunoglobulins, and corticosteroids. *International Immunopharmacology*, 84:106560–106560.
- Shen, C., Wang, Z., Zhao, F., Yang, Y., Li, J., Yuan, J., Wang, F., Li, D., Yang, M., Xing, L., Wei, J., Xiao, H., Yang, Yan, Qu, J. 2020. Treatment of 5 Critically Ill Patients With COVID-19 With Convalescent Plasma. *JAMA*, 323(16):1582–1582.
- Tiberghien, P., Lamballerie, X., Morel, P., Gallian, P., Lacombe, K., Yazdanpanah, Y. 2020. Collecting and evaluating convalescent plasma for COVID-19 treatment: why and how? *Vox Sanguinis*.
- Wu, J. T., Lee, C. K., Cowling, B. J., Yuen, K. Y. 2010. Logistical feasibility and potential benefits of a population-wide passive-immunotherapy program during an influenza pandemic. *Proceedings of the National Academy of Sciences*, 107(7):3269–3274.
- Xu, X., Ong, Y. K., Wang, D. Y. 2020. Role of adjunctive treatment strategies in COVID-19 and a review of international and national clinical guidelines. *Military Medical Research*, 7(1):7–7.
- Zhou, G., Zhao, Q. 2020. Perspectives on therapeutic neutralizing antibodies against the Novel Coronavirus SARS-CoV-2. *International Journal of Biological Sciences*, 16(10):1718–1723.
- Zhou, P., Yang, X. L., Wang, X. G., Hu, B., Zhang, L., Zhang, W., Si, H. R., Zhu, Y., Li, B., Huang, C. L., Chen, H. D., Chen, J., Luo, Y., Guo, H., Jiang, R. D. 2020. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*, 579(7798):270–273.