

THE DISTRIBUTION OF ABO AND RHESUS BLOOD GROUPS AMONG BLOOD DONOR ATTENDING TRANSFUSION MEDICINE DEPARTMENT OF DHAKA MEDICAL COLLEGE HOSPITAL IN 2014

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Abstract

Objective: This study was aimed to identify the distribution patterns of ABO and Rh-D blood group among the blood donor attending at transfusion medicine department DMCH in order to promote social awareness and safe blood transfusion among the population.

Method: It was a cross sectional study conducted in the Department of Transfusion Medicine, Dhaka Medical College Hospital, Dhaka, from January to December 2014. After proper ethical consideration, a total of 39,512 blood donors were included in this study. They were selected irrespective of age and sex by systematic random sampling. ABO and Rh-D blood groups were determined by the antigen antibody agglutination test in our blood bank by standard tile techniques.

Results: Among 39,512 blood donors male blood donors were 31,602(79.98%), female blood donors were 7,910(20.01%). 14,817(37.5%) blood donor were identified as having blood group B, while 12,565 (31.8%) were blood group O, 8614(21.80%) and 3516(8.9%) were blood group A and AB respectively. Rh-D positive were 38,247(96.79%) and Rh-D negative were 1,265(3.2%).

Keywords: ABO, Rh-D, Blood group.

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Introduction

Blood groups of population are determined genetically by the presence of specific antigens on the erythrocytes (Red blood cells). The frequency of ABO and Rh groups vary from one population to another and one region to another. Austrian scientist Karl Landsteiner's discovery opened the door to the birth of wide spectrum of discoveries in the field of immuno-haematology. In 1901, he described the first human blood group ABO system for which he was awarded the Nobel Prize in the year 1930. This was the most important achievement in the history of transfusion services¹. Forty years

later, i.e. in 1941 both Karl Landsteiner and Weiner discovered the Rh blood group system².

The genes of ABO and Rh (D) are located on chromosome 9 and 1 respectively. The bombardment of the red blood cells with A and/or B antigens occurs as a consequence of the action of the glycosyltransferases enzymes that add specific sugars to the precursor substance³. However, a group of conformation-dependent epitopes along the Rh (D) protein form the D antigen⁴. More than 600 surface antigens have been found on red blood cells⁵ and several of these antigens that stem from one allele or

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very closely linked genes are collectively form a blood group system⁶.

The importance of blood group discovery lies in the transfusion of blood amongst different populations irrespective of their ethnic origin, in organ transplantation and in the development of legal medicine, genetic research and anthropology⁷.

The clinical significance of the ABO and Rh blood group system depends on the ability of agglutinins of both blood group systems to cause haemolytic transfusion reaction and haemolytic disease of the foetus and newborn (HDFN)^{8,9,10}.

Methods:

It was an observational cross sectional study conducted in the Department of Transfusion Medicine, Dhaka Medical College Hospital, Dhaka, from January to December 2014. After proper ethical consideration a total of 39,512 blood donors were included in this study. ABO and Rh blood groupings were carried out in our blood bank by standard tile techniques. The blood samples were collected by finger prick with sterile lancet, after warm and clean the puncture set. A drop of monoclonal anti-A, anti-B and monoclonal/polyclonal anti-D (Labkit, Barcelona, Spain) was added to a drop of finger prick blood on clean slide and mixed well. Results of agglutination were recorded immediately for ABO blood groups and after 2 minutes in Rh(D). A drop of monoclonal anti-A, anti-B and monoclonal/polyclonal anti-D (Labkit, Barcelona, Spain) was added (positive and negative controls using one drop of whole blood mixed with one drop of appropriate anti-sera and rocked gently. The test was examined under a microscope, and the results were confirmed by reverse grouping using known group A and B red cells and o cell.

Results:

Among 39,512 blood donors male blood donors were 31,602(79.98%), female blood donors were 7,910(20.01%). 14,817 (37.5%) blood donor were identified as having blood group B while 12,565 (31.8%) were blood group O, 8614 (21.80%) and 3516(8.9%) were blood group A and AB respectively. Rh-D positive were 38,247

(96.79%) and Rh-D negative were 1,265(3.20%). Results are showing in following tables.

Table-I

Percentage distribution of ABO blood groups among the blood donor (N=39,512)

Blood group	Number	(%)
A	8614	21.80
B	14,817	37.5
O	12,565	31.8
AB	3,516	8.9

Table-II

Distribution of sex of blood donor (N=39,512)

Sex	Number	%
Male	31602	79.98%
Female	7910	20.01%

Table-III

Percentage distribution of Rhesus blood groups in blood donor-39,512

Rhesus blood groups	Number	%
Rh Positive	38,247	96.79%
Rh Negative	1265	3.20 %

Table-IV

Percentage of Rh blood groups based on gender

Rh Type	Male	Female
Rh positive	31898	6349
Rh negative	1055	210

Discussion

The distribution pattern of A, B, O, and AB were 21.80%, 37.50%, 27.6% and 9.2% respectively. The study regarding the distribution of ABO and Rhesus Blood Group systems among the people of central part of Bangladesh was first done in 1975 by Rahman¹¹ where blood group B was found most predominant among the population. This study showed the frequency of B, O, A and AB groups were as 35.2%, 33.97%, 22.44% and 8.39% respectively. Another study conducted in the rural and urban areas of Bangladesh showed the similar results of predominant blood group,

B (35.54%) followed by blood group O (32.57%)¹². However, study in South East and Western part of Bangladesh demonstrated the most frequent blood group was O^{13,14}. Study in Northern district of Dinajpur also indicated the group O predominance with a frequency of 40.6% followed by group A 26.6%, group B 23.2% and group AB 9.6%¹². There is a wide variation of blood group frequency in different parts of the world due to the influence of genetic and environmental factors. Comparison of data among the different studies in the Indo-Pak sub-continent revealed that there was an equal dominance of group B and O¹⁵. Studies in Pakistan explored that B blood group predominated in many regions of Punjab and Multan^{16,15} Swat¹⁷, Gilgit¹⁸, and Rawalpindi/Islamabad¹⁹, while in Sindh and in Baluchistan, group O was predominated²⁰. Study in neighboring country Nepal showed different picture of higher frequency of group A²¹. Reports showed that in Australia²², Britain²³, and USA²⁴, group O and group A were the commonest followed by B and AB. The prevalence of Rh-D positive remains very high compared to the Rh-D negative blood throughout the world. Our study also followed the global trend of much higher Rh-D positive than Rh-D negative. Frequencies of Rh-D positive among the Caucasians, Blacks and Asian were 85%, 92% and 99% respectively²⁵. Rh negative frequency in our study is comparable to that of India²⁶. Higher frequency of Rh negative blood was observed in USA as 17%²⁷, in the UK as 17%²⁸ or even in Iran as 10.08%²⁹. In Pakistan, Rh negative frequency varied from 5.40 to 10.73%¹⁵ depending on the various regions that were higher than that of our study.

Conclusion:

The knowledge of ABO and Rhesus D blood group is important in blood transfusion services. The ABO & Rhesus (Rh) blood group system are the most prevalent & important for transfusion of blood & its component, organ transplant, genetic studies & in legal medicine study. Study of blood grouping not only generates a simple database but also create a great social awareness about self-blood grouping and safe blood transfusion among the population of a country.

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