

Association of ABO Blood Groups and Rh factor with COVID-19 Infection in the Population of Rawalpindi Region

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Author's Contribution

³ Conception of study

¹ Experimentation/Study conduction

² Analysis/Interpretation/Discussion

² Manuscript Writing

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Abstract

Background: COVID-19 caused by the SARS-CoV-2 virus has resulted in a worldwide pandemic. Around 1.6 million mortalities have been reported worldwide due to its adverse effects on the human body and no specific treatment is yet available. Thus, this study was planned to determine the relationship between different blood groups and COVID-19 infection according to age and gender in the population of the Rawalpindi region.

Materials and Methods: Around 3000 RT-PCR tests for SARS-CoV-2 were carried out in a private lab in Rawalpindi from April to June 2020, according to which 1160 (38.66%) people tested positive by RT-PCR. Data were collected from all positive individuals using a proforma containing demographic details and blood groups. Data were analyzed using SPSS v. 23.0 (Armonk, NY: IBM Corp.).

Results: Out of 1160 COVID-19 positive participants, 594 (51.2%) were males, and 566 (48.8%) were females. Age group 51-60 years was the most prevalent among COVID-19 infected population. Those having blood group B-positive had a higher chance of getting infection i.e. 45.6% (n=529), and lowest number was blood group AB-negative i.e. 0.34% (n=4). Overall, Rh-positive blood types are higher among positively infected populations compared to Rh-negative blood types.

Conclusion: Blood group B positive is the most common in COVID-19 positive individuals as compared to other blood groups. Individuals with Rh-positive blood type are frequently infected as compared to those with Rh-negative blood type. These findings should be taken into consideration while managing patients of COVID-19.

Keywords: ABO Blood Group System, Rh-Hr Blood-group System, COVID-19.

Introduction

Near the end of 2019, an outbreak of a novel coronavirus-infected pneumonia (NCIP) case was reported in the city of Wuhan in China. Upon subsequent investigation, it came out to be a virus causing the diseases which was termed as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2, 2019-nCoV) because of its primary effect on the respiratory system.¹ Owing to its human-to-human transmission, it ultimately ended in the form of an outbreak that encircled the whole globe as Coronavirus Disease 19 (COVID-19) and World Health Organization (WHO) declared it as a pandemic because of its impact on tens and thousands of people worldwide.^{1,2} Treatment of symptoms, supportive care, isolation, experimental measures, and public awareness are involved in the management of the infection. Various vaccines are being developed and specific antiviral treatments for COVID-19 are being used with caution as per the declarations of the World Health Organization (WHO).³

Individuals suffering from COVID-19 show symptoms including dry cough, fever, and dyspnea manifesting involvement of the respiratory system with variability from person to person. It may also cause headache, nausea, vomiting, and generalized weakness. Individuals suffering from hypertension, diabetes, chronic cardiovascular, and respiratory diseases are more prone to progress to critical COVID-19 infection.^{2,4} Epidemiological studies have shown that COVID-19 infections are higher among blood group A and lower among blood group O and likewise those with Rh-positive blood type are having higher chances of getting infected compared to Rh-negative blood type.^{5,6} Studies have also shown that mortality rates are higher in the population having blood type AB and Rh-positive compared to the population having blood type A and B and Rh-negative blood type.⁷

Not enough literature is available on the regional level to explain the association of different blood groups and their effect on management and prognosis in individuals suffering from COVID-19. In this study, we will discuss how frequently a blood group is involved in COVID-19 infection in our population.

The objective of this study is to determine the relationship between different ABO and Rh blood group types and COVID-19 infection according to age and gender in the population of the Rawalpindi region.

Materials and Methods

Data Collection

Around 3000 tests of Covid-19 were performed in a private lab in Rawalpindi from April to June 2020 in individuals of all age groups. Out of 3000, 1160 individuals were suffering from COVID-19 as confirmed by real-time reverse transcriptase polymerase-chain-reaction test (RT-PCR) and were included in the final study sample. Blood grouping was done using the test tube method in which suspension of red blood cells of the patient is mixed with antisera and then centrifuged to separate cells from reagent. Agglutination is observed when antigen to a particular blood group is present. Data were collected from all PCR-positive patients using a proforma containing demographic details along with blood group and Rh factor. Individuals of all age groups were included in the study.

Data Analysis

Data were analyzed using SPSS v. 23.0 (Armonk, NY: IBM Corp.). Descriptive statistics were applied to determine the frequency of various blood group types among COVID-19 positive individuals.

Results

Out of 1160 participants who tested positive for COVID-19, 594 (51.2%) were males and 566 (48.8%) were females. Age group 51-60 years was the most prevalent age group i.e. followed by age group 31-40 and age group 0-10 years was the least common (Table-I).

Table-I Demographic details of the patients

<i>Variable</i>	<i>Count (n)</i>
Gender	
Male	594 (51.2%)
Female	566 (48.8%)
Age Group (year)	
Less than 10	53
11-20	143
21-30	151
31-40	203
41-50	149
51-60	244
Above 60	123

Among COVID-19 infected population those having blood group B-positive have the higher chances of

getting infection that is 45.6% (n=529) followed by blood group O-positive and A-positive. Group AB-negative has the least prevalence that is 0.34% (n=4). Overall, Rh-positive blood types are higher among positively infected populations compared to Rh-negative blood types.

Further details about blood group types are shown in Table-II.

Table-II Proportion of positive population according to Blood group types (n=1160)

<i>Blood Group and Rh factor</i>	<i>n</i>	<i>%</i>
B Positive	529	45.6
B Negative	23	1.98
A Positive	182	15.7
A Negative	22	1.9
O Positive	261	22.5
O Negative	22	1.9
AB Positive	117	10.0
AB Negative	4	0.34

Discussion

In our study, people with blood group B-positive had the higher chances of getting an infection with COVID-19 and the AB-negative blood groups showed the least chance. Those with Rh-positive blood type are greater in number among positively infected individuals compared to those having Rh-negative blood type. A study conducted in five major hospitals in the state of Massachusetts showed that chances of infection with COVID-19 are higher among those with blood group B and AB and those with Rh-positive blood type.⁶ Another study conducted in New York-Presbyterian (NYP) hospital system showed a slightly higher risk of COVID-19 infection among those with non-O blood groups and those with Rh-positive blood type.⁷

A study conducted in three hospitals in Wuhan and Shenzhen, China reported a higher risk of COVID-19 infection in individuals with blood group A and lower in individuals with blood group O.⁸ A study conducted in a tertiary care center of Pakistan reported a high frequency of COVID-19 infection in blood group A individuals and blood group O individuals least were least commonly affected.⁹

The exact mechanism by which ABO blood group system and COVID-19 are interlinked with each other is unknown. However, researches have shown that blood group antigens are also found on many different epithelial cells and the presence of different blood

group antibodies, especially anti-A antibodies interfere with the adherence of SARS-CoV with their receptors thereby preventing infection.¹⁰ In our study blood group B positive was most prevalent amongst the COVID-19 infected population and blood group AB was the least. This could be explained by the fact that blood group B and O are the most prevalent blood groups in Pakistan¹¹ and AB is the least prevalent blood group all over the world.¹² This study has clearly shown the predominance of Blood Group B positive in Covid-19 patients, with 529 patients being B positive while only 4 patients are AB negative. However further studies need to be done to elucidate the proper mechanism by which different blood group affects the propensity towards COVID-19 infection. Now it is thought-provoking that if the blood group plays a role in Covid-19 patients then how does the world copes up with this grave situation. The severity and mortality rate cannot be ruled out based on blood group only as several other factors also play an important role in deciding the progression of the disease.

Another striking finding which needs to be mentioned here is that all individuals with Rh-negative blood group have little propensity to get infected with Covid-19. However, there is a current need to conduct such similar studies in multiple institutions to assess the relationship between blood groups and COVID-19 infection so that proper and timely management of infected patients could be ensured, and special attention could be given to high-risk patients keeping in mind the risk of progression of the disease to a severe or critical level in such patients.

Conclusion

People with blood group B-positive have higher chances of getting an infection with COVID-19 and those with AB-negative blood group are least affected. Individuals with Rh-positive blood type are frequently infected as compared to those with Rh-negative blood type. These findings should be taken into consideration while managing patients of COVID-19.

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