

Prevalence Of ABO Blood Groups And Its Susceptibility To Covid 19 Patients In A Tertiary Care Centre Located In A Tropical Region – A Retrospective Study: A Subject To Ponder!

¹Dr. A. Hariharan, ²Dr. I. Sureshkumar, ³Dr. N.V. Hemamalini, ⁴Dr. Vinod Kumar Panicker,

¹*Assistant Professor, Department of Transfusion Medicine, Saveetha Medical College Hospital.*

²*Senior Resident, Department of Transfusion Medicine, Saveetha Medical College Hospital.*

³*Tutor, Department of Transfusion Medicine, Saveetha Medical College Hospital.*

⁴*Professor and Head, Department of Transfusion Medicine, Saveetha Medical College Hospital.*

ABSTRACT: *The extensive spread of novel coronavirus19 (COVID19) had put a tremendous burden on health care facilities in investigation and prioritizing the treatment of COVID19 patients. Globally, as of 21 October 2020, there have been 40,455,651 confirmed cases of COVID-19, including 1,119,431 deaths, reported to WHO. Due to rapid increase in its alarmist state it is of prime importance to assess the factors influencing the COVID19 susceptibility. In our study we assessed one of the independent factors like blood group in COVID19 patients. We conducted a retrospective analysis to assess the prevalence and distribution of blood group among COVID19 patients in order to determine its susceptibility. In our study we assessed 1000 COVID19 patients and their blood group was traced in order to find their distribution. In our study majority of COVID19 patients belong to A group and the least belongs to O and AB group. Although a detailed analysis is required for determining the association between blood group and COVID19 susceptibility, these data can throw light and form the basement for a future extensive study.*

Keywords: *ABO Blood group, COVID19, Susceptibility.*

1. INTRODUCTION:

The novel coronavirus disease-2019 (COVID-19) has been spreading around the world rapidly and declared as a pandemic by WHO. There are 34 recognized human blood group systems and hundreds of individual blood group antigens and alleles. According to Landsteiner's law, ABO blood antigens are carbohydrate epitopes that are present on the surface of human cells. The antigenic determinants of A blood group is trisaccharide moieties GalNAc α 1-3-(Fuc α 1,2)-Gal β - and B blood group is Gal α 1-3-(Fuc α 1,2)-Gal β -, while O blood group antigen is Fuc α 1,2-Gal β -. While blood types are genetically inherited, the environment factors can potentially influence which blood types in a

population will be passed on more frequently to the next generation [1]. Differences in blood group antigen expression can increase or decrease host susceptibility to many infections. Susceptibility of viral infection has been previously found to be related to ABO blood group. For example, Hepatitis B and Norwalk virus has clear blood group susceptibility. ABO antibodies can be a part of the natural immune system against some bacterial pathogens as well as enveloped viruses that may play a crucial role in the pathogenesis and personal susceptibility to certain diseases; COVID-19 may be one among these diseases. Different factors which influence the susceptibility of COVID-19 infection were kept on unveiling by the health scientists as the disease progresses [1-3]. In order to assess one of the independent factors such as blood group determining COVID-19 susceptibility, we conducted this study in our tertiary care hospital. Although concrete evidence is not available in saying the blood group determines the COVID-19 susceptibility, the results of this study will form a baseline data for the future extensive study. However, in this study, differences between various blood group systems or blood group antigens which may give more accurate results with in-depth knowledge of the susceptibility of this new viral infection, are not mentioned.

2. MATERIALS AND METHODS:

Study Design:

This study was a retrospective cross sectional study conducted at Department of Transfusion Medicine, Tertiary care Hospital, Chennai, Tamilnadu. The study was done for a period of four months from June 2020 to September 2020.

Sample size and collection:

All SARS COV-2 RT-PCR positive patients including home quarantined and dead patients during the study period were included in this study. A total of 1000 patients were assessed during the study period. Consecutive sampling method was followed. Data regarding patient's blood group and RT-PCR will be collected from Medical records department of Tertiary care Hospital and analyzed.

Statistical Analysis

All the data regarding the study subjects were entered in Microsoft Excel and the data distribution on categorical variable such as blood group was expressed as frequency and percentage.

3. RESULTS:

The ABO blood group in 1808 normal people in Chennai displayed a percentage distribution of 20.6%, 34.07%, 6.25% and 38.94% for A, B, AB and O, respectively, while the 1000 patients with COVID-19 from our Tertiary care Hospital at Chennai, showed an ABO distribution of 37.7%, 25.9%, 3.2% and 33.2% for A, B, AB and O respectively [Table 1]. The percentage of A blood group in patients with COVID-19 was significantly higher than that in normal people, being 37.7% in the former vs 20.6% in the later ($P < 0.001$). The percentage of O blood group in patients with COVID-19 was significantly lower than that in normal people, being 33.2% in the former vs 38.4% in the later ($P < 0.001$).

Table1: Blood group frequencies among general population and COVID 19 patients

Blood Groups	General population		COVID 19	
	No	%	No	%
A	374	20.6	377	37.7
B	616	34.07	259	25.9
O	705	38.94	332	33.2
AB	113	6.25	32	3.2
TOTAL	1808		1000	

4. DISCUSSION:

In this study, we found that ABO blood groups have different association risks for the COVID- 19 infection.

In particular, A blood group was associated with an increased risk whereas blood group O was associated with a decreased risk, thus demonstrating that the ABO blood type is a biomarker for differential susceptibility of COVID-19. These findings are similar with risk patterns of ABO blood groups for corona virus infection found in previous studies [2,5-,9,12].

Patrice et al. found that anti-A antibodies specifically inhibited the adhesion of SARS-CoV S protein-expressing cells to ACE2-expressing cell lines [11].

The ABO antigens are carbohydrate-enriched epitopes present on erythrocytes, endothelial cells, and other specialized tissues and secreted within certain body fluids of some individuals. These antigens induce a potent immune response, triggering isoagglutinin antibodies against non- expressed ABO antigens. SARS virus carries spike proteins which express carbohydrate-rich moieties, as well as ABO antigens borrowed from the infected host. In this way, type O individuals, whose blood naturally contains both anti-A and anti-B isoagglutinin antibodies, are thought to have an inherent immune advantage against SARS viral infections [9,10,12], the lower susceptibility of O blood group and higher susceptibility of A blood group for COVID could be linked to the presence of natural anti-blood group antibodies, particularly anti-A

antibody, in the blood [4]. This speculation will need direct studies to prove. There may additionally be other mechanisms underlying the ABO blood group-differentiated susceptibility for COVID-19 that needs further studies to explicate.

5. CONCLUSION:

From our study we found that ABO blood groups showed variations in susceptibility to COVID-

19 infections. In our study population we found that A blood group patients have more susceptibility to COVID-19 infections than B and O blood group patients. In order to emphasize our findings more detailed study with more parameters and associations determining the ABO blood group and its susceptibility to COVID-19 infections is needed. Our study findings may throw an initial limelight for a detailed extensive study which may pave way for determining ABO blood typing as a biomarker of COVID-19 infections.

Source of funding- NIL

Conflict of Interest - NIL

ACKNOWLEDGEMENT:

6. REFERENCES:

- [1] Zhao J, Yang Y, Huang H, Li D, Gu D, Lu X, et al. Relationship between the ABO blood group and the COVID-19 susceptibility [Internet]. bioRxiv. 2020. Available from: <http://dx.doi.org/10.1101/2020.03.11.20031096>
- [2] Obayes AL-Khikani F. The role of blood group in COVID-19 infection: More information is needed. *J Nat Sci Med.* 2020;3(3):225-226.
- [3] Cooling L. Blood groups in infection and host susceptibility. *ClinMicrobiol Rev.* 2015;28(3):801–70.
- [4] Gérard C, Maggipinto G, Minon J. COVID-19 and ABO blood group: another viewpoint. *Br. J. Haematol.* 2020;190(2).
- [5] Dai X. ABO blood group predisposes to COVID-19 severity and cardiovascular diseases. *Eur. J. Prev. Cardiol.* 2020;27(13):1436-1437.
- [6] Zietz M, Tatonetti NP. Testing the association between blood type and COVID-19 infection, intubation, and death. medRxiv [Internet]. 2020; Available from: <http://dx.doi.org/10.1101/2020.04.08.20058073>.
- [7] Cheng Y, Cheng G, Chui CH, Lau FY, Chan PK, Ng MH, Sung JJ, Wong RS. ABO blood group and susceptibility to severe acute respiratory syndrome. *JAMA.* 2005 Mar 23;293(12):1450-1
- [8] Dzik S, Eliason K, Morris EB, Kaufman RM, North CM. COVID-19 and ABO blood groups. *Transfusion.* 2020;60(8):1883–4.
- [9] Ellinghaus D, Degenhardt F, Bujanda L et al. Genomewide association study of severe Covid-19 with respiratory failure. *N Engl J Med.* 2020 Jun 17.
- [10] Latz CA, DeCarlo C, Boitano L, et al. Blood type and outcomes in patients with COVID-19. *Ann Hematol.* 2020 Sep;99(9):2113-2118.
- [11] Guillon P, Clément M, Sébille V, Rivain JG, Chou CF, Ruvoën-Clouet N, LePendu J.

Inhibition of the interaction between the SARS-CoV spike protein and its cellular receptor by anti-histo-blood group antibodies. *Glycobiology*. 2008Dec;18(12):1085-93.

- [12] Barnkob MB, Pottegård A, Støvring H, Haunstrup TM, Homburg K, Larsen R, et al. Reduced prevalence of SARS-CoV-2 infection in ABO blood group O. *Blood Adv*. 2020;4(20):4990–3.