

## ORIGINAL ARTICLE

## ASSOCIATION OF ABO AND RH BLOOD GROUP TYPES TO HEPATITIS B, HEPATITIS C, HIV AND SYPHILIS INFECTION, A FIVE YEAR' EXPERIENCE IN HEALTHY BLOOD DONORS IN A TERTIARY CARE HOSPITAL

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**Background:** Aim of the study: The aim of the study was to find out the frequency of Hepatitis B, Hepatitis C, Syphilis, HIV and malaria in apparently healthy blood donors and to find out any association between ABO and Rh blood groups. **Methods:** It was a descriptive study carried out at Rehman Medical Institute laboratory. All blood donors who volunteered for blood donation from Jan 2008 to Dec 2014 were reviewed for blood groups and screening tests. Those who were eligible were then screened for Hepatitis B, Hepatitis C, HIV, syphilis and malaria on Architect 8200i through chemiluminescent immunoassay whereas malaria was screened by a thin film. Blood group was determined by both forward and reverse grouping. Statistical analysis was carried out using SPSS software and expressed as frequencies. **Results:** A total of 41033 apparently healthy donors were included in the study. All of them were voluntary donors. Their age ranged from 18–70 years with a mean age of  $38 \pm 10.5$  years. Out of these 41033, 40245 (98.3%) were males and 788 (1.9%) were females. The most frequent blood group was B positive followed by O positive. Out of 41033 donors 961 (2.30%) had Hepatitis B, 566 (1.30%) had Hepatitis C, 363 (0.90%) had syphilis, 311 (0.76%) had malaria and 30 (0.07%) had HIV. There is a significant association between A blood group and HIV and hepatitis B. Donors with blood group O had no significant association with any blood transmitted infection. **Conclusion:** Blood group O may have some influence in protecting against blood transmitted infection. People having Blood group A are more prone to get Hepatitis B and HIV

**Keywords:** Treponema pallidum; chemiluminescent immunoassay; Architect; Syphilis

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### INTRODUCTION

Red blood cells have a number of polysaccharides and proteins on their surface and they are known as blood group antigens.<sup>1</sup> About seven hundred RBC antigens have been discovered and about 33 Blood group systems have been identified. Out of these the most important systems are the ABO and the Rh systems.<sup>2</sup> Several studies have been done to find the association of various blood groups with infectious and non-infectious diseases like salivary gland tumors<sup>3</sup>, peptic ulcers, colorectal carcinoma, carcinoma breast, bronchus<sup>4</sup>, carcinoma cervix<sup>5</sup>. Some blood groups are known to act as receptors or ligands for bacteria, parasites and viruses.<sup>6</sup>

Prevalence of Hepatitis B internationally varies from (> 8%) in Africa and Asia to low (<2%) in Western Europe, North America and Australia.<sup>7</sup> Different studies have been done to find out the frequencies of HIV, HBV and HCV in healthy blood donors in Pakistan. In a study conducted from March 2001 to May 2002 at Railway Hospital Rawalpindi, the frequency of Hepatitis C virus was found to be (6.21%) whereas Hepatitis B virus was next with a frequency of (5.86%). Out of 553 blood donors none was found to be positive for HIV virus.<sup>8</sup> According to

a study carried out in healthy blood donors in Lady Reading Hospital Peshawar, out of 1,27,828 samples of healthy blood donors, recorded mean frequency for HBs Ag, anti-HCV, anti-HIV and syphilis was 2.68%, 2.46%, 0.06% and 0.43% respectively. The trends of the respective infections continued to increase with each year.<sup>9</sup> Syphilis is also a systemic disease caused by Treponema pallidum and the estimated incidence by WHO is 12 million new cases of syphilis per year.<sup>10</sup>

Several studies have been conducted to find out associations between ABO and Rh blood groups to various blood borne infections but the results have been variable.<sup>11</sup>

The aim of this study was to estimate the frequency of Hepatitis B, Hepatitis C, HIV and syphilis in healthy blood donors in a tertiary care hospital and to find out any association between blood groups and blood borne infections.

### MATERIAL AND METHODS

It was a retrospective study carried out at Rehman Medical Institute laboratory. All blood donors who volunteered for blood donation from Jan 2008 to Dec 2014 were reviewed. Donors were selected on the basis of a detailed history sheet which included an

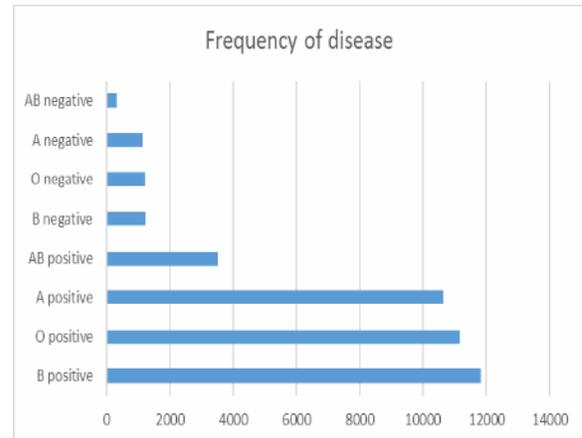
informed consent as well. Those who were found to be eligible for donation, complete blood count was performed on their samples and if haemoglobin was more than 10g/dL, total leucocyte count was between 4–11/L and platelets were above 150,000/L the sample was considered to be adequate and processed further.

The blood was then screened for Hepatitis B, Hepatitis C, HIV, syphilis and malaria. Screening for Hepatitis B, C, HIV and syphilis were done on Architect 8200i through chemiluminescent immunoassay whereas malaria was screened by a thin film. The product used for detecting syphilis was ARCHITECT Syphilis TP, 4J27 ARCHITECT HIV Ag/Ab Combo reagent kit was used for HIV. ARCHITECT HBsAg Qualitative II reagent kit was used for hepatitis B and ARCHITECT Anti- HCV reagent kit for Hepatitis C. Individuals who were included in the study were healthy men and women, non-pregnant and non-lactating women between the ages of 18–70 years, with weight of more than 50 kg and haemoglobin levels more than 10g/dL for females and 13.5 g/dL. Known cases of Hepatitis B, Hepatitis C and AIDS or any other serious illness were excluded from the study. Apart from these high-risk individuals as sex workers, IV drug abusers were also excluded from the study. Blood group was determined by both forward and reverse grouping. Final blood group was mentioned only if both the forward and reverse blood group results matched.

Statistical analysis was carried out using SPSS software and expressed as frequencies and percentages. The associations were presented as odds ratio (OR).

**RESULTS**

A total of 41033 apparently healthy donors were included in the study. All of them were voluntary donors. Their age ranged from 18–70 years with a mean age of 38±10.5years. Out of these 41033, 40245 (98.1%) were males and 788 (1.9%) were females



**Figure-1: Frequency of blood groups among healthy blood donors referred to Rehman Medical Institute transfusion centre during 2008–2014**

**Table-1: Frequency of Hepatitis B, Hepatitis C, HIV and syphilis among blood donors by year**

Year	Number of donors	Hepatitis B positive (%)	Hepatitis C positive (%)	HIV positive (%)	Syphilis positive (%)	Plasmodium positive (%)
2008	5193	114 (2.2)	61 (1.37)	3 (0.05)	11 (0.2)	17 (0.3)
2009	5287	123 (2.3)	78 (1.5)	2 (.03)	28 (0.5)	1 (.0)
2010	5900	128 (2.2)	92 (1.6)	5 (0.08)	67 (1.1)	7 (0.1)
2011	6021	140 (2.3)	92 (1.5)	3 (.0)	60 (1.0)	6 (0.1)
2012	5702	132 (2.3)	88 (1.5)	2 (.03)	66 (1.2)	1 (0.01)
2013	5878	127 (2.2)	66 (1.1)	1 (.0)	58 (1.0)	133 (2.3)
2014	7022	197 (2.8)	89 (1.3)	14 (0.2)	73 (1.0)	146 (2.1)
Total	41003	961 (2.3)	566 (1.3)	30 (0.07)	363(0.88)	311 (0.76)

**Table-2: Frequencies and percentages according to blood group types among apparently healthy blood donors referred to Rehman Medical Institute Transfusion Centre during 2008–2014**

Blood Group	Donors n (41033)	Hepatitis B Positive	Hepatitis C Positive	HIV Positive	Syphilis Positive	Malaria
A positive	10646	286 (2.68%)	151 (1.41%)	12 (0.11%)	95 (0.89%)	88 (0.82%)
A negative	1143	35 (3.06%)	19 (1.6%)	08 (0.69%)	14 (1.31%)	15 (1.31%)
B positive	11843	258 (2.17%)	176 (1.48%)	5 (0.04%)	93 (0.7%)	71 (0.6%)
B negative	1233	31 (2.5%)	15 (1.21%)	1 (0.08%)	15 (1.21%)	9 (0.72%)
O positive	11163	248 (2.22%)	138 (1.23%)	2 (0.018%)	99 (0.89%)	77 (0.69%)
O negative	1203	29 (2.41%)	17 (1.41%)	0	12 (0.99%)	9 (0.75%)
AB positive	3521	72 (2.04%)	56 (1.60%)	2 (0.56%)	40 (1.13%)	33 (0.94%)
AB negative	332	10 (3.01%)	5 (1.5%)	0	4 (1.2%)	9 (2.7%)
Rh positive	37086					
Rh negative	3946					

**DISCUSSION**

Multiple studies have been performed on blood groups and their association with different diseases. According to our study the most frequent blood group was B Positive Followed by O positive, A positive, AB positive, B

negative, O negative, A negative and AB negative. The most frequent disease in blood donors according to this study was Hepatitis B followed by Hepatitis C, syphilis and Malaria. Incidence of all blood transmitted infections seem to be on a rise from 2008 till 2014. According to a

study In Peshawar, Punjab and Bannu the most frequent blood group was B positive whereas in Sindh and Balochistan the most common blood group was O positive.<sup>13</sup> Whereas in Britain, USA, Nigeria, Kenya and India the most common blood group was O positive.<sup>14,15</sup> The frequency of all the diseases are low in females but this may just be a biased statement because the number of female blood donors was very low as compared to the male blood donors. Relationships of blood groups have been studied in relation to gastric cancer and found more in A positive patients.<sup>12</sup> Associations of ABO blood groups have been studied with oral cavity squamous cell carcinoma.<sup>16</sup> The prevalence of certain CVS diseases, thrombotic disorders and certain malignancies has been seen to be associated with non-O blood groups in a variety of studies.<sup>17-20</sup> According to our study there was an increasing trend in Hepatitis B, C and syphilis, which is an alarming issue despite the introduction of Hepatitis B vaccine. Apart from that blood group O is not significantly associated with Hepatitis B, C, HIV, syphilis or malaria which suggests that it might have a protective role against these diseases.<sup>21</sup> In donors who were Hepatitis B positive a significant association was found with A positive blood groups. In syphilis, positive donors, there was no significant association between syphilis infection and ABO blood groups but there was a significant association between Rh positive blood groups. In donors, positive for HIV a significant association was found in A positive blood groups.

## CONCLUSION

There is an increasing trend in Hepatitis B, C and syphilis from 2008 to 2014. Apart from that Blood Group O is not significantly associated with Hepatitis B, C, HIV, syphilis or malaria which may suggest that this blood group has a protective role against these diseases

## AUTHORS' CONTRIBUTION

ZB: Data collection, SPSS entry, Writing introduction, Materials and methods. SH: Writing results and discussion. ST: Making tables and writing references

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