

# Factors Affecting Blood Donations among COVID-19 Plasma Donors at a Tertiary Care Hospital in Mandya, Karnataka, India

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## ABSTRACT

**Introduction:** Blood group antibodies are associated with susceptibility to Coronavirus Disease 2019 (COVID-19) infection among different blood groups. Factors such as age and male sex have been identified as risk factors for COVID-19 and disease severity.

**Aim:** Determination of blood groups of COVID-19 positive plasma donors and examine the association of blood groups with different sexes and age groups. Additionally, the study aims to investigate the factors that either prevent or motivate COVID-19 positive individuals to donate plasma.

**Materials and Methods:** This retrospective cross-sectional study analysed records from July 2020 to June 2021 at the Blood Bank of Mandya Institute of Medical Sciences, Mandya, Karnataka, India. The sample size included 115 COVID-19 plasma donors, selected using inclusion and exclusion criteria. Data on blood group, age, sex, and factors influencing plasma donation were recorded. The collected data was entered into a Microsoft Excel sheet and analysed using Statistical Package for Social Sciences (SPSS) version 20.0 statistical software, applying the Chi-square test.

**Results:** Among the 115 COVID-19 positive patients, 113 were males and two were females. The most commonly affected age group was between 31-40 years (44 donors), and the most commonly observed blood group was O+ve (44 cases). There was no significant association between gender and age group (p-value-0.299). Similarly, there was no significant association between blood group and age groups (p-value-0.730). When evaluating the reasons for donating blood, the majority of people (33 out of 115) mentioned that their family member required blood. The provision of transport facilities by the blood bank did not significantly increase the number of blood donations, as most people preferred using their own vehicles (44 out of 115) due to the fear of COVID-19 infection. Among their friends, the main reason for not donating blood was the fear of infection (63 out of 115).

**Conclusion:** Individual with blood group 'O' were more affected by COVID-19 compared to other blood groups. The pandemic has impacted blood transfusion services as fewer donors are visiting hospitals for blood donation. It is important to thoroughly assess and address the various reasons that prevent individuals from donating plasma through mass awareness campaigns.

**Keywords:** Blood bank, Blood transfusion, Coronavirus disease 2019

## INTRODUCTION

The spread of the coronavirus has strained healthcare and testing resources, making it difficult to identify and prioritise individuals at risk. The COVID-19 virus attaches to the human Angiotensin-Converting Enzyme 2 (ACE-2) receptor through the spike protein, facilitating cell infection. Additionally, the COVID-19 virus acts as a receptor and/or co-receptor for blood group antigens [1]. Studies have shown that factors such as age, male sex, and non communicable diseases like cardiovascular disease, diabetes, and Chronic Obstructive Pulmonary Disease (COPD) increase the risk of COVID-19 infection and severity [2].

Blood types are inherited, and certain environmental factors can influence the inheritance of blood types in subsequent generations [3]. ABO blood groups have been associated with infectious diseases [2]. Previous studies have indicated that individuals with blood group 'O' are more susceptible to Norwalk virus and *Helicobacter pylori* infection [2]. Anti-A antibodies inhibit the adhesion of Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) protein-expressing cells to ACE-2-expressing cell lines, making individuals with certain blood groups more susceptible to COVID-19 infection [3]. Numerous studies have demonstrated that individuals with blood group 'A' are more affected by COVID-19 compared to other blood groups [1,2]. In South India, the 'O' blood group is predominant and has been found to be affected, as shown in studies conducted by Das PK et al., and Periyavan S et al., [4,5].

The pandemic has impacted blood transfusion services due to a decrease in the number of donors visiting hospitals for blood donation.

Inadequate communication from public health departments and the circulation of false information on social media have contributed to fear among the general population.

It is crucial to identify factors that either prevent or motivate blood donors. This may be due to doubts and misinformation about blood donation. The aim of this study is to describe the blood groups of COVID-19 positive plasma donors and investigate the association between different blood groups and sexes, as well as different age groups. Additionally, the study aims to identify factors that either prevent or motivate COVID-19 positive plasma donors to donate plasma.

## MATERIALS AND METHODS

The current retrospective cross-sectional study was conducted at the Blood Bank, Mandya Institute of Medical Sciences, Mandya, Karnataka, India. Records from July 2020 to June 2021 were reviewed during July 2022 to August 2022. Ethical clearance was obtained with Institutional Ethics Committee (IEC) number- MIMS/IEC/584. Data were collected from the records maintained at the blood bank and through a questionnaire prepared by the authors [Annexure-1] to assess information about blood donation during the lockdown period.

**Inclusion criteria:** Records entered in the COVID-19 plasma donor register who passed all the screening tests during the study period. The screening tests followed the ICMR criteria, which included male and non pregnant female donors who were 14 days post-COVID-19

infection, with a positive COVID-19 Reverse Transcription-Polymerase Chain Reaction (RT-PCR) or Rapid Antigen Test (RAT) report, and an ELISA IgG antibody titre against COVID-19 (1:640). Other inclusion criteria involved an age between 18-60 years, weight >50 kg, haemoglobin >12.5 g/dL, and being negative for HIV, Hepatitis B, Hepatitis C, Syphilis, and Malaria [6].

**Exclusion criteria:** Insufficient donor data and repeated data from the same donor were excluded from the study.

The sample size consisted of 115 COVID-19 plasma donors who donated plasma atleast 14 days after infection. Details such as blood group, age, sex, and factors influencing plasma donation were recorded.

### STATISTICAL ANALYSIS

The collected data was recorded in a Microsoft Excel sheet and will be analysed using SPSS 20 statistical software. Descriptive statistics, including mean, standard deviation, and percentage, was utilised for inferential statistics. The Chi-square test was applied to examine associations, and the t-test to compare means. A significance level of 5% (p<0.05) is considered significant.

### RESULTS

Among the 115 COVID-19 positive patients, 113 were males and 2 were females. The most commonly affected age group was between 31-40 years, with 44 donors, followed by the age groups of 21-30 years (41 donors), 41-50 years (24 donors), and 51-60 years (6 donors). The most commonly affected blood group was O+ve, accounting for 44 cases, followed by B+ve with 33 cases and A+ve with 28 cases. There were 4 cases of AB+ve blood group, 3 cases of A-ve blood group, and 1 case each of B-ve, O-ve, and AB-ve blood groups [Table/Fig-1].

The association between blood group and age groups was assessed using the Chi-square test, with a Chi-square value of 16.674. The p-value was not found to be significant (p-value=0.730).

When assessing the reasons for donating blood, it was found that the majority of people (33 out of 115) mentioned that they donated blood when their family member or friend required it. This was followed by the reason of donating when a patient's relative requested it (30 out of 115). Other reasons included being appealed by a public figure or celebrity (27 out of 115), social media campaigns for blood donation (14 out of 115), and NGOs working for blood donation contacting them (11 out of 115).

An evaluation was conducted to determine whether providing transport facilities by the blood bank improved the number of blood donations during the COVID-19 pandemic, considering the non availability of transport. The majority of people (44 out of 115) preferred to use their own vehicles to reach the blood bank due to the fear of catching a COVID-19 infection. This was followed by the reason that many individuals felt encouraged to donate blood (39 out of 115) if transport was provided by the blood bank. A few people (27 out of 115) were unsure about donating blood even after transport arrangements were made to the blood bank. Only a small number of people (5 out of 115) felt that their decision to donate blood would not change even if transport was arranged to the blood bank [Table/Fig-2].

An assessment was conducted on the reasons for friends not donating blood. The majority of people (63 out of 115) cited the fear of infection as the reason. This was followed by travel restrictions due to the lockdown (42 out of 115). A few individuals (6 out of 115) mentioned a lack of motivation as the reason, and a very small number of people (4 out of 115) cited financial crisis as the reason.

Age group (years)	Gender		Blood group							
	Males	Females	A positive	A negative	B positive	B negative	O positive	O negative	AB positive	AB negative
21-30	39	02	08	01	11	01	17		03	
31-40	44		11	02	09		19	01	01	01
41-50	24		06		11		07			
51-60	06		03		02		01			
Total (n=115)	113	02	28	03	33	01	44	01	04	01

[Table/Fig-1]: Distribution of different blood groups according to gender and age.

Age group (years)	Question number			Sex		Blood group							
	5	6	7	M	F	A+	A-	B+	B-	O+	O-	AB+	AB-
21-30	a-05 b-07 c-05 d-20 e-04	a-12 b-12 c-02 d-15	a-20 b-03 c-17 d-01	39	02	08	01	11	01	17		03	
31-40	a-20 b-04 c-12 d-04 e-04	a-15 b-10 c-02 d-17	a-25 b-02 c-15 d-02	44		11	02	09		19	01	01	01
41-50	a-04 b-02 c-14 d-02 e-02	a-10 b-05 c-01 d-08	a-14 b-01 c-08 d-01	24		06		11		07			
51-60	a-01 b-01 c-02 d-01 e-01	a-02 b-00 c-00 d-04	a-04 b-00 c-02 d-00	06		03		02		01			
Total (n=115)	a-30 b-14 c-33 d-27 e-11	a-39 b-27 c-05 d-44	a-63 b-06 c-42 d-04	113	02	28	03	33	01	44	01	04	01

[Table/Fig-2]: Blood groups and various factors affecting blood donations among COVID-19 plasma donors at the tertiary care hospital in Mandya.

## DISCUSSION

This study aimed to investigate if any particular blood group was more prone to COVID-19 infection. During the first wave of COVID-19, plasma therapy was used as a treatment post-infection, and the study aimed to assess the factors affecting plasma donation, including concerns about exposure to infection and the unavailability of transport due to the lockdown. In present study, males were more affected compared to females. A study by Vahidy FS et al., found a higher SARS Co-V positivity rate in males compared to females, with an odds ratio of 1.20 [7]. Another study by Venkatraja B et al., conducted in Mysuru showed a higher incidence of infection in males compared to females, with a male to female ratio of 1:0.59. The Mann-Whitney U test value was significant with a p-value of U critical-0.012 [8].

In present study, the age group between 31-40 years was most commonly affected. A study by Monod M et al., showed that the age group between 20-49 years was affected by COVID-19 [9]. The study by Garg I et al., categorised patients into three groups: severely infected, moderately infected, and mildly infected with COVID-19. In the severely infected group, 82% of the subjects were above 45 years of age, in the moderately infected group, 77% were above 45 years of age, and in the mildly infected group, only 46% were above the age of 45 years [10]. A study by Darshan MS, found that 94.8% of 730 cases were above 40 years of age and had severe manifestations of COVID-19 [11]. Data released by the Center for Disease Control and Prevention showed that the most commonly affected age group was between 18-29 years of age [12].

In present study, the most commonly affected blood group was O+ve, accounting for 44 cases, compared to A+ve blood group, which accounted for 28 cases. Few studies have been conducted to assess the association between blood group and COVID-19 infection. A study by Padhi S et al., in Karnataka showed that group O cases accounted for 39% of COVID-positive cases, followed by group A (24.57%), group B (29.63%), and group AB (5.83%) [13]. Another study by Das PK et al., found that the most common blood group among blood donors in South India is O (38.75%), followed by B (32.69%), A (18.85%), and AB (5.57%) [4]. A study by Periyavan S et al., in Bangalore showed that the majority of donors belonged to the O group (39.81%), followed by B (29.95%), A (23.85%), and AB (6.37%) groups, following the Asiatic trend of O>B>A>AB [5]. According to the blood bank statistics of Mandya Institute of Medical Sciences, the most common blood group among donors was O (4918 O positive donors and 251 O negative donors out of a total of 12010 donors in 2022). All these pieces of evidence support present study finding that the O group is the most commonly affected in COVID-19 infection.

In a study conducted by Yanardag D and Bankir M, it was found that the prevalence of COVID-19 was higher in blood group A, followed by blood groups B, AB, and O [1]. A meta-analytic study by Pourali F et al., found that the frequency of blood group A was higher among COVID-19 infected individuals, ranging from 28.77-44.44%, while the frequency of blood group O among COVID-19 infected individuals ranged from 18.18-45.75% [2]. Another study by Zhao J et al., demonstrated that individuals with blood group A had a higher risk, while those with blood group O had a lower risk of acquiring COVID-19. Among 1775 COVID patients from Wuhan Jinyintan hospital, the distribution of blood groups was as follows: 37.75% for group A, 26.42% for group B, 10.03% for group AB, and 25.80% for group O. The proportion of group A in COVID-19 patients was 37.75%, compared to 32.16% in the normal subjects. Additionally, the study found that age and gender had less influence on the ABO blood group distribution in the patients [3].

The association of gender with respect to age groups was assessed using the Chi-square test with a Chi-square value of 3.673. The p-value was not found to be significant (p-value=0.299).

This finding was consistent with a study conducted by Al-Akkam KA et al., which also found non significant associations between COVID-19 symptoms and patient's gender (p value=0.911) and age (p-value=0.989) [14].

The association of blood group with respect to age groups was assessed using the Chi-square test, with a Chi-square value of 16.674. The p-value was not found to be significant (p-value=0.730). In a study conducted by Zhao J et al., it was found that the influence of age group on blood group distribution did not have a significant effect [3].

Fear of infection and lack of transport were the main reasons for not donating plasma during the COVID-19 pandemic. The questionnaire used to assess the reasons for donating blood during this time yielded the following responses: 33 respondents mentioned a close family member requiring blood, 30 respondents mentioned a patient's relative requesting them to donate, 27 respondents mentioned motivation by a public figure or celebrity, 14 respondents mentioned social media propaganda for donation, and 11 respondents mentioned NGOs working for blood donation contacting them.

A descriptive cross-sectional study conducted by Tripathi PP et al., concluded that the fear of contracting COVID-19 and decreased motivation among blood donors were major hurdles to blood donation activity. Among the 503 donors surveyed, 57.1% expressed fear of COVID-19 infection, with 2.5% exhibiting extreme fear. According to the study, the blood donation area environment and the travelling to the blood donation centre were identified as major sources of potential COVID-19 infection among participants. The most influential factors motivating blood donation were requests from patients (30%), followed by the need for blood from family or friends and social media motivation (both at 26%) [15].

Due to the significant impact of transport availability during the COVID-19 pandemic, a question in present study is included to assess whether the non availability of transport was a reason for not donating blood. The question asked was: "If pick-up and drop facility were provided by the blood bank, what difference would it make in donating blood?" The major responses we received were as follows: 44 respondents preferred using their own vehicle, indicating that the fear of infection was the primary factor preventing them from donating blood. Thirty nine respondents stated that they would be willing to donate blood if transport was arranged. Twenty seven respondents were unsure about the effect of transport on their decision, and the least number of responses (5) indicated that transport arrangements would not affect their decision to donate blood.

Present study findings revealed that the main reason for not donating blood during the COVID-19 pandemic was the fear of infection (63 responses), followed by travel restrictions (42 responses), lack of motivation (6 responses), and financial crisis (4 responses). A study conducted by Sachdev S et al., found that more than half of the participants (415 out of 749) reported a fear of infection [16]. Similarly, a descriptive cross-sectional study by Tripathi PP et al., concluded that the fear of catching COVID-19 infection and decreased motivation among blood donors were significant deterrents to blood donation activity [15].

### Limitation(s)

Parameters such as a history of cardiovascular disease, diabetes, and COPD to assess their association with COVID-19 infection was not included.

### CONCLUSION(S)

The study did not find any association between blood group and COVID-19 infection, as well as between gender and age group in relation to COVID-19 infection. The main factor that prevented

individuals from donating blood, even when transport was provided, was the fear of catching the infection.

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## [ANNEXURE-1]

### Blood groups and factors affecting blood donations among COVID-19 plasma donors at the tertiary care hospital in Mandya.

S. No. Date:

1. Name:
2. Age: \_\_\_\_\_ yrs.
3. Sex:
4. Blood group
5. What would be the reason for you to donate blood?
  - a. Patients relative/attender requesting to donate
  - b. Social media propaganda for blood donation
  - c. Your family member/friends needing blood
  - d. Motivation by a public figure or celebrity
  - e. NGOs contacting you for blood donation
6. If transport facility from your home is provided by blood bank, how would it make a difference?
  - a. Motivates me to donate
  - b. Not sure whether it makes me donate blood or not
  - c. Does not interfere with my decision to donate blood
  - d. I would prefer my own transport
7. What made your friend not to donate:
  - a. Fear of infection
  - b. Lack of motivation
  - c. Travel restriction due to lockdown
  - d. Financial crisis