Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Impact of Blood Group Type on Severity of Disease in COVID-19 Patients

Shivani Rao,*,1 Surbhi Warrior, MDMPH,*,2 Sefer Gezer, MD,3,4 Parameswaran Venugopal, MD,4,3 Shivi Jain, MDMBBS4,3

1Rush University Medical Center, Chicago, IL
2Department of Internal Medicine, Rush University Medical Center, Chicago, IL
3Division of Hematology Oncology, Rush University Medical Center, Chicago, IL
4Rush University Cancer Center, Chicago, IL

Blood (2020) 136 (Supplement 1) : 29.

http://doi.org/10.1182/blood-2020-139021

Background

The virus SARS-CoV-2, which causes COVID-19 has rapidly spread into a global pandemic. In critically ill patients with the disease, common symptoms include sepsis, severe pneumonia with acute respiratory distress syndrome (ARDS), and complications such as coagulopathy and thrombosis. Many patients with COVID-19 have sequelae such as venous thromboembolism (VTE) including pulmonary embolism (PE) and deep vein thrombosis (DVT) as well as arterial thromboembolism (ATE) including stroke. COVID-19 induced inflammation can induce a prothrombotic state by activating the coagulation cascade; coupled with the immobility of severe and critically ill patients in ICU, making thrombosis common in this patient population. Different blood types in patients include A, B, AB, and O. ABO carbohydrate moieties are genetically inherited and have been linked to predisposing patients to cardiovascular diseases, cancers, and even susceptibility of COVID-19. Blood type positivity and negativity are determined by the Rhesus (Rh) factor, which is a protein found on the surface of red blood cells and is also genetically inherited and linked to higher incidence of certain diseases such as diabetes. Studies have shown a relationship between blood types and increased severity of infection from COVID-19 including increased risk of thrombosis. Blood type A has been shown to have higher severity of disease with O blood type having a
lower risk of infection or mortality. This study was done to evaluate if patients with different blood types have increased risk for thrombosis or higher mortality rates with COVID-19 infection.

Methods

A retrospective analysis was performed on COVID-19 positive hospitalized patients between March 1, 2020 and June 26, 2020 at our institution with reported blood typing. Patients who had a thromboembolism (VTE, DVT, PE, ATE, or stroke) verified by imaging were extracted from this cohort and included in the analysis. The prevalence of different blood types in COVID-19 patients was compared to the general population without COVID-19. The incidence of thrombosis and mortality rate based on blood type was analyzed to understand severity of COVID-19 disease. Statistical analysis was performed using chi-squared testing.

Results

Among 1265 COVID-19 positive patients during our time frame, 138 patients were identified to have a thrombosis. Of those, 102 patients with thrombosis and 402 without thrombosis had reported blood types that were used for analysis. There was no significant difference in prevalence of blood types in COVID-19 patients (A 34.3%, AB 2.9%, B 16.7%, O 46.1%) to the general nonCOVID-19 population (A32.7%, AB 4.2%, B 14.9%, O 48.1%) (p=0.8572). There was no significant difference in incidence of thrombosis between blood types: A (23.3%), AB (15%), B (20.7%), and O (18.7%) (p=0.6513). When stratifying by Rh factor, there was also no significant difference in incidence of thrombosis by blood types: A- (11.1%), A+ (24.1%), AB- (0%), AB+ (15.8%), B- (25%), B+ (20.3%), O- (18.2%), O+ (18.7%) (p=0.9054). There was also no significant difference in mortality rate between COVID-19 patients based on blood types in our cohort: A (20.7%), AB (15%), B (13.4%), and O (21.8%) (p=0.3747).

Conclusion

Our study demonstrates that there is no increased prevalence of one blood type over another between COVID-19 patients compared to the general population, showing that patients are not at higher risk for COVID-19 infection based on blood type. There was also no difference between blood types based on incidence of thrombosis. When further stratifying with Rh factor, there was also no difference in incidence of thrombosis based on blood types. This shows that regardless of Rh positivity or negativity, there is no increased risk for thrombosis in COVID-19 patients based on blood type. There is also no difference in mortality in COVID-19 patients based on blood type. Since COVID-19 patients who are critically ill and have more severe disease have higher incidence of thrombosis and higher mortality rates, our study suggests that patients are not at higher risk for severe COVID-19 disease based on blood type.
However, this study is also limited due to small sample size, and prospective studies are needed to better understand the relationship between blood type and severity of disease in COVID-19+ patients.

**Disclosures**
No relevant conflicts of interest to declare.

**Author notes**
* Asterisk with author names denotes non-ASH members.

This icon denotes a clinically relevant abstract

© 2020 by the American Society of Hematology