

Distribution of Transfusion Transmitted Infections in ABO and Rh Blood Groups: A 5 Year Study.

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ABSTRACT

Background: Aim: The present study was conducted to determine the distribution of TTI in different ABO and Rh blood groups and for determining the association of transfusion transmitted infections (TTI) with any specific blood group type. **Methods:** This was a retrospective record based study conducted at blood bank of Chirayu medical college Bhopal Madhya Pradesh over a period of 5 years. A total of 15060 donors were included in the study. All the blood units were screened for HBsAg, HCV, Syphilis, HIV and Malaria. **Results and conclusion:** Seropositivity for TTI was found to be more in Rh positive donors. Blood group O positive showed highest seropositivity for TTI (4.44%). There was no significant association of TTI with any specific blood group. However, no Rh negative blood group revealed seropositivity for HIV. Therefore, more studies are required for association of blood groups with TTI

Keywords: Transfusion transmitted infections, ABO, Rh, Blood group.

INTRODUCTION

The blood group antigens of the ABO blood group system (A, B and H determinants, respectively) are polysaccharide and protein molecules which are present on the surface of red blood cells.^[1] There are about 33 blood group systems defined by International society of blood transfusion, out of which ABO and Rh grouping system is most important.^[2]

The clinical significance of the ABO blood group system extends beyond transfusion medicine as several studies have suggested an important association between blood group type and risk of development of cardiovascular, oncological and other diseases.^[3,4] It has also been found that risk to a variety of transfusion transmitted infections (TTI) is associated with blood group type as presence of genetically determined ABO blood group antigen may block binding of causative organism to the cell surface.^[5]

Various studies have been done regarding association of ABO and Rh blood group and transfusion transmitted infections; but due to different methods

Adopted, difference in sample size, social factors and geographic locations, the results obtained were conflicting. Hence, present study was conducted with an aim to determine the distribution of TTI in different ABO and Rh blood groups and for determining the association of TTI with any specific blood group type.

MATERIALS AND METHODS

This is a retrospective study which was conducted at Chirayu Medical college and Hospital associated blood bank, Bhopal for a period of 5 year from Feb 2011 to Jan 2016.

Total number of donors during this period were 15060. All the information of donors like personal details, demographic details, occupation details and medical history regarding risk factor like history of previous surgery, hospitalization, blood transfusion was obtained from blood bank records. Blood grouping was done by standard test tube agglutination method. Both forward grouping (cell grouping) and reverse grouping (serum grouping) were done. Final groups were confirmed only when both cell type and back type are identical. Antiglobulin technique was used to confirm Rh negative status of donor. All weak Du groups were considered Rh positive.

All the units were screened for the five commonest TTIs namely HIV I & II, HbsAg, HCV, syphilis and malaria. Tests for Hepatitis B Surface antigen (HbsAg), anti-HIV antibody, anti-HCV antibody,

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and malaria were done by enzyme linked immunosorbent assay (ELISA) test. Syphilis was tested by latex agglutination assay. Any sample found reactive was retested for confirmation. The data were recorded on specially formed Performa, tabulated and analyzed. Analysis was done correlating seropositive units with the blood group of the donor.

RESULTS

In the present study, a total of 15060 healthy donors were screened out of which 14469 (96.076%) were

males and 591(3.924%) were females. Majority of donors were in age group 18-30 years (54.821%). The overall seropositivity for TTI (HBV, HCV, Syphilis and HIV) among Voluntary and replacement donors in this study is found to be 4.20% (632/15060). Most common transfusion transmitted infection is HBV with a seropositivity of 2.131% (321/15060) while seropositivity is lowest for HIV 0.139 (21/15060) in all the donors. No donor is found to be positive for Malaria.

Table 1: Seropositivity for TTI in ABO blood groups.

Blood group	No: of donors	HBs Positive	HCV Positive	VDRL Positive	MP Positive	HIV Positive	Total
A	3320	74 (2.23%)	15(0.45%)	44(1.33%)	0	6 (0.18%)	139(4.19%)
B	5420	108 (1.99%)	35 (0.65%)	73 (1.35%)	0	10 (0.18%)	226 (4.17%)
O	4670	96 (2.06%)	38 (0.81%)	64 (1.37%)	0	3 (0.06%)	201 (4.30%)
AB	1650	43 (2.61%)	6 (0.36%)	15 (0.91%)	0	2 (0.12%)	66 (4.00%)
Total	15060	321 (2.13%)	94 (0.62%)	196 (1.30%)	0	21 (0.14%)	632 (4.20%)

[Table 1] shows that there is no significant difference in overall seroprevalence of TTI in different ABO blood groups except for slightly increased seropositivity in blood group O (4.30%). HBV infection is slightly more prevalent in blood group AB (2.61%) while seropositivity for HCV is slightly more in blood group O (0.81%). Blood group O also showed a lower positivity for HIV infection (0.06%). [Table 2] shows that overall

seropositivity for all TTI is significantly less in Rh negative blood groups (2.73%).

Table 2: Seropositivity of TTI according to Rh status

Blood group	No. of donors	No. of TTI positive cases	% of positive cases
Rh +	14401	614	4.26%
Rh -	659	18	2.73%
Total	15060	632	4.20%

Table 3: Seropositivity for TTI according to ABO and Rh blood groups

Blood group	No: of donors	HBs Positive	HCV Positive	VDRL Positive	MP Positive	HIV Positive	Total
A+	3169	73 (2.30%)	14 (0.44%)	40 (1.26%)	0	6 (0.19%)	133 (4.20%)
B+	5184	106 (2.04%)	33 (0.64%)	70 (1.35%)	0	10 (0.19%)	219 (4.22%)
O+	4463	94 (2.11%)	38 (0.85%)	63 (1.41%)	0	3 (0.07%)	198 (4.44%)
AB+	1585	42 (2.65%)	5 (0.32%)	15 (0.95%)	0	2 (0.13%)	64 (4.04%)
A-	151	1 (0.66%)	1 (0.66%)	4 (2.65%)	0	0	6 (3.97%)
B-	236	2 (0.85%)	2 (0.85%)	3 (1.27%)	0	0	7 (2.97%)
O-	207	2 (0.97%)	0	1 (0.48%)	0	0	3 (1.45%)
AB-	65	1 (1.54%)	1(1.54%)	0	0	0	2 (3.08%)
Total	15060	321 (2.13%)	94 (0.62%)	196 (1.30%)	0	21 (0.14%)	632 (4.20%)

[Table 3] shows that overall seropositivity for TTI is slightly more in O positive blood group (4.44%) while its significantly low in O negative (1.45%) and B negative (2.97%) blood groups. HBV infection is more prevalent in AB positive (2.65%) and significantly less in A negative (0.66%) blood group. HCV positivity is more prevalent in O positive (0.85%) and less in AB positive (0.32%) blood groups. Prevalence for VDRL is significantly more in A negative (2.65%) and less in O negative (0.48%) blood groups. None of Rh negative blood group showed seropositivity for HIV infection and among Rh positive blood groups, prevalence was lowest in O positive blood group (0.13%).

DISCUSSION

The ABO and Rh blood group systems have proved to be the most important, for blood transfusion purposes. ABO was the first human blood group system to be discovered by Landsteiner in 1901 while

Rh blood group was defined by Landsteiner and Weiner in 1941.^[6]

Association of blood groups with various diseases has been commonly observed. The studies have shown that cardiovascular diseases like coronary heart disease, ischemic heart disease, venous thrombosis and atherosclerosis are more common in persons of group A, while its low in people with blood group 'O'.^[7] Blood group O is also associated with a reduced risk of pancreatic cancer.^[8] The ovarian cancer is more common in blood group B.^[9] Gastric cancer is frequently associated with blood group 'A' and is least common in group 'O'.^[10]

Various studies to associate TTI with ABO blood groups have produced conflicting results due to differences in sample size, methods of screening, social and geographical factors. Hence, the present study was conducted on 15060 healthy blood donors to see distribution of TTI in different ABO and Rh blood groups. Results show a significant preponderance of TTI in Rh positive blood groups (4.26%) as compared to Rh negative blood groups

(2.73%). This is consistent with results of Mandal et al and Anumanthan et al.^[11,12] However, results of some other studies show that the negative blood groups are more prone to TTIs.^[13,14]

Overall seroprevalence of TTI in all the donors was 4.20%. There was no significant association observed with any specific blood group type. The seroprevalence for TTI was lowest in O negative blood group (1.45%) and showed highest but not statistically significant association with O positive blood group (4.44%). This is consistent with results of Das et al and Anumanthan et al.^[5,12] Among all the five TTIs, Hepatitis B (2.13%) was the commonest followed by Syphilis (1.30%), Hepatitis C (0.62%) and HIV (0.14%) in all the donors. None of the donor was positive for MP. All the blood groups showed distribution of TTI consistent with pattern of their seroprevalence in all the donors. However, blood group AB negative showed increased seropositivity for Hepatitis C (1.54%) while seropositivity for syphilis was significantly high in A negative blood group (2.65%). None of the Rh negative blood groups was seronegative for HIV and among Rh positive blood groups, the seropositivity for HIV was lowest in O positive blood group (0.07%).

CONCLUSION

The results of the present study show that TTI are more commonly associated with Rh positive blood groups. Blood group O positive showed highest positivity for TTI. There was no significant association of TTI with any specific ABO and Rh blood group other than absence of seropositivity for HIV in Rh negative blood groups. Therefore, more studies with a larger sample size over longer duration of time are required for studying any significant association between blood group type and TTI.

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