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Relationship between the abo blood group, age and gender with covid-19 susceptibility

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Abstract

Objective: To investigate the relationship between the ABO blood group, age, gender and the COVID-19 susceptibility. **Design:** The study was conducted by comparing the blood group distribution in 2,033 patients with COVID-19 confirmed by SARS-CoV-2 RT-PCR test. **Materials and Methods:** During the ongoing COVID-19 pandemic, a study was conducted in Blood Bank of a COVID -19 dedicated tertiary care hospital. The purpose of the study was to find out the susceptibility of patient's blood group to COVID-19 disease and its occurrence in particular gender and age. A total of 2033 samples of patients positive with COVID -19 confirmed with positive real-time reverse transcriptase polymerase-chain-reaction(RT-PCR) testing, were taken from a period of7 months that is June 2020 to 30th December 2020. Blood grouping was done with gel card method as well as slide method to identify the respective blood group of the patient. **Results:** After testing the samples of 2033 patients, it was noted that individuals with blood group B+ ve were most susceptible to COVID-19 with a total of 723 cases (37.4%) and individuals with blood group AB-ve 13 cases (0.6%) were least affected. The people between age group 51-60 were most affected with total of 510 cases (25.15%) Male gender dominated with a positive number of 1365 (67.1) cases out of 2033. **Conclusion:** People with blood group B might need particularly strengthened personal protection to reduce the chance of infection; SARS-CoV-2-infected patients with blood group B might need to receive more vigilant surveillance and aggressive treatment;

Keywords: Blood Group, COVID -19, Gel-Card Method, SARS-CoV-2

Introduction

The purpose of the study was to find out the relation of COVID disease with specific blood groups age and gender. It's an observation based study which aimed at finding out particular blood group that was most susceptible to COVID-19 disease and the group which was the least affected. The aim was also to find out which age group was most affected by this particular disease and the gender which had more occurrence of COVID-19. In a similar study conducted in China, it was observed the novel corona virus SARS-CoV-2, causing the new infectious disease [6]. COVID-19 is currently spreading rapidly around the world. Current clinical observation suggest that people's age and gender are two risk factors in the susceptibility to COVID-19. Older people and men are more susceptible to infection [7].

Material and methods

Patients who were admitted to the tertiary care hospital in Delhi with mild to severe symptoms for COVID-19 disease and tested positive for the same which was confirmed by RTP-CR were selected. The subjects were chosen between the age group of 07 to 90 years, including both males and females.

The sample of each patient was collected in EDTA vial from the ward and was sent to blood bank for blood grouping. The grouping was done by gel card method and also by slide method of the same patient. Blood group of the patient was identified and the result was entered in the data register and master chart with all the demographic details of the patients.

Statistical analysis of the results was done along with master charts and tables.

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Results

Table 1: Summary of All Parameters

All Parameters	Mean ± SD ‖ Median (IQR) ‖ Min-Max ‖ Frequency (%)
Age (Years)	51.64 ± 16.07 ‖ 53.00 (39.00-64.00) ‖ 7.00 - 96.00
Age	
≤20 Years	40 (2.0%)
21-30 Years	219 (10.8%)
31-40 Years	286 (14.1%)
41-50 Years	332 (16.3%)
51-60 Years	510 (25.1%)
61-70 Years	406 (20.0%)
71-80 Years	192 (9.4%)
81-90 Years	45 (2.2%)
>90 Years	3 (0.1%)
Gender	
Male	1365 (67.1%)
Female	668 (32.9%)
ABO Group	
A	490 (24.1%)
B	761 (37.4%)
AB	200 (9.8%)
O	582 (28.6%)
Rh Antigen (Positive)	1935 (95.2%)
Blood Group	
A -ve	26 (1.3%)
A +ve	464 (22.8%)
B -ve	38 (1.9%)
B +ve	723 (35.6%)
AB -ve	13 (0.6%)
AB +ve	187 (9.2%)
O -ve	21 (1.0%)
O +ve	561 (27.6%)

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The mean Age (Years) was 51.64 ± 16.07.

40 (2.0%) of the participants had Age: ≤20 Years. 219 (10.8%) of the participants had Age: 21-30 Years. 286 (14.1%) of the participants had Age: 31-40 Years. 332 (16.3%) of the participants had Age: 41-50 Years. 510 (25.1%) of the participants had Age: 51-60 Years. 406 (20.0%) of the participants had Age: 61-70 Years. 192 (9.4%) of the participants had Age: 71-80 Years. 45 (2.2%) of the participants had Age: 81-90 Years. 3 (0.1%) of the participants had Age: >90 Years.

1365 (67.1%) of the participants had Gender: Male. 668 (32.9%) of the participants had Gender: Female.

490 (24.1%) of the participants had ABO Group: A. 761 (37.4%) of the participants had ABO Group: B. 200 (9.8%) of the participants had ABO Group: AB. 582 (28.6%) of the participants had ABO Group: O.

1935 (95.2%) of the participants had Rh Antigen: Positive. 98 (4.8%) of the participants had Rh Antigen: Negative.

26 (1.3%) of the participants had Blood Group: A -ve. 464 (22.8%) of the participants had Blood Group: A +ve. 38 (1.9%) of the participants had Blood Group: B -ve. 723 (35.6%) of the participants had Blood Group: B +ve. 13 (0.6%) of the participants had Blood Group: AB -ve. 187 (9.2%) of the participants had Blood Group: AB +ve. 21 (1.0%) of the participants had Blood Group: O -ve. 561 (27.6%) of the participants had Blood Group: O +ve.

Table 2: Distribution of the Participants in Terms of Age (Years) (n = 2033)

Age (Years)	
Mean (SD)	51.64 (16.07)
Median (IQR)	53 (39-64)
Range	7 - 96

The variable Age (Years) was not normally distributed (Shapiro-Wilk Test: p = <0.001).

The mean (SD) of Age (Years) was 51.64 (16.07). The median (IQR) of Age (Years) was 53.00 (39-64). The Age (Years) ranged from 7 - 96.
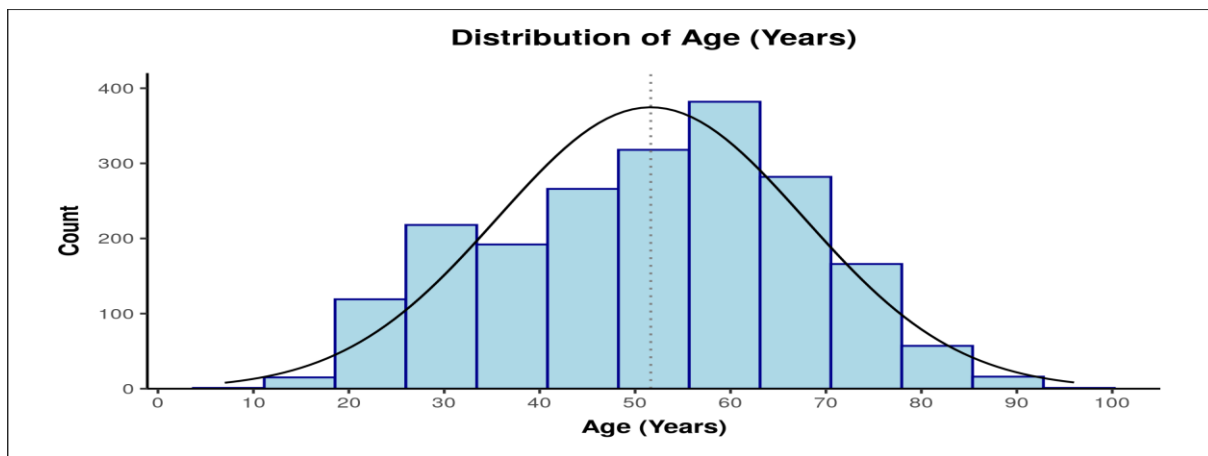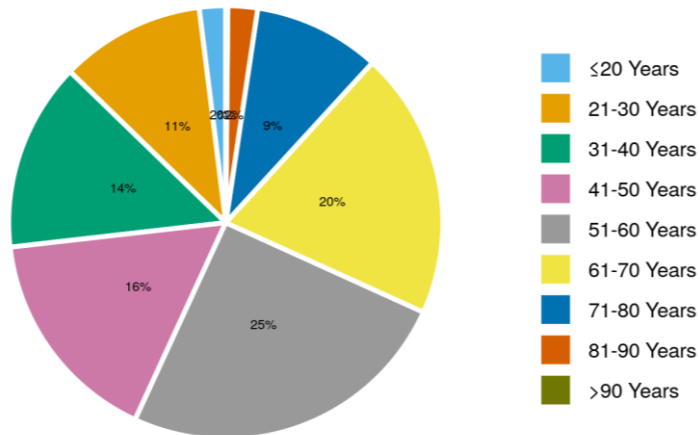

Table 3: Distribution of the Participants in Terms of Age (n = 2033)

Age	Frequency	Percentage
≤20 Years	40	2.0%
21-30 Years	219	10.8%
31-40 Years	286	14.1%
41-50 Years	332	16.3%
51-60 Years	510	25.1%
61-70 Years	406	20.0%
71-80 Years	192	9.4%
81-90 Years	45	2.2%
>90 Years	3	0.1%
Total	2033	100.0%

2.0% of the participants had Age: ≤20 Years. 10.8% of the participants had Age: 21-30 Years. 14.1% of the participants had Age: 31-40 Years. 16.3% of the participants had Age: 41-50 Years. 25.1% of the participants had Age: 51-60 Years. 20.0% of the participants had Age: 61-70 Years. 9.4% of the participants had Age: 71-80 Years. 2.2% of the participants had Age: 81-90 Years. 0.1% of the participants had Age: >90 Years.
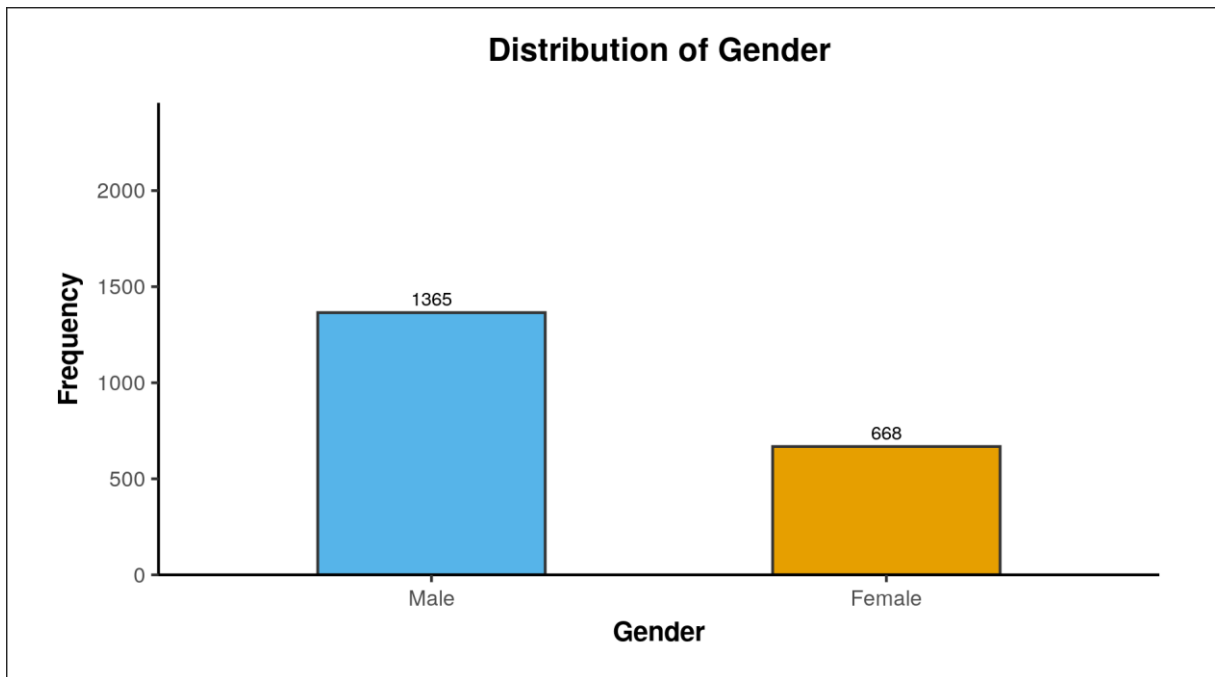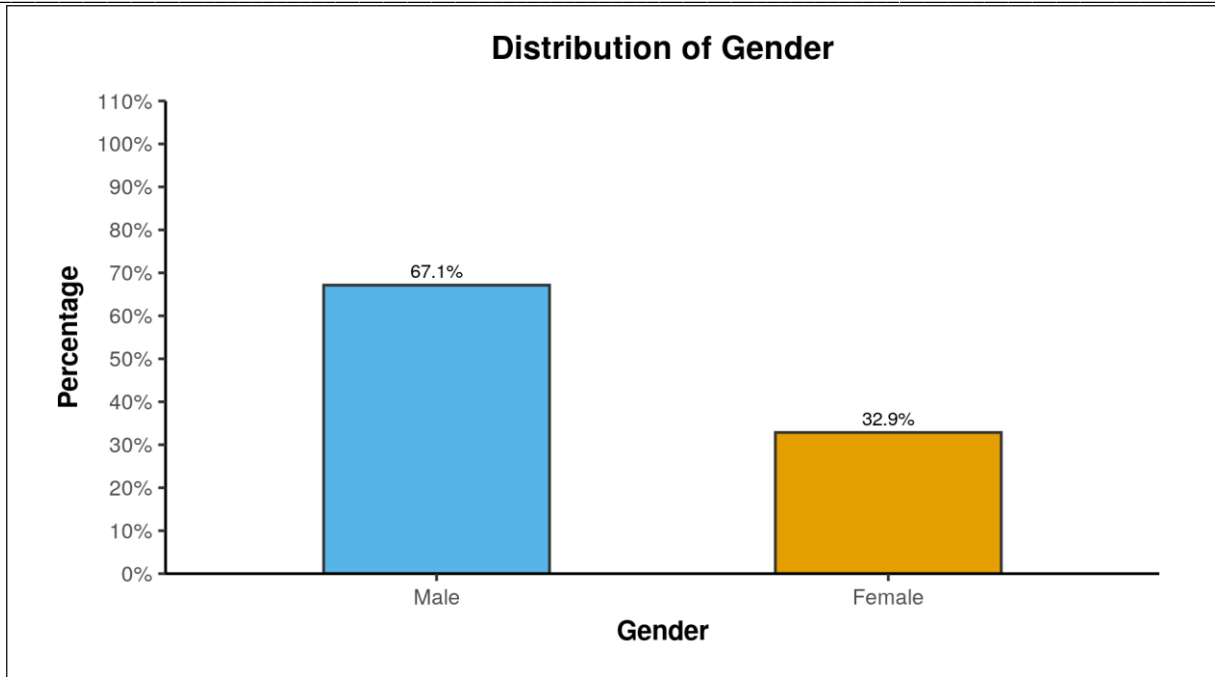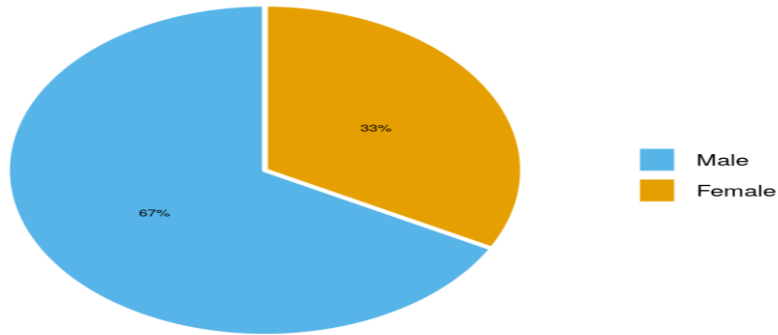
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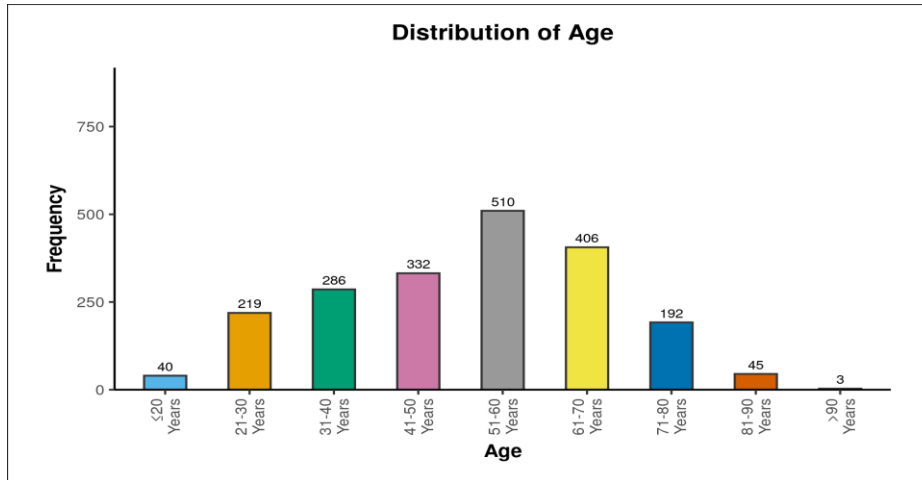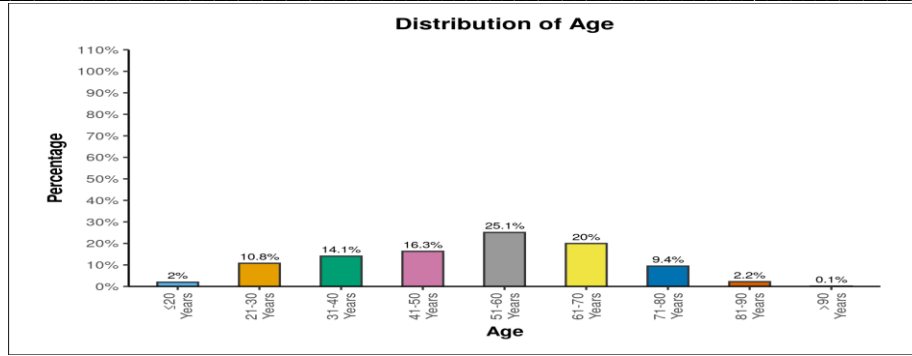
Table 4: Distribution of the Participants in Terms of Gender (n = 2033)

Gender	Frequency	Percentage
Male	1365	67.1%
Female	668	32.9%
Total	2033	100.0%

67.1% of the participants had Gender: Male. 32.9% of the participants had Gender: Female.

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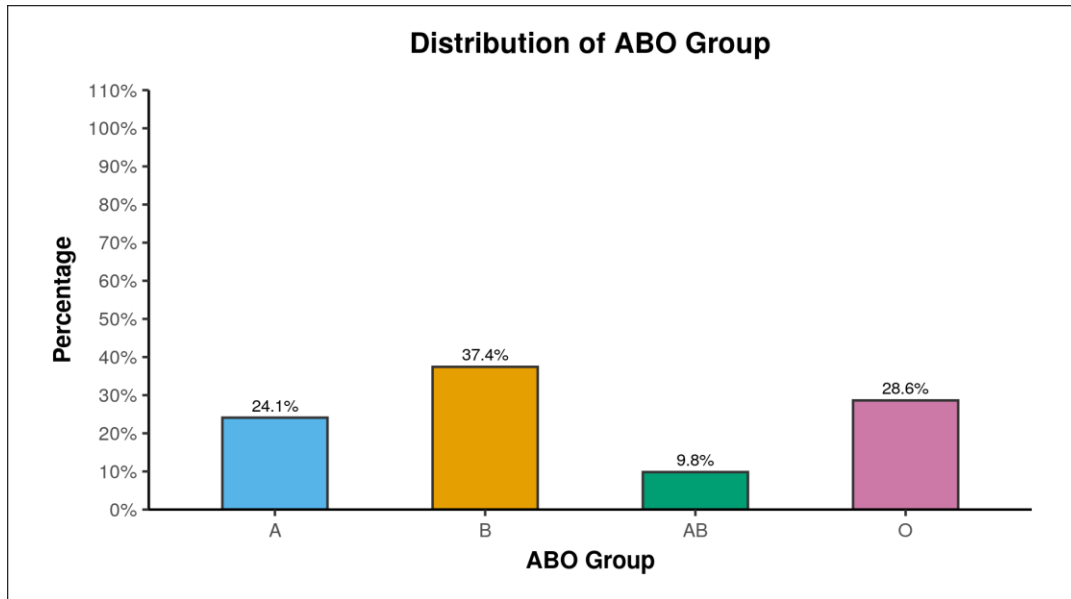
Distribution of Gender

Table 5: Distribution of the Participants in Terms of ABO Group (n = 2033)

ABO Group	Frequency	Percentage
A	490	24.1%
B	761	37.4%
AB	200	9.8%
O	582	28.6%
Total	2033	100.0%

24.1% of the participants had ABO Group: A. 37.4% of the participants had ABO Group: B. 9.8% of the participants had ABO Group: AB. 28.6% of the participants had ABO Group: O.

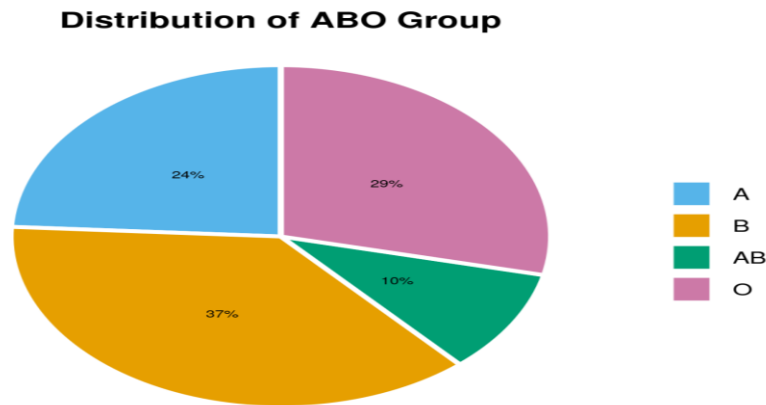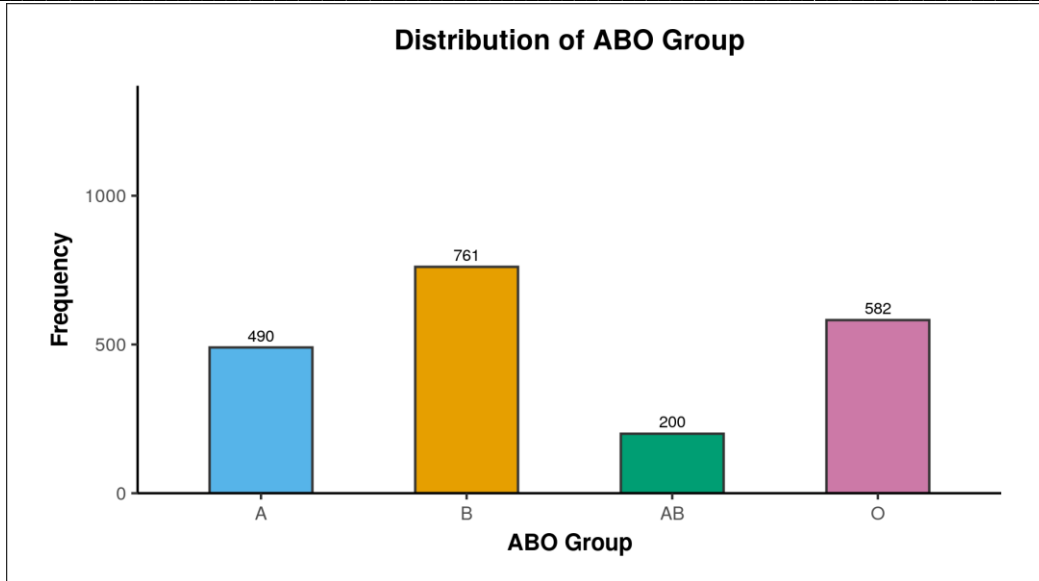

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Distribution of ABO Group

Distribution of ABO Group

Table 6: Distribution of the Participants in Terms of Rh Antigen (n = 2033)

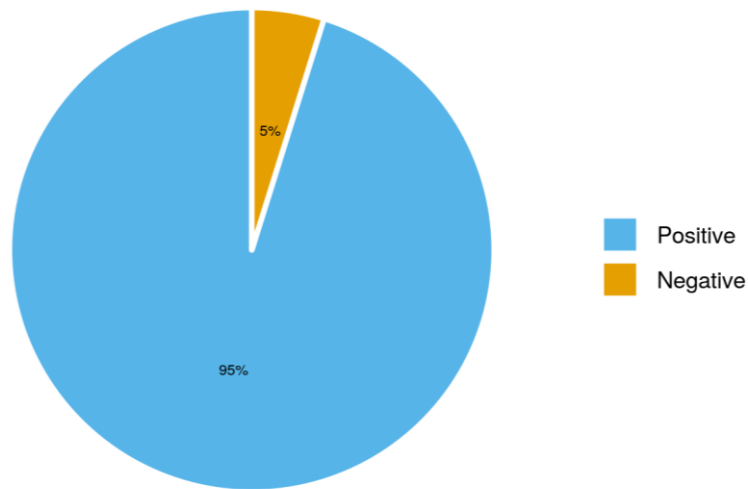| Rh Antigen	Frequency	Percentage
Positive	1935	95.2%
Negative	98	4.8%
Total	2033	100.0%

95.2% of the participants had Rh Antigen: Positive. 4.8% of the participants had Rh Antigen: Negative.

Distribution of Rh Antigen

Distribution of Rh Antigen
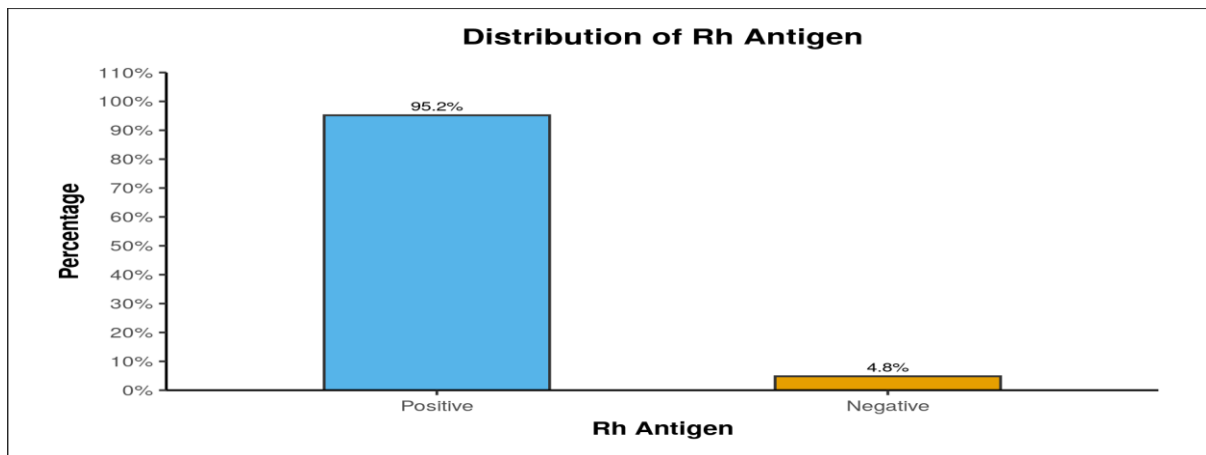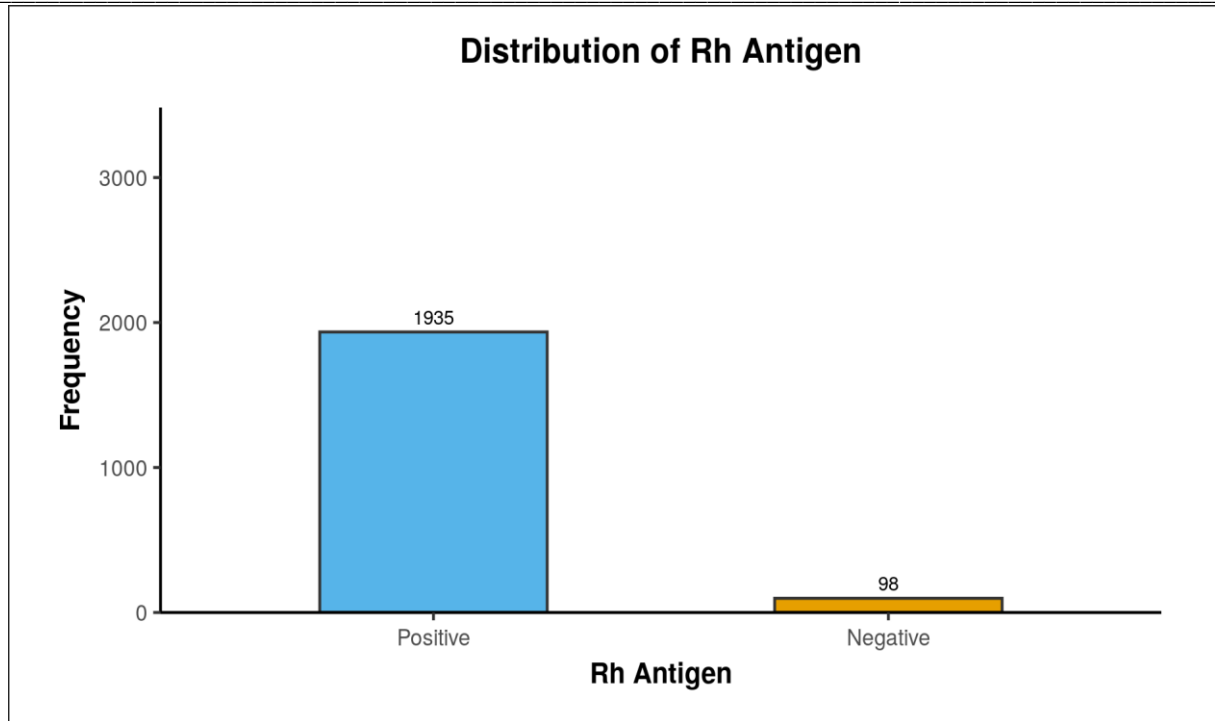
## Distribution of Rh Antigen

Table 7: Distribution of the Participants in Terms of Blood Group (n = 2033)

Blood Group	Frequency	Percentage
A -ve	26	1.3%
A +ve	464	22.8%
B -ve	38	1.9%
B +ve	723	35.6%
AB -ve	13	0.6%
AB +ve	187	9.2%
O -ve	21	1.0%
O +ve	561	27.6%
Total	2033	100.0%

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1.3% of the participants had Blood Group: A -ve. 22.8% of the participants had Blood Group: A +ve. 1.9% of the participants had Blood Group: B -ve. 35.6% of the participants had Blood Group: B +ve. 0.6% of the participants had Blood Group: AB -ve. 9.2% of the participants had Blood Group: AB +ve. 1.0% of the participants had Blood Group: O -ve. 27.6% of the participants had Blood Group: O +ve.

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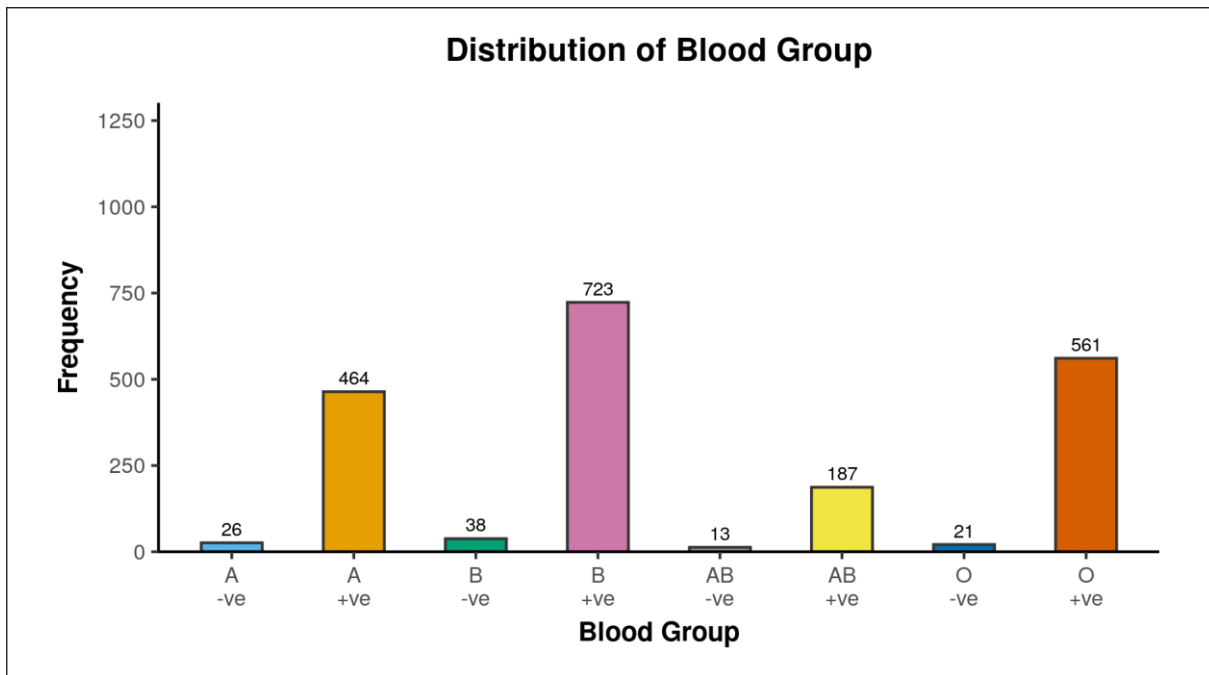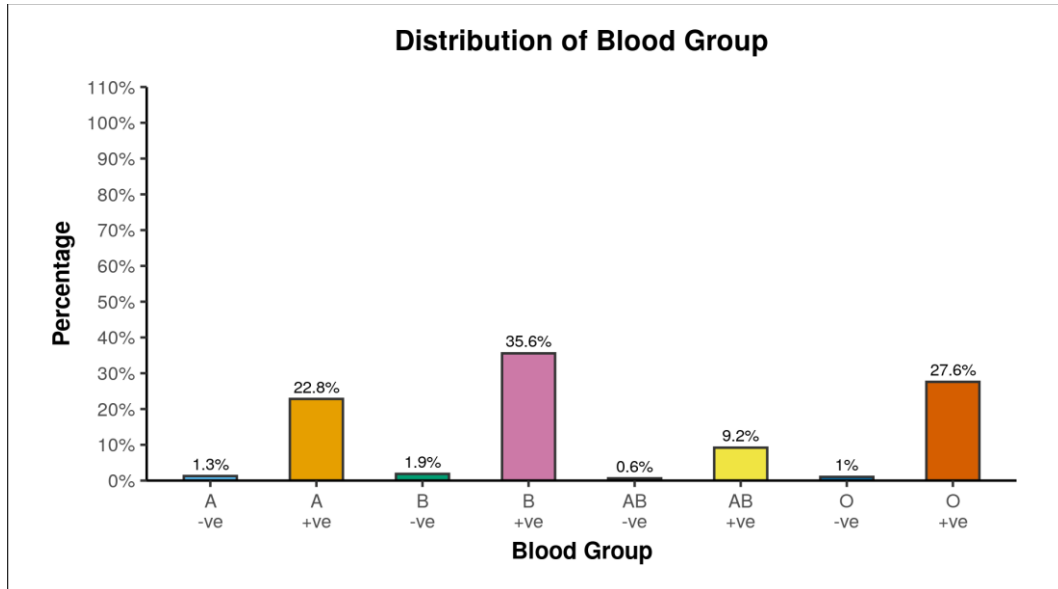
Distribution of Blood Group
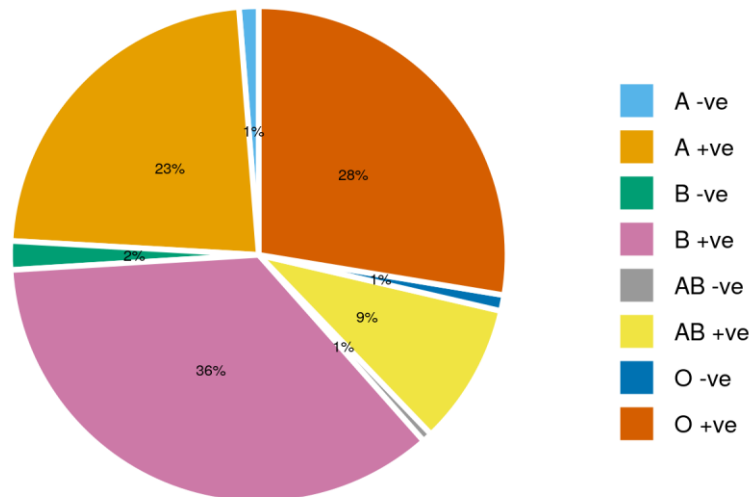
Discussion
This study found that ABO blood groups displayed different association with SARS-CoV-2 resulting in COVID-19. Specifically, blood group B was associated with an increased risk whereas blood group AB was associated with lowest risk.

These findings are consistent with similar risk patterns of ABO blood groups for other corona virus infection found in previousstudies. For example, Cheng *et al.* reported that the SARS-CoV infection susceptibility was differentiated by the ABO blood group systems[8].

The author observed that compared with non-O blood group hospital staff, blood group O hospital staff had a lower chance of getting infected.

Patrice *et al.* found that anti-Aantibodies specifically inhibited the adhesion of SARS-CoV S protein-expressing cells to ACE2-expressing cell lines8, the lower susceptibility of blood group O and higher susceptibility of blood group A for COVID-19 could be linked to the presence of natural anti-blood group antibodies, particularly anti-A antibody, in the blood.

Conclusion
This study may have potential clinical implications given the current COVID-19 crisis:
(1) People with blood group B might need particularly strengthened personal protection to reduce the chance of infection;
(2) SARS-CoV-2-infected patients with blood group B might need to receive more vigilant surveillance and aggressive treatment;
(3) It might be helpful to introduce ABO blood typing in both patients and medical personal as a routine part of the management of SARS-CoV 2 and other corona virus infections, to help define the management options and assess risk exposure levels of people.

It should be emphasized that due to the imitations discussed above, one should be cautious to use this study to guide clinical practices.

Patients and public involvement
This was a retrospective case series study and no patients were directly involved in the study design, setting the research questions, or the outcome measures directly. No patients were asked to advice on interpretation or writing up of results.

Funding
No funding.

Competing interest statement

The authors declare that they have no competing financial interests.

Ethical approval
This study received approval from the Research Ethics Committees of the
participating institutions, which waivered informed patient consent because the study only involved retrospective review of clinical data.

Patient consent
Waived.

Data sharing
No additional data available.

Data Availability Statement
The data used to support the findings of this study are included within the article.

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