Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Association between Blood Type and Severity in COVID-19

N Anuradha[1], K Ashwin[2], Harshvardhan Anilbhai Patel[2]

[1]Associate Professor, Department of General Medicine, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India, [2]Junior Resident, Department of General Medicine, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India

Abstract

Background: Although respiratory failure is the most prevalent complication of coronavirus disease 2019 (COVID-19), renal and circulatory failure are also common in individuals who require critical care or die from the disease. Given the high morbidity and mortality associated with COVID-19 infection, scientists have been interested in gathering information about the traits that make people more vulnerable to the virus, as well as establishing what risk factors are linked to illness development and severity.

Aim: The goal of this study was to see whether there was a link between blood type and the severity of COVID-19, which was defined as intubation or death, as well as to see if there was any variation in testing positive for COVID-19 among blood types.

Methods: In this observational study done in Sree Balaji Hospital during the second COVID wave, adult patients who tested positive for COVID-19 were identified, and the effects of blood type on hospitalization and intubation were investigated.

Results: An increased risk of infection has been associated with blood group A: 144 (72%). Infection with COVID-19 was common in non-blood Group O people. Blood type A had the greatest death rate in our study, followed by blood Group B, and blood Group O had the lowest mortality rate.

Conclusion: In our study, COVID-19 was shown to be common in non-blood type O people, with a high incidence and severity. COVID-19 was not transmitted to those with blood group O. As a result, non-blood type O patients must be closely monitored to avoid Post-COVID complications.

Key words: ABO, Blood type, Intubation, Mortality, Non-blood type O

INTRODUCTION

COVID-19 infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has spread globally, impacting 30 million individuals. COVID-19 symptoms were weariness, fever, and a dry cough, which were invariably followed by myalgia, anorexia, dyspnea, and other symptoms.[1] COVID-19 is most commonly diagnosed as a lung infection, with symptoms ranging from flu-like symptoms to acute respiratory distress syndrome. The emergence of COVID-19 has created a public health danger, and governments are committing scientific and medical resources to combat the epidemic.[2] The virus has had various impacts on the worldwide population; individuals who are older and have comorbidities such as cardiovascular illness, diabetes, or pulmonary disease are more susceptible to severe disease. The emergence of COVID-19 has posed a public health danger, and governments are dedicating scientific and medical resources to combat the epidemic.[3]

Access this article online

www.ijss-sn.com

Month of Submission : 09-2021
Month of Peer Review : 10-2021
Month of Acceptance : 11-2021
Month of Publishing : 11-2021

The ABO blood type system is frequently employed in clinical practice because it is the most well-examined erythrocyte antigen system and the most easily accessible factor in an individual's genetic makeup.[4] After Karl Landsteiner discovered the ABO blood group system in 1901, the link between the ABO blood group system and numerous disorders was not looked upon. The ABO blood type system has been linked to a variety of bacterial and viral infections.[5] Several research on COVID-19 in China

Corresponding Author: Dr. N Anuradha, Department of General Medicine, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

and the United States recently identified links between ABO blood group and COVID-19 infection, severity, and death.[6] Polymorphisms in the ABO gene are reflected in the ABO blood type characteristic. This gene is linked to several other characteristics, including COVID-19 morbidity and mortality risk factors.

In addition to individual mutations, a non-O blood type was determined to be one of the most important genetic risk factors for venous thromboembolism in a 2012 meta-analysis. These circumstances apply to COVID-19 as well. The multiple connections between diseases and both blood type and COVID-19 lead to the conclusion that actual relationships between blood type and COVID-19 morbidity and death may exist. In addition, past research has found links between ABO blood types and a variety of illnesses and disease severity.[7] While blood types are inherited genetically, environmental variables can impact which blood types in a population are handed down to the next generation more frequently. The ABO blood type has been linked to viral infection susceptibility. The Norwalk virus and Hepatitis B, for example, have distinct blood group susceptibility. It was also discovered that those with blood type O were less likely to contract the SARS coronavirus.[6]

The major goal of our research was to look at the distribution of ABO blood types in COVID-19-infected hospitalized patients. The prevalence of severe COVID-19 infection in distinct ABO blood types and the need for mechanical ventilation in various blood types were also analyzed.

METHODOLOGY

This observational study consists of 200 adult men and women, who were diagnosed as COVID19 positive in the period between June 2020 and November 2020. The diagnosis of COVID-19 will be based on the results obtained by the real-time polymerase chain reaction. The subjects will be patients admitted under the COVID ward and intensive care unit at Sree Balaji Medical College and Hospital, Chennai. Every patients' blood group and typing will be determined during the admission. The patient will be observed for the period of the whole hospital stay till he gets discharged/deceased. The severity of the disease will be measured in terms of fall in saturation, the requirement of O2 support, the requirement of IV steroids, Heparin, NIV support, and intubation and mortality despite all measures. The patients having elevated CRP, LDH, and D-dimer will also be considered as severe. All the details will be entered in a master chart and data will be analyzed to find out the association of various blood groups with the severity of the SARS COVID-19 disease.

Inclusion Criteria

The inclusion criteria included COVID-19 positive of either sex, age 18 years or more.

Exclusion Criteria

The following subjects were excluded from the study: (a) Those under the age of 18, (b) individuals who are beyond 90 years old, and (c) those who refuse to participate in the research.

All patients were given a complete medical history, including the onset and duration of their symptoms. All of the patients had a chest high resolution computed tomography (HRCT) and an electrocardiogram (ECG). A complete blood image was taken. blood typing and grouping, renal function test, lactate dehydrogenase (LDH), serum electrolytes, C-reactive protein, serum ferritin, D-dimer, total bilirubin, alanine aminotransferase, prothrombin time, aspartate aminotransferase, and gamma-glutamyl transferase (GGT) are some of the tests performed. A commercial kit provided by Spinreact was used to quantify serum triglycerides, total cholesterol, and high-density lipoprotein (cholesterol), as well as low-density lipoprotein.

The glucose-oxidase method was used to measure fasting blood glucose. A commercial kit was used to quantify glycated hemoglobin A1C using a column chromatography technique. The outcome was determined photometrically using a photometer after the final evaluation (Reference range 5.1–6.4%).

Relevant laboratory and radiological investigations

Liver function tests (including GGT) and hepatic viral markers as required; prothrombin time, blood grouping and typing, fasting lipid profile, fasting plasma glucose, postprandial glucose, HbA1C, ultrasound abdomen and pelvis, renal function test, S. ferritin, S.LDH, C-reactive protein, D-dimer, ECG, and HRCT chest.

Study Period

A period of 3 months was from September 2020 to November 2020.

Study Design

This was a prospective observational study.

RESULTS

200 adult men and women, who were diagnosed as COVID-19 positive in the period from June 2020 to November 2020, were included in this study. Among them, 78 of them were identified with mild infection followed by 74, 48, and 122 patients with moderate, severe, and cases requiring oxygen support [Table 1].

Among the patients, 144 were reported with blood Group A followed by 34 of them with Group O, 14 and 8 of them B+, and AB blood groups, respectively[Table 2].

With respect to the severity of disease, 39 of them belonged to blood Group A+, followed by 3, 14, 22, and 12 with groups A-, B+, AB, and O [Table 3].

Among patients requiring mechanical ventilation, 8 belonged to blood Group A-, 6 to Group A+, and 3 in Groups B+ and AB each, followed by 1 in blood Group O [Table 4].

Table 1 : Comparison of severity of disease enlisted

Disease severity	Number of patients
Mild cases	78
Moderate cases	74
Severe cases	48
Cases requiring oxygen support	122
Total	200

Table 2: Impact of COVID-19 on blood groups

Blood group	Number of patients
A	144
O	34
B+	14
AB	8
Total	200

Table 3: Severity of COVID-19 among blood groups

Blood group	Number of patients
A+	39
A-	34
B+	14
AB	22
O	12

Table 4: Severity of COVID-19 among various blood groups requiring mechanical ventilation

Blood group	Number of patients
A+	6
A−	8
B+	3
AB	3
O	1

DISCUSSION

Given the severity of the present epidemic, a better knowledge of COVID-19 is critical. We looked into if blood type had anything to do with infection, intubation, or mortality. Overall, we discovered minor but persistent changes in risk between blood types. In the current study, we discovered that people with blood type A had a higher chance of contracting COVID-19, but people with blood type AB have a reduced risk. A possible link between ABO blood group and COVID-19 infection, severity, and death was previously documented in a systematic review with meta-analysis of the literature on the relationship between ABO blood group and COVID-19 infection, severity, and death.[5] However, according to another study by Mullins *et al.*,[8] blood type O had the highest occurrence, followed by blood type A. Nevertheless, the greater COVID-19 frequency in blood type O was most likely due to the higher blood type O prevalence in our region's population. This indicates that having a certain blood type does not make you more susceptible to COVID-19 infection.[8]

Individuals with blood groups A+, A-, and AB had a higher risk of COVID-19 severity, whereas those with blood Group O had a reduced risk.[9] Wu *et al.*[5] previously observed a reduced frequency of blood type O in COVID patients in his research. According to Zietz *et al.*,[7] types A and B were associated with a higher risk of an initial positive test than type O, whereas type AB (the rarest) was associated with a very slight risk reduction (0.2%). These findings support a previously established link between SARS-CoV-1 and O blood types being less frequent among SARS patients. Guillon *et al.*[10] postulated that lower sensitivity to blood type O was caused by anti-A antibodies interfering with the interaction of the SARS-CoV-1 spike protein with the cellular receptor for angiotensin-converting enzyme-2.

A mechanical ventilator is used in 21 of the 48 patients, with the highest number of patients belonging to the A- blood group. Our findings are also in line with Zhao *et al.*,[6] who found that non-O types have a higher risk of infection, and Ellinghaus *et al.*[11] who found that non-O types have a higher risk of infection but a lower risk of mechanical ventilation, though the authors note that the difference is not statistically significant at the 5% level. In contrast to Ellinghaus *et al.*,[11] we estimate a slightly greater risk of intubation for types B and AB compared to type O.

CONCLUSION

Our findings revealed that blood type A is more vulnerable to COVID-19 infection, whereas blood Group O is less susceptible; suggesting that more research into the relationship between ABO blood group and COVID-19 infection is warranted. Meanwhile, our findings imply that those with blood Group A should practice greater personal hygiene to reduce the risk of infection. Furthermore, a correlation between ABO blood group and severity, as well as the requirement of oxygen support, might validate

as a strategy that contributes to the better management of SARA-CoV-2.

REFERENCES

1. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. Lancet Infect Dis 2020;20:533-4.
2. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, *et al*. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA 2020;323:1061-9.
3. Zeng F, Huang Y, Guo Y, Yin M, Chen X, Xiao L, *et al*. Association of inflammatory markers with the severity of COVID-19: A meta-analysis. Int J Infect Dis 2020;96:467-74.
4. Mao L, Jin H, Wang M, Hu Y, Chen S, He Q, *et al*. Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. JAMA Neurol 2020;77:683-90.
5. Wu BB, Gu DZ, Yu JN, Yang J, Shen WQ. Association between ABO blood groups and COVID-19 infection, severity and demise: A systematic review and meta-analysis. Infect Genet Evol 2020;84:104485.
6. Zhao J, Yang Y, Huang H, Li D, Gu D, Lu X, *et al*. Relationship between the ABO blood group and the coronavirus disease 2019 (COVID-19) susceptibility. Clin Infect Dis 2021;73:328-31.
7. Zietz M, Zucker J, Tatonetti NP. Associations between blood type and COVID-19 infection, intubation, and death. Nat Commun 2020;11:5761.
8. Mullins J, Al-Tarbsheh AH, Chieng H, Chaukiyal P, Ghalib S, Jain E, *et al*. The association of ABO blood type with the risk and severity of COVID-19 infection. Am J Blood Res 2021;11:53.
9. Cheng Y, Cheng G, Chui CH, Lau FY, Chan PK, Ng MH, *et al*. ABO blood group and susceptibility to severe acute respiratory syndrome. JAMA 2005;293:1447-51.
10. Guillon P, Clément M, Sébille V, Rivain JG, Chou CF, Ruvoën-Clouet N, *et al*. Inhibition of the interaction between the SARS-CoV spike protein and its cellular receptor by anti-histo-blood group antibodies. Glycobiology 2008;18:1085-93.
11. Ellinghaus D, Degenhardt F, Bujanda L, Buti M, Albillos A, Invernizzi P, *et al*. Genomewide association study of severe Covid-19 with respiratory failure. N Engl J Med 2020;383:1522-34.

How to cite this article: Anuradha N, Ashwin K, Patel HA. Association between Blood Type and Severity in COVID-19. Int J Sci Stud 2021;9(8):131-134.

Source of Support: Nil, **Conflicts of Interest:** None declared.