

Prevalence of ABO & Rh blood among the population residing in and around Guwahati - A retrospective study

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Abstract

Background: Blood transfusion is an essential part of modern health system. Blood grouping plays an essential part of blood transfusion service. ABO and Rh blood are most important in human being among the blood group system. Frequency of blood group among different population varies throughout the world even in different parts of the country.

Methodology: It is a retrospective study, conducted at Saharia's Blood Bank of Guwahati over a period of eight years from 2008 -2015 .Blood group of the donors 33382 were determined by commercially available antisera by test tube method.

Results: The Study shows the distribution of ABO blood groups as O+ (11720), O- (444), A+ (8480), A- (311), B+ (9304), B- (293), AB+ (2766) and AB- (64). While looking at ABO grouping it is noticed that the grouping is comparable to a study done in Bangalore in Karnataka and another study done in Kanchipuram district, Tamil Nadu. These studies usually follow the asiatic trend of O>B>A>AB. It shows Rh distribution as 32270 (96.66%) donors to be Rh positive and 1112 (3.33%) donors to be Rh negative.

Conclusion: Knowledge of data of blood group data in population not only helps in blood transfusion services about the availability of human blood in regional calamities, but also serves to enable insight into possibilities of future burden of diseases.

Keywords: Blood group, ABO, Rh, Guwahati, Saharia's

Introduction

Blood transfusion is an essential part of a modern health system. Blood grouping plays an essential part of blood transfusion service. In 1900, Karl Landsteiner has discovered ABO blood group system and later in 1940 Landsteiner and Weiner defined Rh blood Group System of human RBC. Among a total of 29 blood group systems and over

600 different blood group antigens discovered so far, ABO and Rh-D blood group antigens are genetically determined integrated parts of the red blood cell membrane [1] Red blood cells contain a series of glycoproteins and glycolipids on their surface which constitute the blood group antigens.

Today, it is a well-established fact that the ABO blood groups show a wide geographical variation and vary considerably, both within and among ethnic groups [2]. So, the ABO and Rh –D blood groups distribution in different population groups is of importance in health care and transfusion practices .[3]

Blood group distribution in different population is of importance in genetic studies, researching population migration patterns, resolving certain medico-legal issues particularly those of parental dispute and also for effective management of blood bank inventory [4,5] .

Few studies of ABO and Rh blood group prevalence among the various populations of India have been carried out. Study done by Nanu and Thapliyal in the north Indian population report that group B is the most predominant one.[5] as also reported in a study in neighbouring Pakistan.[6] The south Indian study by Das *et al.* shows that group O is the most predominant one, followed by group B and group A, and also, the finding regarding Rh negative was much less than Rh positive.[7] Another south Indian study conducted on the population of Chittoor district of Andhra Pradesh also showed similar pattern of distribution of blood groups.[8]

In a northern Indian study the ABO blood groups and Rh positivity in male and female donors showed that the blood group B positive was most prevalent in both male and female followed by group O, A and AB.[9]

In clinical practice blood grouping is important because an antigen may in certain circumstances, react with its corresponding antibody and cause harmful clinical effects like haemolytic transfusion reactions and haemolytic disease of newborn.

Though blood transfusions can be life saving for a number of patients they are not without risks. In addition to risks such as transfusion - transmissible diseases (TTD) caused by donors viruses, parasites or bacterial

contaminants of blood products, there is also risks to donor-recipient antigen phenotype disparity. Still RBC's for blood transfusion are most only matched for major antigens, ABO and D an approach that is considered as safe and cost effective, except chronic transfusion recipients (eg. thalassemia) who additionally require extended matching for minor antigens.

So, preparation of antigenic profile data bank in a population help blood *transfusion service to select appropriate antigen negative donor unit for prevention of alloimmunization in recipient.*

Aim and objectives

Antigenic frequencies in Indian donors differ from widely available data of European and American countries. Till date, there is no data available / reported about the frequency of different blood group antigens in the large numbers of donor population in North Eastern region except in Manipur in 2010, where study was conducted on ABO & Rh blood group among four populations. So doing a survey on the frequency of clinically significant blood group antigen in donor population is necessary for

- i) To facilitate quality blood transfusion service.
- ii) Preparation of antigenic profile data.
- iii) Comparison of the data of this donor population group with other region.
- iv) Future genetic research.

Materials and methods

A retrospective study was carried out at the Saharia's Blood Bank, Guwahati. The blood groups of donors of either sex presenting over a period of approximately eight years from 2008 to 2015 were studied.

In this study 33382 donors were screened for their blood groups.

Collection of blood samples

The blood samples were collected by finger prick in most cases but occasionally by venepuncture in a disposable syringe, and transferred immediately to a tube containing Ethylene Diamine Tetra Acetic acid (EDTA). The ABO and Rh blood grouping were done by agglutination test using anti-A, anti-B and anti-D human sera. The donors with more than once entered in the record were included once for the study.

Determination of blood group

Blood grouping (ABO) and Rhesus factors (Rh) was done by the antigen antibody agglutination test by tube method. Commercially available antisera were used. All the donors of this institute are voluntary or replacement donors.

Statistical Analysis

Percentage and proportions for each Variable are calculated and 95% confidence intervals were taken to define normal range.

Results

ABO blood groups of 33382 donors at Saharia’s Blood Bank, Guwahati were determined by agglutination method. We found that the percentage of blood groups in donors in descending order was as follows: O>B>A>AB.

Table 1: Distribution according to type of donors.

Donors	No.
Voluntary donors	3638
Exchange donors	29744
Total	33382

Table 2: Distribution showing gender of donors.

Gender	No.
Male	32047
Female	1335
Total	33382

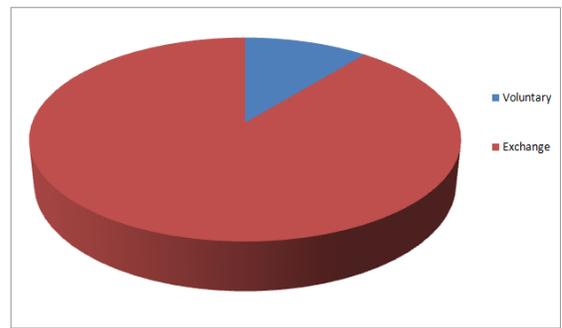


Figure 1: Distribution according to type of donors.

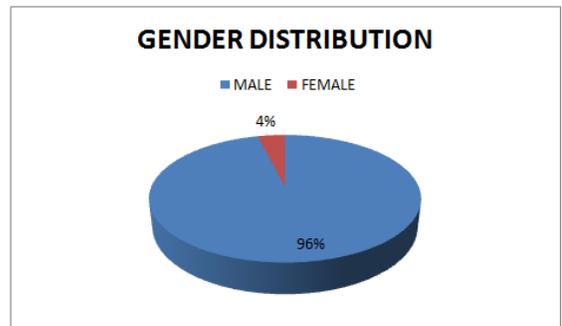


Figure 2: Distribution showing gender of donors.

Table 3: Distribution according to ABO Blood Group.

	Positive	Negative	Total
O	11720	444	12164
A	8480	311	8791
B	9304	293	9597
AB	2766	64	2830
Total	32270	1112	33382

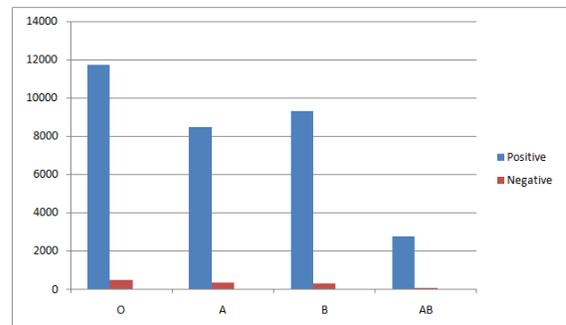
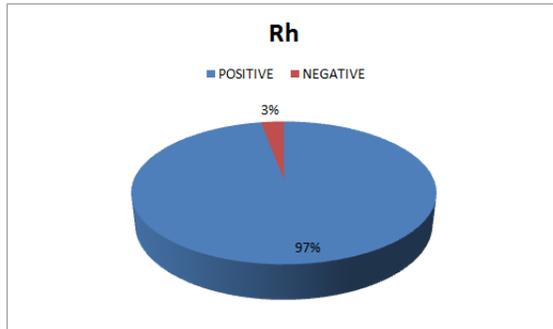


Figure 3: Distribution according to ABO and Rh Blood Group.

Table 4: Distribution according to Rh Blood Group.

Rh	Total
Positive	96.67 %
Negative	3.33 %

**Figure 4: Distribution according to Rh Blood Group.****Discussion**

Knowledge of ABO Blood Groups is an important tool to determine the direction of recruitment of voluntary donors as required for zone across the country. The distribution of ABO blood group varies regionally, ethnically and from population to another.

Table 1 shows distribution of types of donor. It shows 29744 (89.1%) Exchange Donors and 3638 (10.9 %) Voluntary donors.

Table 2 shows gender distribution among the donors. 9160 (96%) male donors and 390 (4%) female donors.

Table 3 shows the distribution of ABO blood groups as O+ (11720), O- (444), A+ (8480), A- (311), B+ (9304), B- (293), AB+ (2766) and AB- (64). While looking at ABO grouping it is noticed that the grouping is comparable to a study done in Bangalore in Karnataka and another study done in Kanchipuram district, Tamil Nadu. These studies usually follow the asiatic trend of O>B>A>AB. [4] . Studies done at Durgapur, Bangalore, Devanagere and Shimoga-Malnad found that the commonest blood group was 'O'. [10, 11, 12].

Table 4 shows Rh blood group distribution as 32270 (96.67%) donors Rh positive and 1112 (3.33%) donors Rh negative.

Conclusion

The study results show that the most frequent blood group in the donors is group O and the rarest is group AB and Rh-negative frequency is 3.33%. Blood donation by the females is very low 4% and it needs to be increased by improving health status and awareness about blood donation.

This study has a significant implication regarding the management of blood banks and transfusion services in this area. Knowledge of blood group phenotype distribution is also important for clinical studies (for example disease association), as well as for population study.

Similar well designed studies in other states of India and along with the present study may be useful for health planners, for making efforts to face the future health challenges. In short, generation of a simple database of blood groups, not only provides data about the availability of human blood in case of regional calamities, but also serves to enable insight into possibilities of future burden of diseases.

It is also hoped that the data generated in this study would assist in the planning and establishment of a functional blood service that would meet the ever-increasing demand for safe blood and blood products.

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