



Original Article

Pattern of ABO and Rhesus(Rh) Blood Group Among Blood Donors

M A Ahad¹, M A Bakar², H A M Nazmul Ahsan³

Abstract

This study was carried out among the blood donors attending the Blood Transfusion Department of Khulna Medical College Hospital. Both ABO and Rhesus (Rh) blood grouping was done to see the pattern of ABO and Rh blood group among them. Maximum blood donors were between age group 18-37 years. Among the donors maximum were male 12105 (94.73%). Male: female ratio was 18:1. Among them B+ve was found 4286 (33.54%), B-ve was 127 (5.0%), O+ve was 4091 (32.02%), O-ve was 131 (1.03%), A+ve was 3014 (23.59%), A-ve was 74 (0.58%), AB+ve was 1019 (7.98%), AB-ve was 37 (0.29%). Overall total Rh positive blood group were 12410 (97.11%) and total negative blood group were 369 (2.89%).

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Introduction

The A, B and H antigens are detectable early in fetal life, but are not fully developed on the red cells at birth. The number of antigen sites reaches adult levels at about 1 year of age and remains the same throughout life until old age when a reduction may occur¹. Antibodies to the other blood group antigens (Rhesus, Duffy, Kell, Kidd etc) only develop in individuals who lack the particular antigen and who are exposed to the antigen, either by transfusion or during pregnancy². The membranes of important and best known of these are the A and B antigens, type B have the B, type AB have both, and type O have neither. These antigens are found in many tissues in addition to blood: these include salivary glands, Saliva, pancreas, kidney, liver, lungs, testis, semen and amniotic fluid. Type A and B antigens are actually complex oligosaccharides that differ in their terminal sugar. On red cells they are mostly

glycosphingolipids, whereas in other tissues they are glycoproteins.

Antibodies against red cell agglutinogens are called agglutinins⁴. Thus, type A individuals develop anti B antibodies, type B individuals develop anti- A antibodies, type O individuals develop both, and type AB individuals develop neither. When the plasma of a type A individual is mixed with type B red cells, the anti-B antibodies cause the type B red cells to clump (agglutinate).

In addition to the ABO system of antigens in human red cells, there are systems such as the Rh, MNs, Lutheran, Kell, Kidd, and many others⁵. There are over 500 billion possible known blood group phenotypes, and because undiscovered antigens undoubtedly exist, it has been calculated that the number of phenotypes is actually in the trillions.

Aside from the antigens of the ABO system, those of the Rh system are of the greatest clinical

¹ Assistant Professor, Department of Gastrointestinal & Liver Diseases, Khulna Medical College, Khulna, Bangladesh.

² Associate Professor, Department of Medicine, Khulna Medical College, Khulna, Bangladesh.

³ Associate Professor, Department of Medicine, Khulna Medical College, Khulna, Bangladesh.

importance³. The "Rh factor" named for the rhesus monkey because it was first studied using the blood of this animal, is a system composed primarily of the C, and E antigens although it actually contains many more. Unlike the ABO antigens, the system has not been detected in tissues other than red cells. D is by far the most antigenic component, and the term "Rh- Positive" as it is generally used means that individual has agglutinin D. The D protein is not glycosylated, and its function is unknown. The "Rh-negative" individual has no D antigen and forms the anti-D agglutinin when injected with D positive cells. The Rh typing serum used in routine blood typing is anti-D serum. Eighty five percent of Caucasians are D-positive and 15% are D-negative; over 99% of Asians are D positive. Unlike the antibodies of the ABO systems, anti-D antibodies do not develop without exposure of a D-negative individual to D-positive red cells by transfusion or entrance of fetal blood into the maternal circulation. However, D-negative individuals who have received a transfusion of D-positive blood can have appreciable anti-D titers and thus may develop transfusion reactions when transfused again with D-positive blood. Aim of this study was to see the pattern of ABO and Rhesus (Rh) blood group among blood donors of our perspective.

Materials and Methods

It was a retrospective study carried out in the department of blood transfusion, Khulna Medical College Hospital from June 2001 to September 2002. A total of 12779 donors both professional and voluntary with age range 18-57 years attending the blood transfusion center both ABO and Rh blood grouping was done. 2ml blood was collected aseptically from the donor. Blood typing was performed by mixing an individual's red blood cells with antisera containing the various agglutinins on the slide and seeing whether agglutination occurs on the same day.

Results

A total of 12779 blood donors' blood groupings were done. Maximum donors 12200 (95.48%) were between age group 18-37 years. Among the donors maximum were male 12105 (94.73%) and female only 674 (5.27%). Male: Female ratio was 18:1. Age & sex distribution is shown in Table-I. Out of 12779 donors total Rh positive blood group was found in 12410 (97.11%) donors and total Rh negative blood group was found in 369 (2.89%) donors. Among the donors B+ve was found 4286 (33.54%), B-ve was found 127 (1%), O+ve was found 4091 (32.02%), O-ve was found 131 (1.03%), A+ve was found 3014 (23.59%), A-ve was 74 (0.58%), AB+ve was 1019 (7.98%) and AB-ve was 37 (0.29%). Distribution of ABO and Rh blood grouping is shown in Table-II.

Table I: Age & Sex distribution of donor's blood grouping done with percentage.

Total No.	18-27 years	28-37 years	38-47 years	48-57 years	Male	Female	M: F ratio
12779	7725 (60.46%)	4475 (35.02%)	504 (3.95%)	75 (0.59%)	12105 (94.73%)	675 (5.27%)	18:1

Table II: Distribution of combined ABO and Rh blood grouping with percentage

Total Blood grouping	B			O			A			AB		
	Total B	Rh+ve	Rh-ve	Total O	Rh+ve	Rh-ve	Total A	Rh+ve	Rh-ve	Total AB	Rh+ve	Rh-ve
12779	4413 (34.54%)	4286 (33.54%)	127 (1.00%)	4222 (33.05%)	4091 (32.02%)	131 (1.03%)	3088 (24.17%)	3014 (23.59%)	74 (0.58%)	1056 (8.27%)	1019 (7.98%)	37 (0.29%)

Discussion

Both ABO and Rh blood grouping is very important for safe blood transfusion. Dangerous hemolytic transfusion reactions may occur when blood is transfused into an individual with an incompatible blood type i.e. an individual who has agglutinins against the red cells in the transfusion³. The plasma in the transfusion is usually so diluted in the recipient that it rarely causes agglutination even when the titer of agglutinins against the recipient's cells is high. However, when the recipient's plasma has agglutinins against the donor's red cells, the cells agglutinate and haemolyse. Free haemoglobin is liberated into the plasma. The severity of the resulting transfusion reaction may vary from an asymptomatic minor rise in the plasma bilirubin level to severe jaundice and renal tubular damage, with anuria and death. Another complication due to "Rh incompatibility" arises when an Rh negative mother carries an Rh positive fetus (Erythroblastosis fetalis).

In our study, maximum donors 12200 (95.48%) were between age group 18-37 years because young adult persons are usually willing to donate blood than older age group. It was also evident that maximum blood donors were male 12105 (94.73%) and female only 674 (5.27%). It is due to lack of education, awareness and fear among the female regarding blood donation. In our study total Rh positive blood group was found in 12410 (97.11%) donors and total Rh negative blood group was found in 369 (2.89%) donors, which closely corresponds to the study done in Indian population^{3,6}. In our study total B group blood was found in 4413 (34.54%) cases, among them B+ve was 4286 (33.54%) and B-ve was 127 (1%). Total O group blood was found in 4222 (22.05%) cases. Among them O+ve was 4091 (32.02%) and O-ve was found in 131 (1.03%) cases. Total A group blood was found in 3088 (24.17%) cases among them A+ve was 3014 (23.58%) and A-ve was 74

(058%) cases. Total AB group blood was found in 1056 (8.27%) cases, of them AB+ve was 1019 (7.98%) and AB-ve was 37 (0.29%) cases. These study closely resemble the study done in Pakistan⁷ and India⁶, where they have also shown the higher frequency of B blood group.

Conclusion

Thinking about the life threatening complications and dangerous sequel of transfusion reaction we should be very careful regarding ABO and Rh blood grouping starting from blood collection, blood grouping and cross matching and up to transfusion to the recipient. Only sincerity, carefulness and awareness can bring these dangerous transfusion reactions to zero.

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All correspondence to:

Dr. MA Ahad

Assistant Professor

Department of Gastrointestinal & Liver Diseases
Khulna Medical College, Khulna, Bangladesh.