Original Article

Pattern of ABO and Rh Blood Groups Distribution Among COVID-19 Patients

ABO and Rh Blood Groups Distribution Among COVID-19

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ABSTRACT

Objective: This study was conducted to find out the pattern of blood group distribution among Covid-19 patients in this part of world.

Study Design: cross-sectional study

Place and Duration of Study: This study was conducted at the department of Pathology, Margalla Hospital Taxila from April to June during first phase of Corona followed by second wave in October to December 2020.

Materials and Methods: In this study, 3936 participants were included using non-purposive consecutive sampling technique, who were tested for COVID 19 by real-time reverse RT-PCR. Data was analyzed using SPSS version 26. Frequencies for different blood groups were calculated. Cross tabulation was done for RT-PCR positive and negative blood groups and chi square test of significance was applied.

Results: Out of 3936, 436 (11.1%) tested positive by RT-PCR. Majority of males tested positive (64%, p=.001). Most frequent blood group among covid patients was B (38.7%, p= .001), followed by O (29.3%), A (22.7%) and AB (9.1%). Out of total 436, 399 (91.5%) were Rh positives.

Conclusion: Blood group B and Rh positives were more frequent among study population; however, it doesn't conclude that these blood groups increase susceptibility to covid infection.

Key Words: SARS-COV-2, COVID- 19, ABO blood groups, Rh blood groups

INTRODUCTION

Outbreak of Zoonotic origin viral infection (SARS-CoV-2), caused by novel corona virus occurred in Wuhan, China in December 2019. Leading to unexplained pneumonia, this infection was declared a pandemic and Global Health Emergency by World Health Organization (WHO) on 11th March, 2020.[1] The novelty of this virus and lack of literature has led to uncertainty in multiple aspects of this disease.[2] Association of Covid-19 infection with various biological markers including blood group antigens is among them. International society of blood transfusion has recognized 34 human blood group systems among which ABO and Rh blood group antigens are commonly investigated.[3] Difference in blood group antigens expressions can increase or decrease host susceptibility to various bacterial and viral agents[4].

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Blood group antigens mainly serve as a receptor or co-receptor for infectious agents and many blood group antigens facilitate adhesion, intracellular uptake and signal transduction through organization of microdomains.[5] Previous studies have shown susceptibility of ABO blood groups to bacteria like helicobacter pylori and viruses such as Hepatitis B, Norwalk virus and SARS corona Virus.[6,7] In this ongoing pandemic people more susceptible of acquiring this infection should be identified so in future certain characteristics are kept in mind while diagnosing the illness.[8] Risk of acquiring COVID-19 infection is equal among people with different blood group types.[9] However, a study from Wuhan, China showed that odds of having SARS-COV-2 infection was more common among A while less among O blood group of ABO system. Zietz and Tatonetti found that blood type A was correlated with a higher odds of testing positive for disease while Rh (D) positive blood groups were associated with increased infection and death following infection.[10] Another study also showed higher risk of acquiring SARS-COV-2 with blood group A and lower risk with O group as compared to non-O groups.[11] Regarding RH factor, Rh (−) blood group is found to be protective and the Rh (+) blood group is susceptible to Covid 19 significantly.[12]

We undertook this study to understand the pattern of SARS-COV-2 among ABO blood group in our part of the world. In this study we observed the blood groups in SARS-COV-2 infected population and compared

them against the ABO blood of SARS-COV-2 negative population. The aim is to identify increased susceptibility of acquiring COVID-19 infection among certain blood groups. So that high-risk blood groups are identified as markers of acquiring infection and are dealt accordingly in future for better control and elimination of this public health disease.

MATERIALS AND METHODS

This was a cross-sectional study carried out in the department of Pathology, Margalla hospital Taxila from April to June during first phase of Corona followed by second wave in October to December 2020, after approval of Ethical Review Committee of the hospital. Patients of all age groups irrespective of their gender were included after informed consent. The confidentiality of the patients was preserved. Non-purposive consecutive sampling technique was used. All persons who were screened for COVID 19 by real-time reverse transcriptase polymerase-chain-reaction test (RT-PCR) were included in the study. Sample size calculated for total population with a margin of error of .05% was 430. Study variables (ABO, Rh blood groups, gender, indication of test and test results were obtained from Hospital data record (HMIS). Nasopharyngeal swabs were collected from all persons by trained lab technician after wearing proper PPEs using minitip swab with a flexible shaft (wire or plastic) through the nostril parallel to the palate until resistance encountered after tilting the head back to 70 degrees, till it reached the depth, equal to distance from nostrils to outer opening of the ear. Then by gently rubbing and rolling the swab to absorb secretions. Swabs were placed immediately into a sterile transport tube containing 2-3mL of viral transport medium (VTM), followed by labelling each specimen container with the patient's ID number and the date. These samples were then transported to tertiary care center for performance of RT-PCR, in a thermopole container containing ice packs maintaining temperature to 2-8 Celsius.

RESULTS

Total 3936 participants were tested for COVID-19 using RT-PCR either because of having symptoms or for preventive screening. Out of 3936, 436 (11.1%) tested positive for PCR, whereas 3500 (88.9%) tested negative. Overall test positivity was 11%. Male participants were 2835 (72%), whereas females were 1101(28%).

Table No.1: Gender distribution among PCR Positive and Negatives

Gender	RT-PCR Result		p -Value
	Positive	Negative	
Male	280 (64%)	2555 (73%)	
Female	156 (35.7%)	945 (27%)	.001*
Total	436	3500	

Statistically significant association was observed between gender and RT-PCR positivity status

The mean age of participants was 37.12 (SD=14.83). Minimum age was 2 months and maximum was 86 years. A statistically significant association was observed between age categories and study groups.

Table No.2: Age distribution of the study participants

| Age categories	Study participants		Total	P Value
	PCR Positive	PCR negative		
0 -18 years	68	395	463	.001*
19-60 years	349	2995	3344	
≥61 years	19	110	129	
Total	436	3500	3936	

*Statistically significant at .05

Regarding distribution of blood groups, majority of patients (158) having positive PCR had B+, followed by O+ (117). Statistically significant association was found to exist between blood groups and PCR positive and negatives.

Table No.3: Frequency of ABO blood groups among study groups

Blood Groups	Study Participants		P Value
	PCR Positive	PCR Negative	
A	99 (22.7%)	813 (23.2%)	
AB	40 (9.1%)	353 (10%)	.001*
B	169(38.7%)	1279(36.5%)	
O	128(29.3%)	1055(30.1%)	

Table No.4: Frequency of and Rh blood groups among study groups.

Rh+ Blood Groups (n=3551)	PCR Positives	PCR Negatives	Rh- Blood Groups (n=385)	PCR Positive	PCR Negative	P Value
A+	89(2.5%)	742 (20.8%)	A-	10(2.5%)	71(18.4%)	.87
AB+	35 (.98%)	309 (8.7%)	AB-	5 (1.2%)	44 (11.4%)	.57
B+	158 (4.4%)	1168 (32.8%)	B-	11(2.8%)	111 (28.8%)	.40
O+	117 (3.2%)	933 (26.2%)	O-	11(2.8%)	122 (31.6%)	.19
Total	399 (11.2%)	3152 (88.7%)	Total	37(9.6%)	348 (90.3%)	.57
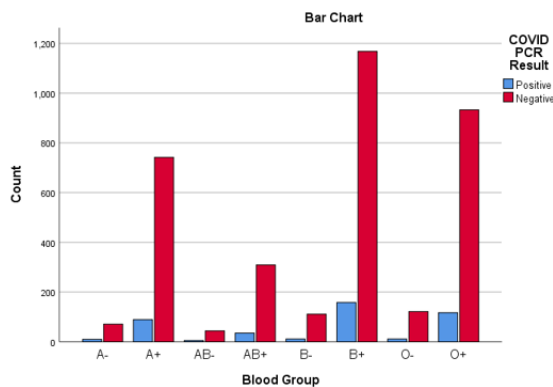
Figure No.1: Distribution of blood groups among RT-PCR Positives and Negatives

DISCUSSION

Since COVID-19 is an emerging virus, number of studies have been conducted to establish an association between ABO blood groups to SARSCoV-2 infection causing COVID-19 disease and it was found that blood group O was less frequent among severely ill patients, while Blood group A was found to be most vulnerable.[13]

Results of our study showed that maximum covid patients had blood group B (38.7%), followed by O (29.3%), A (22.7%) and AB (9.1%). These findings are inconsistent with findings of study conducted at Wuhan that showed maximum patients had blood group A (37.7%), followed by blood group B (26.5%), O (25.8%) and AB (10%).This distribution of blood groups among covid patients at Wuhan was similar to that found among general population of Wuhan.[14]

Angileri F et al, reported significantly low frequency of B and O blood groups 927 (52.2%) among COVID-19 patients as compared to group A and AB 848(47.8%) collectively. Where A was significantly more frequent 670 (37.7%) as compared to AB 178 (10%).[15] This distribution is evident from findings of current study. More than half of covid-19 patients had blood group O and B (68% collectively), with majority of having blood group B 169 (38.7%).

Regarding pattern of RH positives and negatives among Covid-19 patients, frequencies of B+, O+, A+ and AB+ were (4.4%), (3.2%). (2.5%) and (.98%). Whereas the frequencies of B-, O-, A- and AB- were (2.8%), (2.8%), (2.5%) and (1.2%) respectively. These findings contradict the results of study conducted by Saify et al, showing distribution of O+, A+, B+, AB+ as (25.25), (29.24), (17.61), and (9.30%) respectively and frequencies of O-, A-, B- and AB- as (7.31%), (7.97%) (2.66%) and (0.66%) respectively.[16]

Frequency of blood groups among 11,468 COVID-19 patients reported in a study conducted at USA showed that blood group O was most frequent (48.1%), followed by A (39.6%), B (9%) and AB (3.2%).[17] Same pattern of blood groups distribution was observed between hospitalized O(49.2%), A(38.6%), B(8.8%), AB(3.4%) and non-hospitalized O(47.9%), A(39.9%), B(9.1%), AB(3.1) covid-19 patients in that study. Whereas in our study blood group O (29.3%) was second most frequent after blood group B (38.7%), followed by A (22.7%) and AB (9.1%).

Ad'hiah et al demonstrated pattern of blood group distribution among covid patients (n=300) in Iraqi an population. No significant difference was observed to occur between distribution of A (28.7%), B (26.7%), O (025.1%) and AB (19.6%). These findings are not aligned with results of present study. A statistically significant difference was observed among COVID-19 PCR positive and negative groups, secondly the most frequent blood group in present study was B (38.7%).[18] This difference might be attributed to demographic variations among two populations.

Findings of this study are consistent with results of another study conducted by Rahim F et al, that showed proportion of blood type-B was significantly higher among COVID-19 group (35.9% vs 31.9%, p=0.009). 93.3% were having Rh Positive blood types in COVID-19 group. This finding is aligned with results of present study (91.5% RH positives).[19] This similarity is likely due to ethnically homogenous samples in both studies.

Despite of a significant difference in distribution of blood groups among Covid-19 PCR positive and negatives, our data does not support any correlation between COVID-19 and blood groups, in contrast to previous studies that shows diverse association of ABO blood group to SARSCoV-2 infection causing COVID-19 disease. The influence of blood group antigens on body's immunity still needs further research for better understanding.

CONCLUSION

Blood group B and Rh positives were more frequent among study population; however, it doesn't conclude that these blood groups increase susceptibility to covid infection.

Author's Contribution:

Concept & Design of Study:	Shabana Asif
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Revisiting Critically:	Shabana Asif
Final Approval of version:	Shabana Asif

Conflict of Interest: The study has no conflict of interest to declare by any author.

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