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Original Research Article

Distribution of ABO and Rhesus (Rh) Blood Groups among Voluntary Donors in Kachchh Gujarat

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ABSTRACT

Background: The ABO and Rh blood group systems are the most important blood group systems in Transfusion Medicine. This study was carried out with an objective to study the distribution of ABO and Rh blood groups among voluntary blood donors in Western Gujarat, India which is essential for effective management of blood inventory.

Material and methods: The present retrospective study was carried out at GKGH Blood centre. The data of present study is from 01/01/2024 TO 31/12/2024. Total 19355 voluntary blood donors were considered medically fit and accepted for blood donation. ABO and Rh typing were done by Complete Grouping Card method by Tulip matrix, both forward and reverse blood grouping after validation at blood centre.

Results: Out of 11,013 blood donors O blood group was most common (3520-31.96%) and the least blood group was AB Blood group (70-0.63%). There were more Rh-Positive blood donors as compared to Rh Negative blood donors.

Conclusion: The most common blood group among voluntary donors was O positive and least common blood group was AB negative.

Keywords: ABO Group, Rhesus Group, Voluntary Blood Donors

INTRODUCTION

Human blood groups are genetically inherited and exhibit varying degree of polymorphism. There is significant difference in the frequency of distribution of the various blood groups in population. Of the various blood group systems, the ABO blood group system is the most important blood group system in Health and disease.[1]

To date about 362 red cell antigens have been recognized by International Society of Blood Transfusion.2 These antigens are organized into 45 human blood group systems and each person has a unique spectrum of blood groups with the exception of identical twins or triplets whose blood groups are exactly the same.3,4 The most important human blood group systems for blood transfusion or transplantation are the ABO and Rhesus blood systems.

Red blood cells contain a series of glycoproteins and glycolipids on their surface which constitutes the blood group antigens.

The distribution of ABO and Rh blood groups is important for the effective management of blood centres.5 The ABO blood group system was the first human blood group system discovered by Landsteiner in 1900.6 The ABO blood group system is the only system in which antibodies are constantly present in the serum of human beings whose red cells lack the antigens.

Depending on whether Rh antigen is present on red cells or not, Rh phenotype is classified as Rh – D positive and Rh – D negative. Although all individuals share the same blood group system, they differ in the frequencies of a specific type.7 ABO and Rhesus (Rh) groups vary markedly in different parts of the world. Karl Landsteiner discovered the blood groups ABO and classified it into A, B, O groups.

Blood group AB was discovered by Landsteiner's associate, Von Decastello and Sturli in 1902. The Rh - D antigens have greater immunogenicity than all other red cell antigens except A and B antigens. Transfusion of ABO – incompatible blood can be associated with acute intravascular hemolysis, renal failure and death. It is of primary importance in Obstetrics, being the main cause of haemolytic disease of the newborn (HDN).

Of the Rhesus antigens, D antigen is most immunogenic. Individuals in whom the D antigen is absent will produce anti- D if they are exposed to the D antigen via Pregnancy, transfusion or transplantation. So in the blood bank, every blood donation is screened for ABO and Rhesus factor. This study was conducted with the aim of determining the distribution of ABO and Rhesus blood groups among voluntary blood donors.

MATERIAL AND METHODS

The present retrospective study was carried out at our blood centre. The data of present study is from 01/01/2024 to 31/12/2024 and includes In house and Blood donation camps 100% voluntary non remunerated voluntary blood donors. 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 screened by medical personel according to blood donor selection criteria and guidelines from drug and cosmetic act. Individuals with good health, mentally alert, physically fit were selected as blood donors. The donors were then asked to sign the donor questionnaire and inform consent form.

Total 19355 donors were considered medically fit and accepted for blood donation. After blood donation, ABO and Rh typing was done by Complete Grouping Card Method of Tulip, both forward and reverse blood grouping after validation at blood centre. Doubtful cases were confirmed by tube technique and weak D blood group confirmed by Column Agglutination technology method. All weak D groups were considered as Rh positive in blood donors.

RESULTS

ABO blood group was carried out on 100% voluntary non remunerated 11,013 healthy blood donors.

Distribution of blood donors according to gender shows there were more male donors (95.67%) as compared to female donors (4.33 %). Out of 11,013 blood donors O blood group was most common (3520 – 31.96 %) and the least blood group was AB Blood group (70 – 0.63 %).

We found that the percentage of ABO blood groups in donors in descending order as follows: O > B > A > AB. (Table 1) (Table 2) (Fig1). Rh blood group distribution of blood donors according gender shown in Table 2. There were more Rh-Positive blood donors as compared to Rh Negative blood donors.

Table-1: Comparison of Distribution of Blood groups ABO AND RH IN KACHCHH

BLOOD GROUP	Rh positive	Rh negative
A	2330	174
B	3461	301
O	3461	278
AB	878	277

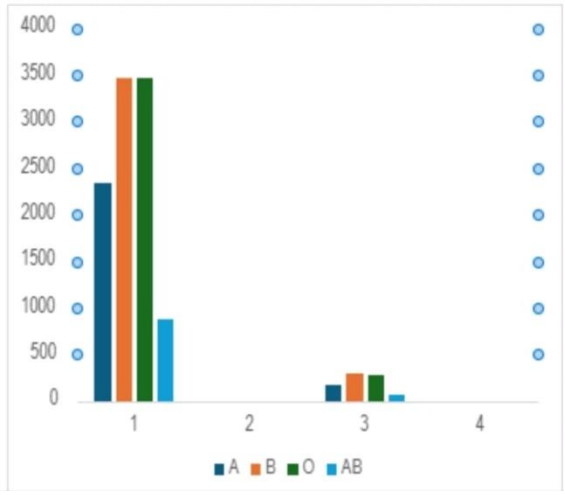

Figure-1: Bar graph showing distribution of ABO blood groups among individuals (both male and female)

Table-2: Sex Distribution of Accepted Donors

Blood Group	Male (n=10,536)	Female (n=477)	Total (n=11,013)
A+	2224	103	2327(21.12%)
A-	166	8	174(1.57%)
B+	3307	151	3458(31.39%)
B-	291	10	301(2.73%)
O+	3374	146	3520(31.96%)
O-	271	14	285(2.58%)
AB+	836	42	878(7.97%)
AB-	67	3	70(0.63%)
Total	10,536 (95.67%)	477 (4.33%)	11,013 (100%)

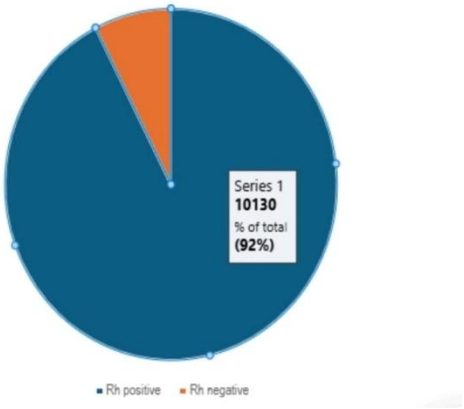

Figure-2: Pie chart showing Rhesus (Rh) blood group distribution among individuals

DISCUSSION

The findings of this study show that the blood group O occurs most frequently among the donors and blood group AB is the least common. Knowledge of the distribution of ABO and Rhesus blood groups is an important element in determining the direction of recruitment of voluntary blood donors as required in each region and for effective management of blood centres inventory, be it at a facility of a small local transfusion services or regional or national transfusion

services. In the present study males (95.67%) comprised the significant donation group as compared to female donors (4.34%) which is similar with other Indian studies. The lower rate of donation in females is due to fear of donation and low hemoglobin level among females. The commonest blood group was O followed by B, A, AB. This is similar with other studies from Central Gujarat in which blood group O was found to be predominant. The Rh D positive blood group was found in the range of 91% to 97% across the India in different studies. The blood group AB found also as a least common blood group in the range of 5% to 12% across the India in different studies.

CONCLUSIONS

This present study concludes that O (31.96%) blood group is the most common and AB (0.63%) blood group is the least common blood group among voluntary blood donors in western Gujarat. The study helps to prepare a database for the blood centres and creates awareness as to which blood groups should be stored and given importance and maintain inventory. It is necessary to conduct similar well-designed studies in other states of India to determine the blood group frequencies in the different regions. So, it is advisable to do blood grouping studies in each region for drafting proper national policies and for supplying to the needy patients during emergency.

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