



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Disponible en ligne sur

ScienceDirect  
www.sciencedirect.com

Elsevier Masson France

EM|consulte  
www.em-consulte.com



Short communication

## Locally harvested Covid-19 convalescent plasma could probably help combat the geographically determined SARS-CoV-2 viral variants



Manish Raturi<sup>a,\*</sup>, Anuradha Kusum<sup>b</sup>, Mansi Kala<sup>b</sup>, Garima Mittal<sup>c</sup>, Anita Sharma<sup>d</sup>, Naveen Bansal<sup>e</sup>

<sup>a</sup> Department of Immunohematology and Blood Transfusion, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Swami Ram Nagar, Jolly Grant, 248016 Dehradun, Uttarakhand, India

<sup>b</sup> Department of Pathology, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Swami Ram Nagar, Jolly Grant, 248016 Dehradun, Uttarakhand, India

<sup>c</sup> Department of Microbiology, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Swami Ram Nagar, Jolly Grant, 248016 Dehradun, Uttarakhand, India

<sup>d</sup> Department of Biochemistry, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Swami Ram Nagar, Jolly Grant, 248016 Dehradun, Uttarakhand, India

<sup>e</sup> Department of Transfusion Medicine, VCSG Government Institute of Medical Science and Research, Srinagar, Uttarakhand, India

### ARTICLE INFO

#### Article history:

Available online 7 May 2021

#### Keywords:

Vaccine impact  
Blood safety  
Pandemic  
Blood donors  
Donor registry  
Viral variants  
COVID-19 convalescent plasma

### ABSTRACT

The only effective way to provide individuals with herd immunity against the novel coronavirus [SARS-CoV-2] is to administer an effective vaccine that will help check the current pandemic status. In India, the central drugs standard control organization (CDSCO) has granted the emergency-use authorization [EUA] to three vaccines namely, Covishield (live vaccine, Oxford AstraZeneca, United Kingdom being manufactured by the Serum Institute of India), Covaxin (inactivated vaccine, Bharat Biotech, India) and Sputnik V (live vaccine, Gamaleya, Russia). However, there is a rising need for the efficacy of the vaccines to be proven against the “SARS-CoV-2 viral variants.” Also, human plasma is polyclonal in nature with an inherent propensity to identify multiple epitopes of either an antigen or pathogen. With this context in mind, the researchers hypothesize that using COVID-19 convalescent plasma [CCP] harvested from the locally recovered individuals [i.e. potential CCP donors] may be particularly beneficial in combating not only the founder SARS-CoV-2 virus but also the geographically determined SARS-CoV-2 variants among the regionally affected COVID-19 patients.

© 2021 Société française de transfusion sanguine (SFTS). Published by Elsevier Masson SAS. All rights reserved.

## 1. Background

In December 2019, the presence of a novel coronavirus [nCoV] was reported in Wuhan, China [1]. It is known to cause coronavirus disease 2019 [COVID-19], which has been renamed Severe Acute Respiratory Syndrome Coronavirus 2 [SARS-CoV-2]. Furthermore, currently, in the absence of any definite cure, the most effective way to combat the COVID-19 pandemic is to develop herd immunity in the population through a safe and effective vaccine [2]. All the viruses, including SARS-CoV-2, evolve with time. In fact, when a virus replicates or makes copies of itself, it sometimes changes a little bit, which is a normal phenomenon. These changes are termed “mutations”. A virus with one or more of these novel muta-

tions is hence referred to being a “variant” of the founder strains. Likewise, SARS-CoV-2 variants have emerged [3–5] and elude the antibodies elicited by the ancestral or founder SARS-CoV-2 strains. Additionally, with the multiple genomic sequence data of the nCoV already available since January 25th, 2020, leading pharmaceutical companies, the world over, in turn, have started working on the clinical trials to produce vaccines against this nCoV [6]. In India, the central drugs standard control organization (CDSCO) has granted the emergency-use authorization [EUA] to three vaccines namely, Covishield (live vaccine, Oxford AstraZeneca, United Kingdom being manufactured by the Serum Institute of India), Covaxin (inactivated vaccine, Bharat Biotech, India) and Sputnik V (live vaccine, Gamaleya, Russia) [7]. Additionally, based on priorities for the high-risk groups towards infection and transmission such as elderliness, healthcare workers, taskforce distribution phase plans, including the Indian government’s commitment, a mass vaccination program is already being rolled out in India. Again there are

\* Corresponding author.  
E-mail address: manishraturi@srhu.edu.in (M. Raturi).

challenges regarding the blood supply management as well as vaccinated donor's acceptance as per Indian studies [8,9]. To add, many vaccines under the phase-III trial have already claimed to demonstrate their efficacy as high as 95% against the original structure of the nCoV. However, there is a rising need for the efficacy of the vaccines to be proven against these "viral variants." Also human plasma is polyclonal in nature with an inherent propensity to identify multiple epitopes of either an antigen or pathogen. With this background, we hypothesize that harvesting COVID-19 convalescent plasma [CCP] from locally recovered and seroconverted individuals [i.e. the potential CCP donors] might be specifically beneficial for the regionally affected COVID-19 sufferers to help fight against the geographically determined albeit emerging SARS-CoV-2 variants.

### 1.1. SARS-CoV-2 variant formations and their impact on a local community

On wide circulation amidst a locally confined population, the likelihood of the mutations in the founder virus strain increases drastically. Once there is an increase in the opportunities for a virus to spread, the more it replicates undergoing some changes at every step. Although, most viral mutations have little to no impact on its virulence and or causing disease. However, depending on where the changes are located in its genetic material or the outer structure [i.e. the RBD region of spike proteins], its properties, such as the grade of transmission or severity may get affected. Through natural selection, strains that are less susceptible to host antibodies start becoming much more prevalent ones and gradually displace the founder strain. Undoubtedly, having got vaccinated does not make an individual 100% immune against the viral variants. Additionally, data continues to be collected and analyzed on the novel variants of the COVID-19 virus. In fact, the world health organization [WHO] is working keenly with global researchers and scientists to understand how these variants could affect the virulence of the virus including their impact on the effectiveness of vaccines (if any). With the ever-evolving knowledge of nCoV, most scientists believe that the vaccines that are currently in development and a few that have been approved should be able to protect against the variants because these vaccines elicit a fairly broad immune response, in the form of a host of antibodies and cell-mediated immune responses [9].

## 2. How could CCP help against viral variants?

As a potent anti-viral, CCP can help neutralize the nCoV [1]. In fact administration of monoclonal Ab combinations (oligoclonal "cocktails") can revoke the emergence of resistant viruses, as has already been demonstrated for SARS-CoV-2 mAbs [10]. CCP on the other hand is polyclonal in nature and contains antibodies with paratopes against various epitopes of a pathogen or protein giving it a chance to neutralize a wide variety of pathogens. Further, individuals who recover from variant COVID-19 are likely to generate CCP capable of neutralizing SARS-CoV-2 variants [11]. Hence, variant CCP from a locally determined region could help become a potential antidote for variant SARS-CoV-2 of multiple specificities in a geographically defined area. Therefore, as SARS-CoV-2 variant strains spread in human populations, the locally harvested CCP units will be especially efficacious for the regional patients or carriers harbouring these SARS-CoV-2 variants.

### 2.1. Prevention of the emerging novel variants of the original COVID-19 virus

As we enter the second quarter of 2021, the world is still in a situation where new evidence becomes available every day and we're learning new things. But at the same time, we have to act

in real-time to protect ourselves. The only effective way to check the spread at the source remains the key. Current measures to reduce transmission include frequent hand washing, wearing a mask, respiratory etiquette, physical distancing, good ventilation and avoiding crowded places or closed settings. All these measures will continue to work against emerging variants by reducing the viral transmission and hence also reducing the opportunities for the virus to mutate. Scaling up the manufacturing of vaccines and rolling out vaccination program as early and widely as possible will also be a critical way of helping to protect people from the risk of new variants. However, priority should be given to vaccinating high-risk groups such as the elderly or people with comorbidities everywhere to maximize global protection against the risk of acquiring the infection. We may rightly say that "I am safe only if everyone is safe".

### 2.2. The future course of action

Detection of novel variants [3–5] has emphasized the need for sequence-based strain surveillance, to promptly detect mutations to prevent their spread. WHO further advises countries, where feasible, to increase the routine, systematic sequencing of SARS-CoV-2 viruses to better understand the SARS-CoV-2 transmission and to monitor for the emergence of variants. This sequence data should then be shared internationally through community accessible databases. However, in countries without sequencing capacity, CCP recovered and harvested from a local seroconverted person could help fight against the geographically determined novel variants provided CCP administration is initiated before the development of the cytokine storm in the sufferer.

## 3. Conclusion

To sum up, "vaccination for all" is a desirable need of the hour. In fact, modifying COVID-19 vaccines would probably be the most straightforward way of dealing with SARS-CoV-2 variants. Until this happens, the use of universal infection prevention strategies in conjunction with building the local CCP donor registry through voluntary camps and having a sufficient inventory of AB-type harvested CCP in a regional blood centre might help address the fight against the SARS-CoV-2 variants.

## Funding and resources

Swami Rama Himalayan University/HIMS/RC/2021/019/PIN/Blood Transfusion/2021/01 dated 17.02.2021.

## Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional ethics committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Institutional ethical approval was sought and obtained [Ref No: HIMS/RC/2021/34 date of sanction 04-03-2021].

## Disclosure of interest

The authors declare that they have no competing interest.

## References

- [1] Sahu KK, Mishra AK, Raturi M, Lal A. Current Perspectives of convalescent plasma therapy in COVID-19. *Acta Biomed* 2020;91(4):e2020175. <http://dx.doi.org/10.23750/abm.v91i4>. Published 2020 Nov 10.

- <https://www.mattioli1885journals.com/index.php/actabiomedica/article/view/10681>.
- [2] Randolph HE, Barreiro LB. Herd Immunity: Understanding COVID-19. *Immunity* 2020;52:737–41.
  - [3] Rambaut A, Loman N, Pybus O, et al. Preliminary genomic characterisation of an emergent SARS-CoV-2 lineage in the UK defined by a novel set of spike mutations. *Virological.org* 2020 [Internet] Available from: <https://virological.org/t/preliminary-genomic-characterisation-of-an-emergent-sars-cov-2-lineage-in-the-uk-defined-by-a-novel-set-of-spike-mutations/563>.
  - [4] Tegally H, Wilkinson E, Giovanetti M, et al. Emergence and rapid spread of a new severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) lineage with multiple spike mutations in South Africa. *medRxiv* 2020 [Preprint] 2020.12.21.20248640v1. Available from: <https://www.medrxiv.org/content/10.1101/2020.12.21.20248640v1>.
  - [5] Faria NR, Claro IM, Candido D, et al. Genomic characterisation of an emergent SARS-CoV-2 lineage in Manaus Preliminary findings. *Virological.org* 2020 [Internet] Available from: <https://virological.org/t/genomic-characterisation-of-an-emergent-sars-cov-2-lineage-in-manauas-preliminary-findings/586>.
  - [6] Park AK, Kim IH, Kim J, Kim JM, Kim HM, Lee CY, et al. Genomic Surveillance of SARS-CoV-2: Distribution of Clades in the Republic of Korea in 2020. *Osong Public Health Res Perspect* 2021;12:37–43.
  - [7] Available from: <https://qz.com/india/1951939/how-india-approved-bharat-biotech-s-covaxin-vs-covishield/>. [Last accessed on 09 April, 2021].
  - [8] Raturi M, Kusum A. The blood supply management amid the COVID-19 outbreak. *Transfus Clin Biol* 2020;27:147–51.
  - [9] Bansal N, Raturi M. COVID-19 vaccination in the Indian blood donors: Adjudging the impact on the deferral period. Available from: <https://www.sciencedirect.com/science/article/pii/S1246782021000628>. [Last accessed on 13 April, 2021].
  - [10] WHO's Disease Outbreak News. Coronavirus disease (COVID-19). Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/media-resources/science-in-5/episode-20-covid-19-variants-vaccines> [Last accessed on 09 April, 2021].
  - [11] Baum A, et al. Antibody cocktail to SARS-CoV-2 spike protein prevents rapid mutational escape seen with individual antibodies. *Science* 2020;369:361–1018.