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Novel Corona Virus (Covid-19) Infection and Blood Group Antigen: An Observational Multicentric Study in Gujarat Population

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ABSTRACT: Covid -19 is a respiratory disease caused by the SARS COV-2 virus. Many viral diseases have shown there Association with ABO blood group in the past. Hence it was hypothesized that blood group antigens mat have some relationship with the susceptibility of covid 19 infection. This study was designed to explore such relationship using the blood group data of the infected patients during the pandemic time.

Methods: It was an observational, noninvasive retrospective study conducted on the covid-19 positive cases registered at the covid hospital from nov- 2020 to march -2021. We determined the blood groups for covid -19 tested individual by using laboratory measures recorded in the HMIS system and IHBT department. All health care workers of hospital and cases tested negative was taken as a control cases.

Results: A total of 1414 case data was collected out of which 1153 cases where confirmed positive cases and 261 cases was taken as a control cases of health care workers were analyzed. Positive cases (81.54%) and control (18.46%).

Male (70%) cases female (30%) cases so male are more affected than females.

In covid-19 positive cases blood group A shows (22.50%), blood group B shows (37.40%) and blood group O shows (28.30%).

The Krushkal-Wallis test comparing the blood group results of the COVID 19 patients showed a significant difference between the three centers. ($x^2 = 6.552$, df = 2, $p<0.05$)

Conclusions: the present study shows that there is an evidence for association between blood group and covid -19.specifically people with blood group B shows a higher risk than blood group O and then blood group A for SARS covid-19 infection in Gujarat.

KEY WORDS: ABO Blood group, Rh, covid-19; SARS-cov-2.

I. INTRODUCTION:

The novel corona virus SARS COV-2 causing the new infectious disease covid-19 is currently spreading rapidly in the world. The relationship between the ABO blood group antigen and corona virus was studied and shows the strong relationship.

Landsteiner's ABO blood types are carbohydrates epitopes that are present on the surface of human cells. The antigenic determinants of A and B blood group are trisaccharide moieties GalNAcα1-3-(Fucα1, 2)-Galβ- and Galα1-3- -(Fucα1, 2) - Galβ-, while O blood group antigen is Fucα1, 2) - Galβ-.[1,2] While blood types are genetically inherited the environmental factors can potentially influence which blood types in a population will be passed on more frequently tot the next generation.[3,4], It was also reported that blood group O individual were less likely to become infected by covid-19. SARS-COV-2 replicates respiratory & gastro epithelium that can synthesize A or B glycan antigens, depending on the phenotype.[6] If the S protein of an A, B, OR AB group individual carries respective glycan

antigens. It is possible that binding of the respective antibodies can block the interaction between S protein and ACE2, thereby offering complete or incomplete protection [7]. Thus we can predict the infectivity between ABO groups. For e.g. the virus produced in an individual with blood group B will be caring antigen B and has a higher chance of infecting a person with blood group B or AB, as compared to blood group A and O. this can explain the least number of cases in blood group O that contains both antibody-A and antibody – B. it is also believed that once the infection is fully established , it then replicates in the individuals epithelial cells and thus exhibits that individual antigen, rendering the individuals antibodies ineffective[8,9]

This study was designed to explore the relationship between the ABO blood group type and the susceptibility to covid-19 patients in Gujarat.

II. MATERIALS &METHODS:

It was an observational, noninvasive retrospective study conducted on the cases registered at the covid hospital, from Nov-2020 to March -2021.

The study protocol was approved by the Ethics Research Committee, of the different centres of Gujarat (Reference No23815/20).

The blood groups details of covid -19 patients were recorded from three different centres of Gujarat by using laboratory measures recorded in the hospital management and information system (HMIS) and immuno-haematology and blood transfusion (IHBT) department. The standard Performa was used to record the demographic details of the patient. The data include patient age, gender, Covid -19 statuses, and their ABO and the RH blood group status. Only those cases which had proper hospital and identification documents mentioning their blood groups were included.

This was a retrospective study no patients were directly involved in the study design, setting the questions, or the outcome measures directly.

Health care workers who participated willingly in this research project tested negative was taken as a control cases. Consent from all health care workers was taken and the data including covid-19 status, ABO & RH blood group status was collected. One Google Form questionnaires were designed and written in the English, language, the questionnaires were distributed via social media whaatsup.

The control questionnaire included questions similar to that of the first category of questions in the COVID-19 questionnaire;

All participants were allowed to terminate the survey at anytime. All measures were taken to keep the confidentiality of the data. The survey was outlined following the pertinent guidelines. This comparison was done only to compare with different age groups and gender groups. The data was entered in the Microsoft excel sheet and the statistical analysis was performed using the statistical tools.

III. RESULTS:

A total of 1414 cases which included 1153 Covid- 19 positive cases and 261 control subjects were included in the study. The study subjects included a total of 901 males (63.70%) and 512 females (36.30%).positive cases males shows (69.99%) whereas female shows (29.91%).

This shows that male is more affected than females. Whereas in control groups male were 36 % and female were 64% i.e. because more number of females are working as a health workers than males. Almost 64% were female in health care system so there was no infection to the female health care workers. (Table-1)

In confirmed cases blood group A shows 22.50%, blood group B shows 37.40% whereas blood group O shows 28.30%.blood group AB shows 8.20%. (Table-2).

The proportion of blood group B of confirmed cases was significantly higher than that of normal.

In control cases blood group A shows 22.60%, blood group B shows 29.10%, whereas blood group O shows 32.60 % and blood group AB shows 8%. (Table-2)

The proportion of blood group O (28.30%) in confirmed cases was significantly lower than that of normal (32.60).so hospital staffs have lower chance of getting infected.

Frequency distribution of various blood groups is shown in figure -1.

The cross tabulation of the blood group data with the two study groups revealed a significant relationship between the blood group and the COVID 19 infection. ($x^2 = 16.667$, df = 7, $p<0.05$) (Table-3).

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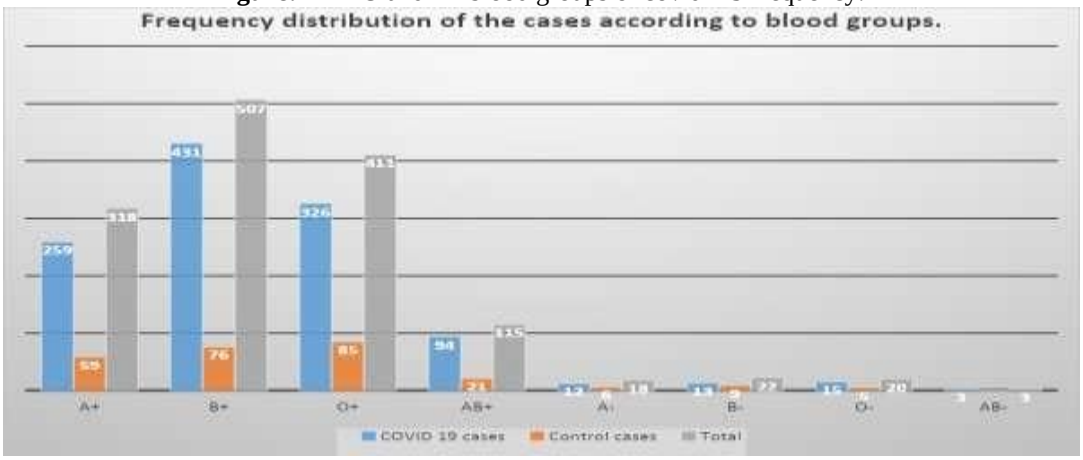
Table 1: The table showing the frequency distribution of the study subjects.

Study subjects	Male		Female		Total	
	N	%	N	%	N	%
COVID 19 cases	807	69.99%	345	29.91%	1153	81.54%
Control cases	94	36%	167	64%	261	18.46%
Total	901	63.70%	512	36.30%	1414	100.00%

Table 2: The table showing the frequency distribution of the COVID19 and control cases according to the blood groups.

Blood Group	COVID 19 cases		Control cases		Total	
	n	%	n	%	n	%
A+	259	22.50%	59	22.60%	318	22.50%
B+	431	37.40%	76	29.10%	507	35.90%
O+	326	28.30%	85	32.60%	411	29.10%
AB+	94	8.20%	21	8%	115	8.10%
A-	12	1%	6	2.30%	18	1.30%
B-	13	1.10%	9	3.40%	22	1.60%
O-	15	1.30%	5	1.90%	20	1.40%
AB-	3	0.30%	0	0%	3	0.20%
Total	1153	100%	261	100%	1414	100%

Figure: 1 ABO and Rh blood groups of covid -19 frequency.



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Table; 3 The cross tabulation of the blood group data with the two study groups revealed a significant relationship between the blood group and the COVID 19 infection. (x^2 = 16.667, df = 7, p<0.05)

Blood Group	Male		Female		Total	
	n	%	n	%	n	%
A+	187	23.20%	72	20.80%	259	22.50%
B+	301	37.30%	130	37.60%	431	37.40%
O+	228	28.30%	98	28.30%	326	28.30%
AB+	57	7.10%	37	11%	94	8.20%
A-	11	1%	1	0.30%	12	1.00%
B-	9	1.10%	4	1.20%	13	1.10%
O-	12	1.50%	3	0.90%	15	1.30%
AB-	2	0.20%	1	0%	3	0.30%
Total	807	70%	346	30%	1153	100%

The Mann-Whitney U test comparing the distribution of the blood group in the COVID 19 cases between genders showed an insignificant difference.(z= 0.944, p>0.05)

IV. DISCUSSION:

In the present study we collect the data of 1414 confirmed positive case of corona patients were collected from three different centres of Gujarat. For the control groups we have collected the data of 261cases health care workers who were tested negative for covid-19. We found the most common ABO blood group is O while the least common blood group was AB. This finding may suggest that B and A blood group of ABO blood grouping is a risk factor for getting covid -19 infections compared to the O blood group.

The male female ratio in confirmed cases of covid 19 infections was 2.3:1.0 which shows female showed better resistance as compared to male.

Gender can also be considered as a predisposing factor for covid-19and males may be more susceptible than females.

Among the 1414 confirmed cases 901 were males and 512 were females this is probably due to gender based immunological differences between male and female. Sex hormones estrogen receptors in body might be playing a vital role for increased resistance in females.

A gender association conveyed that in men blood group B was more susceptible than female.

A Spanish study suggested a lower susceptibility to covid 19 for blood group O, while a high risk of complications was found in blood group B [10-14]

Although some inconsistent results have been reported, most studies agree that ABO blood groups are of particular significance with their association with susceptibility to covid-19, but the molecular mechanism underlying this association has not been well described. The blood group impact on susceptibility to covid-19 nay depend on a different clustering of the virus glycoprotein receptors on host cell surface, induced by ABO (H) determinants through interactions with the glycan motif of these receptors and this may interfere with the binding of virus and its entrance to target cells. The Rh negative type of blood is found to have lesser affinity for covid 19 infection. This statement is supported by the present study and also from the study by Zeitz at al. [15-21]

V. CONCLUSION:

People with blood group B might need particularly strengthen personal protection to reduce the chance of infection

Specifically people with blood group B have a higher risk than blood group O and lastly the blood group A.

Males are more affected than female. We find evidence of association with only RH positive blood groups, while RH negative where rare.

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