



## Frequency of ABO And Rh (D) Blood Groups Among Blood Donors In Lahore, Pakistan

Muhammad Umer Khan<sup>\*1</sup>, Muhammad Waqas Bashir<sup>2</sup>, Raima Rehman<sup>3</sup>, Rizwan Ahmed Kiani<sup>4</sup>

<sup>1</sup> M.phil Biochemistry, University of Health Sciences, Lahore, Pakistan

<sup>2</sup> M.phil Microbiology, University of Lahore, Lahore, Pakistan

<sup>3</sup> M.Sc. Microbiology, University of Health Sciences, Lahore, Pakistan

<sup>4</sup> M.phil Biochemistry, PMAS-Arid Agriculture University, Rawalpindi, Pakistan

### Abstract

The clinical significance of ABO and Rhesus blood group systems has been well documented. The objective of this study was to determine the frequency of ABO and Rhesus blood groups in blood donors in Lahore, Pakistan, with a view to generate data with multipurpose future practicalities in the field of medicine. Blood groups of 3000 blood donors were determined by commercially available standard monoclonal antisera by tube agglutination technique. Out of 3000 donors, 92.2% were males and 0.8% were females. The most frequent ABO blood group present was B (37.8 %) followed by O (28.8%), A (24.2%) and AB (9.1%) in blood donors; while in Rhesus system 93.0% were Rh+ve and 7.0% were Rh-ve. The most important implementation of such studies is in management of blood banks and transfusion services.

**Keywords:** ABO and Rhesus blood groups; blood donors; Transfusion

### Introduction

In early 20th century Karl Landsteiner discovered the first blood group system, ABO, and was awarded a Nobel Prize for this incredible discovery. This was a revolutionizing step in the field of transfusion medicine. Until then all blood had been anticipated to be the same and the repeated disastrous consequences of blood transfusions were not understood. As the understanding of the ABO group improved, not only did the blood transfusion practices become safer, but also scientists could study one of the first human characteristics proven to be inherited (Laura, 2005). Later, Rh blood group was defined by Landsteiner and Wiener in 1941 (Rahman and Lodhi, 2004). Rh system appeared as second most significant blood group system due to hemolytic disease of newborn and its importance in RhD-negative individuals in subsequent transfusions once they develop Rh antibodies (Dennis et al 1998). Since 1901 nearly 700 erythrocyte antigens are introduced and organized into 30 blood group systems by the International Society of Blood Transfusion (ISBT 2008). The ABO blood group antigens remain of primary importance in transfusion medicine as they are the most immunogenic of all the blood group antigens. The most common cause of death from a blood transfusion is ABO incompatibility. In modern medicine, the need for blood group frequency and prevalence studies is multipurpose. In blood donors such studies can be meaningfully implemented regarding the inventory management of blood bank and transfusion services. Besides being important in relation to blood transfusion and organ transplantation, blood group antigens can also be utilized in genetic research, forensic pathology, anthropology and training ancestral relation of human (Khurshid et al 1992). These are definite genetic markers engaged in population genetics and frequencies of different ABO blood types vary among different populations,

implying that a particular blood type conferred a selection advantage (e.g., resistance against an infectious disease. (Sigmon 1992). The aim of the present study was to record the frequency of ABO and Rhesus blood groups among blood donors in Lahore, Pakistan, and also to compare the statistics with the population of other areas of Pakistan, as well as some other countries of the world, with a view to obtain data with multipurpose future utilities in the field of medical science and also see the common trend of the prevalence of various blood groups.

### Materials and Methods

A total number of 3000 healthy adult donors, volunteers as well as directed, between the ages 18-60 yrs visiting the CH&ICH and Ittefaq Hospital (Trust), Lahore from July to December 2012, were included. After taking informed consent 2ml blood sample was drawn from the antecubital vein of each donor in a disposable syringe, and transferred immediately to a tube containing ethylene diamine tetra acetic acid (EDTA). ABO and Rh (D) blood grouping was done by test tube agglutination method, forward and reverse both types (Dacie and Lewis, 2006). Forward blood grouping (cell grouping) was performed using commercially available (Biolaboratories) standard antisera A, antisera B, and Antisera D. Reverse blood grouping (serum grouping) was performed by test tube agglutination method with pooled known A, B and O cells. Final blood group was confirmed only if both forward group (cell group) and reverse group (serum group) are identical. Rh negative blood groups were confirmed by antiglobulin technique. All weak D groups were considered as Rh positive. Descriptive statistics were used to describe the data. Using SPSS v.16 the data was managed and analysed.

### Results

Out of 3000 donors, 2975 (92.2%) were males and 25 (0.8%) were females. This shows blood donation practices are much more prevalent among males as compare to females. Table 1 shows the age distribution of donors.

**Table 1: Frequency and percentage of age groups**

Age Group	Frequency	Percentage (%)
20-30 y	1345	44.8
30-40 y	1272	42.4
40-50 y	383	12.8
Total	3000	100

The frequency and percentage of ABO blood groups among blood donors is shown in table 3. It reveals the frequency of blood groups as B>O>A>AB.

**Table 2 : Frequency and percentage of ABO blood groups**

Blood Group	Frequency	Percent
B	1135	37.8
O	864	28.8
A	727	24.2
AB	274	9.1
TOTAL	3000	100

The frequency and percentage of Rhesus blood group system were found to be Rh+ve 2789 (93.0%) and Rh-ve 211(7.0%).

## Discussion

The order of prevalence of various blood groups found in this study matches those which have been recorded in other studies on various segments of the Pakistani population (Khurshid, 1992; Khaliq, 1984; PMRC, 1984; Yousif, 1988; Khan, 2004). However the data from the British and African populations reveals that O group is most dominant in those populations as compare to Indo-Pak sub-continent where equal dominance of group B and O is seen (Khaliq, 1984; Talib 1991). One similarity is that the least reported group in all the populations is AB, as seen in our study as well. The dominance of group O has been reported in United States, Syrian Arab, Palestine and Asia with AB being the rarest blood group while in Saudi Arabia blood group A is more prevalent as compared to the Pakistani population where there is higher prevalence of group B. In India the most prevalent blood group is O, followed by B, A and AB (Canadian blood services, 2010). The relative frequency of blood groups in Bangladesh is O>A>B>AB and in Nepal is A>O>B>AB (Talib 1991 and Ghasemi). In addition all over the world the trend of Rh (D) positive is much higher as compare to Rh (D) negative (Canadian blood services, 2010). The differences of blood grouping among various populations may be due to geographical variations, external environment and genetic factors involved. Racial and environmental factors have been described to affect the frequency of various blood groups in researches conducted on various societies, including Bangladesh and Latin America (Shamim 2002). The genetic and environmental factors responsible for varying frequency of the blood groups among the Pakistani population needs to be investigated further.

## Conclusion

In conclusion, generation of record of blood groups, not only provides data about the availability of blood in case of regional calamities, but also serves as a fore warner of future burden of disease. Such studies need to be carried out at regional levels.

## References

Canadian Blood Services - Société canadienne du sang. "Types & Rh System, Canadian Blood Services". Retrieved 2010-11-19.

Dacie and Lewis 2006. Practical haematology, 10th ed, Churchill Livingstone, Philadelphia.

Dennis LY, Hjlem NM, Fidler C (1998). Prenatal diagnosis of fetal Rh D status by molecular analysis of maternal plasma. N Engl J Med.;339:1734–8. [PubMed].

Ghasemi N, Ayatollah J, Zadehrahmani M et al. Frequency of ABO and Rh blood groups in middle school studies of Yazd Province. Iranian Journal of pediatric Hematology and Oncology Voll.No1.

Khaliq MA, Khan JA, Shah H, Khan SP (1984). Frequency of ABO and Rh (D) blood groups in Hazara division (Abbottabad). Pak J Med Res. 23:102-3.

Khan MS, Subhan F, Tahir F, Kazi BM, Dil AS, Sultan S, Deepa F, Khan F , Sheikh MA (2004). Prevalence of Blood groups & Rh factor in Bannu (NWFP) Pakistan. Pak J Med Res. 3:8-10.

Khurshid B, Naz M, Hassan M, Mabood SF (1992). Frequency of ABO and Rh (D) blood groups in district Sawabi NWFP Pakistan. J Sci Tech Univ. Peshawar; 16:5–6.

Laura D (2005). Blood Groups and Red Cell Antigens. Bethesda (MD): National Center for Biotechnology Information, U.S URL <http://www.ncbi.nlm.nih.gov/books/NBK2277/>.

Manual of Normal Parameters of the health. Peshawar. Pakistan Medical Research Council, Islamabad: 1984, pp. 79-81.

Rahman M and Lodhi Y (2004). Frequency of ABO and Rhesus blood groups in blood donors in Punjab. Pak J Med Sci; 20:315–8.

Shamim A, Hafeez MA, Ahmad MM (2002). ABO and Rh blood groups I: Markers of cardiovascular risk and association with lipids and other related risk covariables in a Pakistani population. Proc Pak Acad Sci. 39:47-66.

Sigmon JM (1992). Basic principles of the ABO and Rh blood group systems for hemapheresis practitioners. Journal of clinical apheresis, 7(3):158–62.

Talib VH (1991). Handbook of medical laboratory technology.2nd edition. New Delhi: CBS publisher "Table of blood group systems". International Society of Blood Transfusion (ISBT). Oct 2008, URL:<http://ibgri.blood.co.uk/isbt>.

Yousaf M, Yousaf N, Zahid A (1988). Pattern of ABO and Rh (D) Blood groups distribution in Bahawalpur Division. Pak J Med Res. 27:40-41.