Original Article

Prevalence of ABO and Rh Blood groups and their combinations among the blood donors attending the Transfusion Medicine Department of TMC and RCH, Bogura

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Abstract:

Background: The ABO blood group was the first human blood group system discovered by Landsteiner in 1901 and Rhesus group in 1940. The second most important type of blood group Rhesus system was discovered in 1940. These fundamental discoveries played a vital role in development of transfusion medicine. Frequencies of these blood groups vary from irrespective of their ethnic origin. There are many blood group systems on the basis of different blood group antigens but mainly ABO and rhesus (D) system are important in clinical practice. ABO system consists of four main groups: A, B, AB and O which are determined on the basis of presence or absence of A and B antigens. In rhesus (D) system, blood groups are Rh-positive or Rh-negative on the basis of presence or absence of Rhesus (D) antigens on red cell surface[5].

Objectives: The aim of this study was to examine the distribution of these two groups and their combinations among the blood donors attended RCH, Bogura in relation to their age & sex.

Methods and Materials: This observational type of cross sectional study was conducted in the dept. of Transfusion Medicine using 6 months data (January, 2021- July, 2021) on the donors attending the Dept. of Transfusion Medicine of TMC & RCH. Records of 1,963 Voluntary blood donors were reviewed. Prior to donating blood the donors were assessed for blood donating criteria. Only donors who satisfied these criteria were recruited.

Results: Nineteen hundred sixty three (1,963) blood donors were included in this study. The donor had a mean age of 21±5.7 years and were mainly male (93.89%). The distribution of ABO blood group was; B (33.88%); O (30.92%); A (26.69%) and AB (8.50%). The proportions of Rhesus (D) positive and Rhesus (D) negative were 97.30% and 2.70% respectively. A significantly higher proportion of males were as a donor and Rhesus (D) negative than females (2.70% vs 0.00%). No significant relationship was found between age and ABO blood group distribution.

Conclusion: the sequence of ABO distribution among the blood donors who are more likely to boost blood stocks in the region. This may make the transfusion services to take necessary inventory for people who need the resource for their ailment.

Keywords: ABO blood group, Rhesus (D) Blood group, Blood donors.

Introduction:

Until the discovery of ABO blood groups by Karl Landsteiner in 1901, most of the transfusion trial failed with no significant explanation. After this several blood groups such as P and MNS blood groups were discovered[1] but yet the doctors were facing difficulties to perform transfusion safely. In 1940, Landsteiner and Weiner discovered the second most important blood group named Rh blood group which helped to transfuse blood safely[2]. The importance of Landsteiner's discovery lies firstly in the transfusion of blood amongst different populations irrespective of their ethnic origin, Secondly, organ transplantation[3] and finally the development of legal medicine and anthropology[4].

There are many blood group systems on the basis of different blood group antigens but mainly ABO and rhesus (D) system are important in clinical practice. ABO system consists of four main groups A, B, AB and O which are determined on the basis of presence or absence of A and B antigens. In rhesus (D) system, blood groups are

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Rh-positive or Rh-negative on the basis of presence or absence of Rhesus (D) antigens on red cell surface[5].

Frequencies of ABO & Rh Blood groups vary throughout the world even in different region of the each country with ethnicity, geographic area, race, population migration, natural selection and genetic phenomenon. In a study among the voluntary donors, the distribution of ABO blood group was such; blood group B (31.65%); O (29.60%), A (25.83%) and AB (12.92%), Rhesus (D) positive (95.89%) and Rhesus (D) negative (4.11%)[6]. In another study among donors, the distribution of blood groups was B>O>A>AB, in Rh positive groups donors and O>B>A>AB among Rh negative donors. Blood group B was more common among the males (37.42%) while O was predominant among female donors (33.83 %)[7].

Method and Materials:

This observational type of cross sectional study was conducted in the dept. of Transfusion Medicine using 6 months data (January, 2021- July, 2021) on the donors attending the Dept. of Transfusion Medicine of TMC & RCH. Records of 1,963 Voluntary blood donors were reviewed. Prior to donating blood the donors were assessed for blood donating criteria. Only donors who satisfied these criteria were recruited. Incomplete donor equipment forms were excluded.

Blood grouping ABO and Rhesus was done by double slide method (Tiles method) using commercially available standard anti-sera validated at National Safe Blood Transfusion Services. For ABO groups forward (cell grouping) and reverse grouping (serum grouping) methods were used. Donor's age, sex, dates of donation ABO blood groups with Rh factors were recorded in register book. Data were analyzed and expressed in percentage.

Results:

This study includes 1963 donors of which male donors were 1843 (93.89%) and female donors were only 120 (6.11%). Donors were of age between18 to 60 years. Majority of the donors were of age between 18-27 years (Table I)

Table I: Distribution of donors (Male and Female) according to their age

Age group	Male (N & %)	Female (N & %)	Total (N & %)
18-27 year	1265(64.44)	63(3.20)	1328(67.65)
28-37 year	463(23.58)	42(2.13)	505(25.72)
38-47 year	95(4.83)	14(0.71)	109(5.55)
48-60 year	20(1.01)	01(0.05)	21(1.06)
Total	1843(93.89)	120(06.11)	1963(100)

This study shows that in ABO blood group system, B blood group was most prevalent (33.88%) among them male donors were 31.74% and female donor only 2.14%. Next most prevalent group was O (30.92%) followed by A (29.69%) and AB (8.51%). In Rh blood group system, majority of donors was Rh (D) positive (97.30%), among them male donors were 91.19% and female donor only 6.11%), among female donors, none were Rh (D)negative (Table II). Among female donors, O blood was prevalent (2.19%) followed by B group (2.14%).

Table II : Distribution of donors (Male and Female) according to their ABO & Rh blood Group

ABO Blood Group	Male (N & %)	Female (N & %)	Total (N & %)
A	499(25.42)	25(1.27)	524 (26.69)
B	623(31.74)	42(2.14)	665(33.88)
AB	157 (8.00)	10(0.51)	167(8.51)
O	564(28.73)	43(2.19)	607(30.92)
Total	1843 (93.89)	120 (6.11)	1963 (100)
Rh(D) Blood Group			
Rh(D)pos	1790 (91.19)	120 (6.11)	1910 (97.30)
Rh(D)neg	53 (2.70)	--	53 (2.70)

Table III reveals that majority of blood donors was B +ve 645(32.86%) followed by O+ve 588(29.95%), then A+ve 514(26.18%) and AB+ve 163(8.30%). Among Rh-ve donors, B-ve 20(1.02%), O-ve 19(0.97%), A-ve 10(0.51%), AB-ve 4(0.20%).

Table III: Distribution of Rhesus (D) groups in relation to ABO blood group donors:

Blood Group	Rh Positive (N & %)	Negative Rh (N &%)	Total (N & %)
A	514(26.18)	10(0.51)	524(26.69)
B	645(32.86)	20(1.02)	665(33.88)
O	588(29.95)	19(0.97)	607(30.92)
AB	163(08.30)	4(00.20)	167(08.50)
Total	1910(97.30)	53(2.70)	1963(100)

Discussion:

In this study, the dominance of male 1843(93.89%) over female 120 (6.11%) in blood donation exercise can be attributed to the fact that there is a general belief that men are healthier than women and they are more suitable for blood donation. Women in menstruating age

group lose blood every month and in obstetrical factors including pregnancy, breast feeding and nutritional deficiency are the most common cause of donor rejection. Other causes in Bangladesh, like cultural habits, lack of motivation and fear of blood donation have been the reasons why female donors are very few.[1-9]

The findings of this study show that the blood group B (33.88%) and O (30.92%) occurs most frequently among the donors, then A (26.69%) and AB (8.51%) i.e. B>O>A>AB. A similar study was done in Dhaka Medical College among general people and found B group (39.8%), O group (27.6%), A group (23.5%) and AB group (9.2%)[10]. These results were a little bit higher in groups B,O and AB but less in A group. This study is similar to the first study in Bangladesh done by Rahman M[11] in 1975 where blood group B was found most predominant among the population, and the frequency of B, O, A and AB groups were as 35.2%, 33.97%, 22.44% and 8.39 respectively i.e. B>O>A>AB. Karim S et al in their study found similar prevalence of ABO blood group distribution pattern of B, O, A and AB were 37.50%, 27.60%, 21.80% and 9.20% respectively[12].

In contrast, the blood group A is most prevalent group in Gaza[8]. In Iran, the blood group O had the high frequency (33.77%)[9]. In another study, the blood group O is the most prevalent group in Egypt[13]. Likewise blood group A in Russian Federation[14] . Our study showed that the blood group B positive was most prevalent (31.74%) in male and blood group O (2.19%) in female. where as a study done in our country shows, the most prevalent blood group B positive in both male and female[6]. In all the studies cited and including our study, blood group AB is the least distributed among the population of the world[1-14]. Our study reveals that Rhesus (D) negative has the lowest distribution among the donors which is similar to other studies conducted [5,9,10,13,14]. About 5-11 % of donors all over the world are detected as Rhesus (D) negative except in Britain and USA, where the distribution of Rhesus (D) negative is 15 and 17 % respectively[15].

In this study, in positive and Negative cases, B>O>A>AB. These results are concordant with the study of Tashmim FD et al, where the distribution of blood groups was B>O>A>AB, in Rh positive groups donors but not similar O>B>A>AB among Rh negative donors. Blood group B was more common among the males (37.42%) while O was predominant among female donors (33.83 %)[7].

In Rhesus System, our study shows prevalence of Rh positive was 97.30% and Rh negative was 2.70%, which was similar to other studies carried out in Bangladesh by Quader MA[5], Rahman M[11], Afrose S[16] and Hossain MM[17]. Our donor population showed Rh negativity of 2.70% as compared to 17% in Britain. This suggests that the expected frequency of Rh iso-immunization would be lower in our population than that encountered in the Britain population[18].

Conclusion:

The ABO and Rh blood group system is not only important in Transfusion medicine services, but also important to create a social awareness about self-blood grouping and voluntary blood donation among the population of a country. Knowledge of frequencies the distribution of ABO and Rhesus (D) blood groups is an important element in determining the direction of recruitment of voluntary blood donors as required in each region and also very useful in blood banking and transfusion service policies that could contribute significantly to the National Health System.

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