VOLUME - 10, ISSUE - 06, JUNE- 2021 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Immunohaematology



Fahimuddin	$\label{eq:stant} Assistant  \text{Professor},  \text{Dept of Pathology},  \text{GSVM}  \text{Medical}  \text{College}  \text{Kanpur}.$
Dr Samarjeet Kaur	Assistant Professor, Dept of Community Medicine, GSVM Medical College Kanpur.
Dr Chayanika Kala*	Assistant Professor, Dept of Pathology LPS Institute of Cardiology Kanpur. *Corresponding Author

ABSTRACT

orresponding Auth Purpose: COVID-19 has caused large scale morbidity and mortality. Assessment of frequency of blood groups in COVID-19 to investigate its susceptibility in different blood groups will help in risk stratification

and its better understanding.

Aims: To assess association between blood group antigens and coronavirus infection.

Settings and Design: Blood group of COVID-19 patients was determined and was compared with blood group of blood donors over a period of 23 months. Blood group of both Ccovid-19 positive and negative health care workers was also compared.

Methods and Material: Blood group determination was done in 1559 COVID-19 patients, out of which 81 were health care workers. Blood group of 754 COVID-19 negative health care workers was also determined. Gel column technique was used for blood grouping. Blood group frequency of COVID-19 patients was compared with blood group frequency of blood donors over a period of 23 months.

Statistical analysis used: Odds ratio, 95% confidence limit, z statistic and p value were calculated using online software available at https://www.medcalc.org/calc/odds\_ratio.php. p value less than 0.05 was considered significant.

Results: B+ is most prevalent blood group in blood donors hence it was the most frequent blood group encountered in COVID-19 patients, No significant difference was noted in frequency of blood groups of COVID-19 patients and blood donors. Similar results were obtained after comparison of blood group in COVID-19 positive and negative

Conclusions: No blood group is immune to SARS-CoV-2. Hence there should be universal compliance of sanitization protocols and vaccination

# KEYWORDS : COVID-19, SARS CoV-2, Blood groups, risk factors.

## **INTRODUCTION:**

Covid-19 pandemic caused by SARS- CoV-2 virus has led to high morbidity and mortality. As of 29 November, 202061.8 million cases and over 1.4 million deaths have been reported globally. This had led to unprecedented strain on health care facilities and economies especially in developing world countries. Various studies to elucidate risk factors and to provide healthcare to vulnerable groups has been undertaken. Stratification of risk factors will also play a role in decisions regarding vaccination against Covid-19 to more susceptible groups on priority.

Advance age, male sex, comorbidities like cardiovascular disease, diabetes, COPD pose a greater risk for SARS-CoV-2 infection and higher disease severity.<sup>2</sup> ABO blood groups have been investigated in different diseases. Individuals with blood group O are more susceptible to Norwalk virus and H. pyelori.<sup>34</sup> There is increased risk of acute respiratory distress syndrome in trauma and sepsis patients in group A individuals.<sup>5</sup> Risk of cardiovascular diseases and gastric carcinoma is higher in individuals with non-O groups, however, no difference is seen in overall cancer morbidity and mortality.

## SUBJECTS AND METHODS:

Blood group determination was done in 1559 COVID-19 positive patients by gel column technique, over a period of 4 months in a tertiary level 3 hospital of north India. Out of these 1559 patients 81 were health care workers who become infected. Blood group data was also collected from COVID-19 negative health care workers (N=754) to assess susceptibility in reference to their blood groups. Diagnosis of COVID 19 was confirmed by positive real-time reverse transcriptase polymerase chain reaction test of SARS-CoV-2 on

nasopharyngeal swab specimens from patients. Patients of COVID-19 belonging to moderate and severe category were included as mild severity patients were not hospitalized, hence were excluded from study due to lack of data.

Blood group data of blood donors from January 2019 to November 2020 was retrieved and was considered as control group (N=40817). Blood group data of blood donors was also compared with survey by Nanu et al<sup>7</sup> to see the comparability blood group frequency in donors with that of general population in north India Odds ratio, 95% confidence limit, z statistic and p value was calculated using online software available at https://www.medcalc.org/calc/odds ratio.php. p value less than 0.05 was considered significant.

## **RESULTS:**

Out of 40817 blood donors (control group), 38364 (93.9%) were males, while among 1559 COVID patients 67.7% (n=1056) were males. Majority of individuals in control group were in the age range of 29-38 (n=23346) followed by age group of 39-48 years (n=5551). Most of the patients, 718 (46%) were in the age group of 20-40 years. B+ blood group has the highest number of COVID patients as B+ is the most prevalent group in north Indian population. On comparison of frequency of blood group in control group and COVID group, no significant difference was noted (Table 1).

Table 1: Frequency of different blood groups in blood donors
and COVID-19 positive patient

Rh	Numbe	Number	Odds	95%	Z	р
Positive	r Of	of COVID	Ratio	confidence	Statistics	Value
Blood	Blood	positive		limit		
Group	Donors	patients				

10 ★ GJRA - GLOBAL JOURNAL FOR RESEARCH ANALYSIS

OLUME -	10. ISSUE -	06, IUNE-	2021 •	PRINT ISSN No.	2277 - 8160	<ul> <li>DOI : 10.36106/gira</li> </ul>

A +	8636	297	0.877	0.79 to	2.001	0.045
	(21.2%)	(19.0%)		0.99		
B+	14346	569	1.06	0.95 to	1.096	0.2732
	(35.0%)	(36.5%)		1.18		
0+	12024	441	0.94	0.84 to	0.996	0.319
	(29.5%)	(28.3%)		1.05		
AB+	3859	168	1.156	0.98 to	1.745	0.081
	(9.5%)	(10.8%)		1.36		
Rh	1952	84 (5.4%)	1.134	0.90 to	1.097	0.273
negative	(4.8%)			1.41		
Total	40817	1559	-	-	-	-
	(100%)	(100%)				

Blood group frequency was also compared between COVID positive and negative health care workers to assess the susceptibility of infection. No significant difference was observed (Table 2).

# Table 2: Frequency of blood groups in COVID negative and positive health care workers

Rh	Number	Number	Odds	95%	Ζ	р
Positive	COVID	of COVID	Ratio	confidence	Statistics	Value
Blood	negative	positive		limit		
Group	HCWs	HCWs				
A +	149	15	1.0836	0.60 to 1.95	0.267	0.79
	(19.8%)	(18.5%)				
B+	269	29	0.9945	0.62 to 1.60	0.023	0.98
	(35.7%)	(35.8%)				
O+	217	23	1.0190	0.61 to 1.69	0.073	0.94
	(28.8)	(28.4%)				
AB+	82	9 (11.2%)	0.9762	0.47 to 2.02	0.065	0.95
	(10.8%)					
Rh	37 (4.9)	5 (6.1%)	0.8876	0.34 to 2.32	0.243	0.80
negative						
Total	754	81	-	-	-	-
	(100%)	(100%)				

HCWs = Health care workers

### DISCUSSION:

There is variation between different ABO and Rh genes and phenotypes among different regions and populations. India is like a microcosm of the world in terms of its diversity due to constant migration of different populations as a result of good weather and fertile land<sup>8</sup>. Intermarriages between native people and migrants have led to mixing of genes. Many studies have shown predominance of B blood groups in north Indian population<sup>7,9</sup> which is similar to our study.

Control group had 93.9% males in comparison to 67.7% males among COVID patients due to the fact that a smaller number of females are fit to donate blood due to anaemia, pregnancy lactation malnutrition etc. However, blood group antigen is independent of sex therefore it cannot be a confounding factor, hence ignored. Male preponderance among patients could be due higher movement of males out of their homes due to their occupation.

COVID -19 pandemic has led to massive loss of lives and had a deleterious effect on economies across the globe. Stratification of risk factors and prognostic markers will help in better patient management especially in the absence of definitive treatment protocols. Many studies have been carried out to assess the association between blood group and susceptibility and severity of COVID-19<sup>10-14</sup> Meta-analysis of different studies have shown decreased prevalence of SARS-CoV-2 infection in ABO group O in comparison to other groups. Blood group A was found to be a partial risk factor for COVID-19. Blood group B and AB were not significantly associated with SARS-CoV-2 infection. However, no significant association was found between mortality and frequency of blood groups.<sup>12</sup> Present study did not find any significant association between blood groups and COVID-19, despite the reports that angiotensin-converting enzyme 2 (ACE2) is receptor for SARS-CoV-2<sup>13</sup> and the receptor binding domain is present on S protein of coronavirus. S protein expressed by A-positive infected cells shares epitopes of A blood group, hence adhesion of S protein and ACE2 can be inhibited by anti A natural antibodies<sup>14</sup>. Thus, anti-A and anti-B natural antibodies being produced in individuals with blood group O could potentially block viral adhesion to cells<sup>12</sup>.

People with blood group O have also higher interleukin 6 (IL-6) levels<sup>15</sup> which is a proinflammatory cytokine associated with COVID-19 severity, as it is a part of a cytokine storm.

### CONCLUSION:

No association was observed between frequency of blood groups and COVID-19 infection, highlighting the fact that no blood group is immune to SARS-Cov-2. We emphasize the need to follow COVID protocols regarding wearing of masks, hand sanitization and physical distance and universal vaccination of all population.

### Acknowledgement: None

#### **REFERENCES:**

- Coronavirus disease 2019 (COVID-19) weekly epidemiological update 16 World health organization WHO Coronavirus disease 2019 (COVID-19) weekly epidemiological updates (2020-12-1) https://www.who.int/publications/m/item/weekly-epidemiological-update--1-
- december-2020 2. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y et al. Epidemiological and
- 2. Chief R, Diot R, Dong R, Qu J, Cong J, Han T et al. "Internet module and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020 (published online Jan 29). https://doi.org/10.1016/S0140-6736(20)30211-7
- Lindesmith L, Moe C, Marionneau S, Ruyoen N, Jiang X, Lindblad L, et al. Human susceptibility and resistance to Norwalk virus infection. Nat Med 2003;9:548-53
- Lin CW, Chang YS, Wu SC, Cheng KS. Helicobacter pyelori in gastric biopsies of Taiwanese patients with gastroduodenal diseases. Jpn J Med sci Biol 1998;51:13-23
- Reilly J, Meyer N, Shashaty M, Feng R, Lanken P, Gallop R et al. ABO blood type A is associated with increased risk of acute respiratory distress syndrome in Caucasians following both major trauma and severe sepsis. Chest 2014;145:653-61
- Etemadi A, Kamangar F, Islami F, Poustchi H, Pourshams A, Brennan P et al. Mortality and cancer in relation to ABO blood group phenotypes in Golestan Cohort study. BMC Med 2015;13:8
- Nanu A, Thapiyal RM. Blood group gene frequency in a selected north Indian population. Indian J Med Res 1997;106:242-6. PMID 9378531
- Ågrawal S, Srivastava S K, Borkar M, Chaudhari T K. Genetic affinities of north and northeastern populations of India: inference from HLA-based study. Tissue Antigens. 2008;72:120-30. Doi: 10.1111/j.1399-0039.2008.01083.x. PMID:18721272
- Agrawal A, Tiwari A K, Mehta N, Bhattacharya P, Wankhede R, Tulsani S, et al. ABO and Rh(D) group distribution and gene frequency; the first multicentric study in India. Asian J Transfus Sci 2014;8:121-5
- Barnknob M B, Pottegard A, Stovring H, Haunstrup T M, Homberg K, Larsen R et al. Reduced prevalence of SARS-CoV-2 infection in ABO blood group O. Blood Advances. 2020;4:4990-93 DOI 10.1182/bloodadvances.2020002657
- Latz C A, DeCarlo C, Boitano L, Maximilian Peng C Y, Patell R, Conrad M F et al. Blood type and outcomes in patients with COVID-19. Ann Hematol 2020;99:2113-18. https://doi.org/10.1007/s00277-020-04169-1
- Pourali F, Afshari M, Alizadeh-Navaei R, Javidnia J, Moosazadeh M, Hessami A. Relationship between blood group and risk of infection and death in COVID-19: a live meta-analysis. New microbes and new infections. 2020;37:1007431SSN 2052-2975, https://doi.org/10.1016/j.nmni.2020.100743
- Zhao J, Yang Y, Huang H-P, Dong Li, Dongfeng Gu, Xiangfeng Lu et al. (2020) Relationship between the ABO blood group and the COVID-19 susceptibility. medRxiv. https://doi.org/10.1101/2020.03.11.20031096.03.11.20031096
- Guillon P, Clement M, Sebille V, Rivain JG, Chou CF, Ruvoen-Clouet N et al. Inhibition of the interaction between the SARS-CoV spike protein and its cellularreceptor by anti-histo-blood group antibodies. Glycobiology 2008;18:1085-93
- Naitza S, Porcu E, Steri M, Taub DD, Mulas A, Xiao X, et al. A genomewide association scan on the levels of markers of inflammation in Sardinians reveals associations that underpin its complex regulation. PLoS Genet 2012;8:e1002480.