

Prevalence of ABO and Rhesus Blood Groups in Blood Donors: A Study from A Tertiary Care Centre in South Kerala

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ABSTRACT

Introduction: 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 blood donors in South Kerala, India which is essential for effectual management of blood inventory.

Material and methods: It is a retrospective study carried out in the Department of Transfusion Medicine, Government Medical College Hospital, Thiruvananthapuram, Kerala from July 2016 to June 2017. The study was done on 30,839 blood donors. The ABO grouping and Rh typing was done using tube agglutination method with antisera A, B, O and Rh and freshly prepared pooled A and B cells. The frequency of ABO and Rh blood groups were reported in simple percentages.

Results: The distribution of ABO blood group was; blood group O (37.86%); blood group B (29.10%); blood group A (26.27%) and blood group AB (6.77%). The proportions of Rhesus (D) positive and Rhesus (D) negative were 90.48% and 9.52% respectively. There was a higher rate of male blood donation than females.

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

Keywords: ABO Blood Group, Blood Donor, Rh Blood Group

INTRODUCTION

In the year 1901, Karl Landsteiner, an Austrian scientist discovered the ABO blood group system. He identified three types of blood groups A, B and O. The fourth blood group AB, was discovered in 1902 by Alfred Von Decastello and Adrian Sturli.¹ The ABO blood group system is divided into four blood types on the basis of presence or absence of A and B surface antigens determined by ABO genes, situated on the long arm of chromosome 9q and naturally occurring anti A and anti B antibodies in the serum of individuals lacking the corresponding antigen. These antibodies are capable of producing intravascular hemolysis in case of incompatible transfusion.

The Rh blood group system was discovered in 1941.¹ The Rh antibody described by Landsteiner and Wiener, agglutinated 85% of human red cells and was nonreactive with 15% of the Caucasian population. It is of primary importance in obstetrics, being the main cause of hemolytic 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 and transplantation.

The ABO and Rhesus are the most important blood group

systems for blood transfusion or transplantation. The prevalence of ABO blood groups varies with race, ethnicity and region. The knowledge of the distribution of ABO and Rh blood groups is essential for effective management of blood banks inventory. It is therefore important to have an information on the distribution of these blood groups in the population of this study region and hence this study has been carried out to study the distribution of ABO and Rhesus blood groups in blood donors of tertiary care hospital in South India.

MATERIAL AND METHODS

This retrospective study was conducted in the Department of Transfusion Medicine, Government Medical College Thiruvananthapuram, Kerala. The data of blood donors during the period of one year from July 2016 to June 2017 were analysed. This included both voluntary and replacement donors who has donated blood in the blood bank or in the outdoor voluntary blood donation camps conducted by the department. The donors were selected as per the criteria laid down by the Drugs and Cosmetics Act, 1940 and Rules, 1945.

The donors were first required to fill up a donor registration form which included personal details and medical history. Those donors with haemoglobin more than 12.5 gm% were selected and screened by a medical officer. A total of 30,839 donors were accepted for blood donation. After blood donation, blood group was determined by forward and reverse grouping by conventional tube method from the pilot samples of the donors following standard operative procedures of the blood bank. The forward grouping was performed using mono clonal anti A, anti B, anti H antisera (Tulip diagnostics ltd) and reverse grouping performed using in house prepared A, B, O pooled cells. For Rh typing anti-D (Tulip diagnostics) antisera was used. The forward grouping was done by one technologist and reverse grouping by another technologist. The blood group was confirmed only if forward and reverse groups were identical. Rh negative blood groups were confirmed by antiglobulin technique and

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Blood group	No of donors	Percentage
O	11,675	37.86%
B	8,974	29.10%
A	8,102	26.27%
AB	2,088	6.77%

Table-1: Frequency of ABO Blood Groups among Blood Donors

Blood group	No of donors	Percentage
O	10518	34.11
B	8039	26.07
A	7418	24.05
AB	1929	6.25

Table-2: Frequency of ABO Blood Groups among Rh positive blood Donors

Blood group	No of donors	Percentage
O	1157	3.75
B	935	3.03
A	684	2.22
AB	159	0.52

Table-3: Frequency of ABO Blood Groups among Rh negative blood Donors

weak D groups were considered as Rh positive. All reagents were used after subjecting it to quality control test. The donor blood group were recorded and data on frequency of ABO and Rh-D blood groups were described in percentages and compared with the similar studies.

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. Descriptive statistics like mean and percentages were used for the analysis.

RESULTS

The total donors studied from July 2016 to June 2017 were 30,839. The female donors constituted only about 1.13% (347) of total donors. The commonest ABO blood group was O (37.86%) followed by B (29.10%), A (26.27%) and AB (6.77%) respectively (Table-1). The distribution of ABO Rh positive blood groups were as follows, blood group A positive 24.05%, B positive 26.07%, O positive 34.11% and AB positive 6.25% (Table-2), The distribution of Rhesus (Rh) D factor were as follows, 27904 (90.48%) Rh D positive and 2935(9.52%) Rh D negative. Among Rh D negative blood donors, O negative (3.75%) was most common followed by B negative (3.03%), A negative (2.22%), and AB negative (0.52%) (Table-3). There was no Bombay blood group detected during the study period.

DISCUSSION

In the present study males comprised the significant donation group as compared to female donors (ratio of 88:1) which is similar with other Indian studies.^{2,3} Even though the female literacy rate is high in our state, the lower rate of donation is due to fear of donation and low haemoglobin level among females. The commonest blood group was 'O' followed

by B,A and AB. This was conflicting with other studies from North India in which blood group B was found to be predominant.^{4,5,6} Studies from South India like Periyavan et al and Suresh et al showed a similar pattern of frequency where O blood group was predominant.^{7,8} In the neighbouring countries like Pakistan and Nepal the predominant blood groups were B and A respectively.^{9,10} The incidence of Rh D positive blood group is 90.48% and 9.52% to be Rh D negative which similar to a study from South India.⁸ Studies from India shows variation from 92% to 98%.¹¹ The Rh-negative phenotype occurs in 15% to 17% of Whites, but is not common in other ethnic populations.^{12,13} No Bombay groups were detected during the study period.

CONCLUSION

The present study concludes that most common blood group is O and AB is the least common amongst the blood donors at Thiruvananthapuram, Kerala state. The percentage of Rh positive donors were 90.48% and Rh negative 9.52%. Knowledge of frequency of ABO grouping and Rh typing is important in the maintenance of blood bank inventory and blood transfusion services to the patients. The proportion of female donors is meagre in this state which has a high female literacy rate and steps should be taken to promote female donation. The data obtained in the present study will be useful to face the future transfusion challenges in the state.

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