# Association between ABO & RH Blood Group Phenotype with Covid-19 Infection

**Priyanshi Chauhan[1], Ritu Adhana[2], Jay Ballabh Kumar[3], Sanket Jheetey[4], Anjali Verma[5]**

*[1]M.Sc. Medical (Physiology), Department of Physiology, [2]Professor, [3]HOD & Professor, [4]Assistant Professor, [5]Associate Professor, Department of Physiology TMMC&RC, Moradabad, Uttar Pradesh, India*

## Abstract

**Introduction:** Covid-19, conjointly referred to as severe acute metabolism syndrome appeared in December 2019 by a new Corona virus. The virus originated from Wuhan, the capital of China's Hubei Province and unfold everywhere the globe and have become a worldwide pandemic due to lack of cure. The number of cases increased as a result of human to human transmission, overseas travelers and direct contact with infected people made up the majority of cases.1-2-3. The study's goal was to determine whether there was an association between ABO and Rh blood group phenotypes with COVID-19 infection.

**Objective -** To study the association of ABO Blood Group and COVID-19 infection. To study the association of Rh factor and COVID-19 infection.

**Material Method:** This retrospective study was conducted after the approval college research committee of Teerthanker Mahaveer medical college and research center. The study period of this study is from 12 March 2021 to 12 March 2022. The current research included 3000 Covid-19 patients confirmed by RTPCR test and admitted in the Teerthanker Mahaveer University Hospital, Moradabad. Covid -19 positive patient's age, gender, ABO blood group, Rh factor and personal data was collected from the medical record department.

**Result:** The most common blood group affected was B+ (1,119, 37.3%) followed by O+ (729, 24.3%), A+ (653, 21.8%), AB+ (330, 11.0%), B- (77, 2.6%), O- (36, 1.2%), A-(36, 1.2%) and AB- (20, 0.7%).

**Interpretation & Conclusion:** The findings of this study are the blood group that was more affected was B positive and least numbers of patients are of blood group AB negative.

***Keyword:*** *ABO blood group, coronavirus disease, Rh factor.*

## Introduction

4,800,875 people have died so far from the corona virus as of 01, October 2021 in 206 nations, regions or territories.[4]According to the World health Organization the virus primarily spreads between people through close contact. This COVID-19 virus is a metastatic type that can be transferred from on infected person to a healthy one through droplet

**Corresponding author:**
**Dr. Anjali Verma**
Anjaliverma06071965@gmail.com

infection. This virus can be spread by inhaling or just chatting.[2,4]

This virus has different type of affects on different people:

Usual indication:- High temperature, dizziness, breathlessness, cough, fatigue, ageusia and anosmia.[5]Less ordinary indication:- Coughing, migraine, joint pain, nausea, dermatitis on skin, browning of fingers or toes, reddish or angry eyes. [5]Consequential indication:- Breathing difficulties or dyspnea, aphasia or chest pain are all possible symptoms. People who are already normal and have mild indication should manage their problems at private. It means the average of 5-6 days for symptoms usually appear once a person has been exposed to the virus. It may, however, need 14 days.[5]

As a precautionary measure against the Corona virus, India's government imposed a 21-day nationwide lockdown on March 24, 2020. As the first lockdown's expiration date approached, state governments and other advisory groups requested that the lockdown be extended because it had slowed the Pandemic's development rate. Preventive measures including social distancing, quarantine and isolation procedures had been implemented. When adequate pharmacological drugs failed to treat, these preventive strategies were found to be successful.[6-7]

Scientists worked to understand several corona virus variants circulating in India.

The World Health Organization has observed four variations of concern: B.1.17, B.1.351 P2, and B.1.617. Alpha, Beta, Gamma and Delta will be their public labels. SARS-CoV-2 has a sub-lineage that was discovered in India and is now known as "Kappa".[8]

The state has been ravaged by a second wave of COVID-19. On 9/5/2021, our country had approximately 4lakh communicable diseases.

Several recent investigations have connected genetic differences in angiotensin-converting 1 enzyme and glutathione S-transferase T1 to corona virus contamination or fatality.[9]

The variable production of ACE-2 in the airway is one of many molecular level theories postulated for the differing occurrence of the disease or sensitivity to serious disease. The ABO carbohydrate moieties of Landsteiner were transmitted biologically but prior study has revealed the link among ABO blood type, cardiac disease and cancer but also classification or vulnerability toward certain viruses like the sever acute respiratory syndrome corona virus.[10]

Previous research has found that a person's ABO blood group affect their genetic vulnerability to viral infections like influenza, Ebola or sever acute syndromes of respiratory system affected by corona virus 2.[11-12]

The ABO blood group system given by K.Landsteiner in 1901, many scientists since then have given various possibilities and linkage of the blood group to diseases and viruses.[13]

On a large percentage of individuals both types of allergens (A and B) were found on the surface of red blood corpuscles. These antigens are responsible for the majority of blood transfusion reactions. Due

to the manner in which agglutinogens are transferred from one generation to another, people may neither have any of these agglutinogens or they may have one or both on these cells.[13]

When transfusion of blood takes place from one individual to another, the presence and lack of these 2 agglutinogens is typically used to classify donors and recipients into four primary ABO grouping systems. [13]

The ABO blood grouping system has been connected to a variety of human ailments, particularly cardiac, oncological, infectious or non-infectious issues, according to numerous researches.[14-15]

Corona virus disease and ABO blood group have been linked in a few studies. The A, B and AB blood types are all risk factors for transmission; however the O blood group is linked to a decrease incidence in the majority of populations analyzed. [10,16]

When compared to ABO, Rh (D) phenotypes are linked to a small number of illnesses. Rh has a role in type compatibility and immunological response, just like ABO.[17]

The study's goal was to determine whether there was an association between ABO and Rh blood group phenotypes with COVID-19 infection.

## Study Method

Study design: Retrospective study

Study period: 12 March 2021- 12 March 2022

Inclusion Criteria: Patients admitted with COVID-19 infection confirmed by RT-PCR test.(17)

Exclusion Criteria: Any history of smoking.(5)

The current research included 3000 patients with Covid-19 who were admitted to the Teerthanker Mahaveer University Hospital in Moradabad and were confirmed by RTPCR test. Covid -19 positive patient's age, gender, ABO blood group, Rh factor and personal data were acquired from the medical record department after clearance by the College Research Committee and the medical superintendant of TMU Hospital. After that the data was analyzed.

## Statistical Analysis

SPSS and MedCalc Software were used for the data analysis.

## Result

**Table1: Distribution of the patients on the basis of blood group and Rh (n=3,000)**

| Blood Group/Rh factor | Frequency | Percent |
|---|---|---|
| A- | 36 | 1.2% |
| A+ | 653 | 21.8% |
| AB- | 20 | 0.7% |
| AB+ | 330 | 11.0% |
| B- | 77 | 2.6% |
| B+ | 1,119 | 37.3% |
| O- | 36 | 1.2% |
| O+ | 729 | 24.3% |

The most common blood group affected was B+ (1,119, 37.3%) followed by O+ (729, 24.3%), A+ (653, 21.8%), AB+ (330, 11.0%), B- (77, 2.6%), O- (36, 1.2%), A-(36, 1.2%) and AB- (20, 0.7%).

## Discussion

Zhao J colleagues discovered in a study published in 2020 that blood group A had a heightened incidence of severe acute respiratory illness, while blood groups O had a reduced risk.[18]

In the year 2020, Ad'hiah AH et al did a study with 300 confirmed cases. They came to the conclusion the individuals with the ABO blood type and those with type A blood group were more vulnerable of becoming infected, as compared with type AB.[19]

According to Fan Q et al in 2021, blood group A individuals diagnosed with Severe acute respiratory had a greater mortality rate than normal participants.[20]

The interface among spike proteins and Angiotensin converting enzyme 2 receptors was normally inhibited by antibody type A, which indicates that type O blood group, is shielded towards infections and death rates from COVID 19. The function of ABO antibody just on interface between both the corona spike proteins as well as the Angiotensin converting enzyme 2 receptor remains unknown. The spikes of protein of the viral genome transmit A, B, AB glycan antigen, which is dependent on the blood type of the vector for virus replication and infection transmission to new hosts. As the O type of blood group has both type of antibodies (A and B) so there are less chances for the infections with A, B and AB antigens.[21] The ABO antibody titers also have a preventive role. Those disparities in data on the correlation among blood types and corona infection might attribute to strains of SARS-CoV-2 having varied pathogenesis and differences in the studied population. [22]

Study done by Ravuri S et al, suggested that individual who had B blood group, they were more infected with the corona virus as compared to rest of all blood groups.[22]

Study done in 2021 by Rana R et al, according to their research blood group A, B & Rh positive were more prone to the infection while blood group O, AB and Rh negative have a higher resistance for COVID-19 infection.[23]

Research done in 2020 by Almadhi MA et al, they observed that blood group B had more chance of corona illness than blood group AB.[24]

In the present research, we found that people with blood group B was more at risk to COVID-19 illness, whereas subject with blood group AB was the least sensitive for the infection.

The source of connection and higher frequency of covid-19 disease in people with Blood Group B is unclear. [22,25]

## Conclusion

In our study we found that blood group was affected most B positive and least number of patients affected are of AB negative blood group.

Limitation in the present clinical study is that there is a likelihood that different pre-existing sickness could have increase severity of corona virus infection we did not exclude the pre-existing sickness in corona virus patients.

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**Conflict of Interest:** None.

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