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Original Article

Distribution of ABO and Rhesus Blood Groups among Blood Donor Attending Transfusion Medicine Department of Chattagram Maa-O-Shishu Hospital Medical College

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Abstract

Introduction: *The ABO blood group system was the first human blood group system to be discovered by Karl Landsteiner in 1900. Next to ABO, Rhesus system the second most significant blood group system. Blood group is applied to the genetically determined antigen which can be detected on the red cell surface of an individual by specific antibody. The aim of this study to examine the distribution patterns of ABO and Rh-D blood group among the blood donor attending at Transfusion Medicine Department in CMOSH. It is helpful to increase social awareness among the population and maintain safe blood transfusion to patient.*

Materials and methods: *It was a cross sectional study conducted in the Department of Transfusion Medicine,Chattagram Maa O Shishu Hospital Medical College, from January to December 2022. After proper ethical consideration a total of 7,289 blood donors were included in this study. ABO and Rh blood groupings were carried out in our blood bank by standard tile techniques.*

Results: *Among 7,289 blood donors male blood donors were 6,936(95.15%), female blood donors were 353(4.84%).2,775 (38.07%) blood donor were identified as having blood group B while 2,185 (29.97%) were blood group O, 1702(23.35%) and 627(8.6%)were blood group A and AB respectively. Rh-D positive were 6,960(95.48%) and Rh-D negative were 329(4.51%).*

Conclusion: *The knowledge of ABO and Rhesus D blood group is important in blood transfusion service.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.*

Key words: ABO; Blood group; Rh-D.

INTRODUCTION

The ABO system is the most important of all blood groups in transfusion practice. It is the only blood group system in which individuals have antibodies in their serum to antigens, that are absent from their RBCs. Austrian scientist Karl Landsteiner truly opened the doors of blood banking with his discovery of the first human blood group system,ABO in 1900.[1] He received the Noble Prize for Medicine for his discovery in 1930. He found three different blood types and described them as A, B and O blood groups.In 1902 Landsteiner's associates,Sturli and Von Descatello discovered the fourth ABO blood group, AB.[2]

The ABO system follows the Mendelian laws of inheritance. The locus of ABO gene is on the chromosome 9 which is occupied by one of three major allelic genes i.e. A, B or O and thus there is a gene which responsible for the specificity of our ABO blood groups.[2] Red blood cell contain a series of glycoprotein and glycolipids on their surface, which constitutes the blood group antigens. The bombardment of the red blood cells with A and or B antigen occurs because of the action of glycosyl transferase enzymes that add specific sugars to precursor substance.

The Rh blood group system discovered by both Karl Landsteiner and Weiner in 1941. The Rhesus antigens are determined by three pairs of closely linked allelic genes located on chromosome one.[3] When a person inherits a D antigen his red cell, react with anti –D are called Rh D positive, If person does not inherit D antigen, red cell not react with anti-D are called Rh D negative.[2] The importance lies in the discovery of blood group in case of an emergency where require blood transfusion, transfusecorrect compatible blood .Also important in organ transplantation,to solve disputed paternity, anthropological and medico-legal case study.

The ABO and Rh system is regarded as the most important blood group system because of haemolytic transfusion reaction and haemolytic disease of the foetus and newborn which depends on the ability of agglutinins of both blood group systems.

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, Chattagram Maa-O-Shishu Hospital Medical College in order to promote social awareness and safe blood transfusion among the population.

MATERIALS AND METHODS

It was an observational cross sectional study conducted in the Department of Transfusion Medicine, Chattagram Maa O Shishu Hospital Medical College, from January to December 2022. After proper ethical consideration a total of 7,289 blood donors were included in this study.Prior to donating blood the donor was first assessed for physical and health wellbeing.Donor of both genders were analyzed.The donors were first required to fill up a registration form which carried all the information like personal details,demographic details,occupation and medical history.The donors were then selected by medical officer according to blood donor selection criteria and guidelines from safe blood transfusion.Forward grouping or cell typing was done by known monoclonal(-A,-B) and reverse grouping or serum typing was done on serum with known A, B and O cell (Pooled and freshly prepared). Presence of Rh D antigen was determined by monoclonal/polyclonal anti D.The data were analyzed for the frequency of ABO and Rhesus blood groups and reported in simple percentages.

Donor's age, sex, dates of donation with screening for TTI (Transfusion Transmitted Infection) blood groups with Rh factors were tabulated in register book.

RESULTS

Among 7,289 blood donors male blood donors were 6,936(95.15%), female blood donors were 353(4.84%).2,775 (38.07%) blood donor were identified as having blood group B while 2,185 (29.97%) were blood group O, 1702(23.35%) and 627(8.6%)were blood group A and AB respectively. Rh-D positive were 6,960(95.48%) and Rh-D negative were 329(4.51%).

Table I Percentage distribution of ABO blood groups among the blood donor (n=7,289)

Blood group	Number	%
A	1,702	23.35
B	2,775	38.07
O	2,185	29.97
AB	627	8.6

Table II Distribution of sex of blood donor (n=7,289)

Sex	Number	%
Male	6,936	95.15
Female	353	4.84

Table III Percentage distribution of Rhesus blood groups in blood donor (n =7,289)

Rhesus blood groups	Number	%
Rh Positive	6,960	95.48
Rh Negative	329	4.51

Table IV Rh blood groups based on gender

Rh type	Male	Female
Rh Positive	6,618	342
Rh Negative	318	11

DISCUSSION

The distribution pattern of A, B, O and AB were 23.35%, 38.07%, 29.97% and 8.6% respectively.

The study regarding the distribution of ABO and Rhesus Blood Group systems among the people of central part of Bangladesh was first done in1975 by Rahman, where blood group B was found most predominant among the population.[4] 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%).[5] In Karim S study the distribution pattern of A, B, O, and AB were 21.80%, 37.50%, 27.6% and 9.2%respectively.However, study in South East and Western part of Bangladesh demonstrated the most frequent blood group was O.[6,7]

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 O.[8]

Studies in Pakistan explored that B blood group predominated in many regions of Punjab and Multan,[9] Swat[10], Gilgit and Rawalpindi/Islamabad, while in Sindh and in Baluchistan, group O was predominated.[9-13] Study in neighboring country Nepal showed different picture of higher frequency of groupA.[14] Reports showed that in Australia, Britain and USA, group O and group A werethe commonest followed by B and AB.[14-17] The prevalence of Rh-D positive remains very high compared to the Rh-D negative blood throughoutthe world. Our study also followed the global trend of much higher Rh-D positive then Rh-D negative. Frequencies of Rh-D positive among the Caucasians, Blacks and Asian were 85%, 92% and 99% respectively.[18] Rh negative frequency in our study is comparable to that ofIndia.[19] Higher frequency of Rh negative blood was observed in USA as 17%, in the UK as 17% or even in Iran as 10.08%.[20,21,8] 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. In Siransy Bogui study, 605 blood donors representing 92.93% of the blooddonors were found to be RhD positive while 46 blood donors representing 7.07 were found to be RhD negative.[22] In Nitin Agarwal study The most common group was found to be B, followed by O, A, and AB. Of the donors, 94.36% were found to be D positive.[23] This finding is in concordance with other studies published from India.[24,19] However,overall worldwide frequency of the B antigen is low, excluding some areas, such as central Asia and Africa. In studies from Europe, America and South East Asia, the O antigen has been found to be the most common blood group.[25,26]

CONCLUSION

The transfusion of blood remained mysteriously unsafe until the discovery of blood group.The knowledge of ABO and Rhesus D blood group is important in blood transfusion service.The knowledge of both blood group system are important for component preparation and ensure safe blood transfusion. Also important for organ transplantation,genetic research and anthropological study.Study of blood donor grouping not only generates a simple database but also create a social awareness about self-blood grouping and safe blood transfusion among the population of a country.

RECOMMENDATION

Further study may be done in different ethnic people of Bangladesh to see the distribution of rare and subgroups of ABO and Rhesus system for medico-legal and clinical benefit.

DISCLOSURE

All the authors declared no competing interest.

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