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Original Research Article

Distribution of ABO and Rh blood groups among people visiting tertiary hospital of Dibrugarh district of Assam, India

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ABSTRACT

Background: Clinical application of blood grouping are many. Blood grouping are needed for blood transfusion, in preventing hemolytic disease, paternity dispute, medico legal cases, in knowing susceptibility to disease, and also necessary for genetic research. This study was carried out with an objective to provide data regarding distribution of ABO and Rh blood groups among people visiting various department of tertiary hospital of Dibrugarh district of Assam, India.
Methods: Data of 200 subjects were collected and analyzed regarding ABO and Rh blood groups from 01 August 2021 to 31 July 2022 and reported in simple numbers and percentage. ABO and Rh blood group type is determined by glass slide method.
Results: The most common blood group among the subject was O (33%), B (33%), A (23%) and AB (22%). Rh positivity among the subject was 93% and Rh negativity is 7%.
Conclusions: The most common blood group among the subject was O positive and B positive and least common was AB negative.

Keywords: ABO, Rh blood groups, Genetic research

INTRODUCTION

Karl Landsteiner and his student in early 1900 discovered ABO blood group system. This ABO system, was shown by Bernstein in 1925 to consist of three alleles of a single gene, I^A, I^B, and I^O, forming four different phenotypic groups: A (I^AI^A or $I^A I^O$), B (I^BI^B or I^BI^O), AB ($I^O I^O$). In ABO system the blood serum of man himself manufactured the antibodies that reacted with the blood – cell antigens of other individuals. So transfusions of blood between individuals of different ABO types may result in an agglutination reaction, especially if large quantities of a different blood type are being introduced; either the antibodies of the recipient will destroy (hemolyse) the red cell of the donor or the antibodies of the donor will hemolyse the red cell of the recipient. If small quantities of blood are being introduced, however transfusion can be considered safe as long as the serum of the recipient does not contain antibodies for the blood-cell antigen of the donor. In small transfusions, even if the donor serum transmits antibodies for the recipient's blood cell, the antibodies are usually quickly absorbed by other tissues or greatly diluted in the recipient's bloodstream. On this basis people of O blood type lack A and B antigens, and may therefore serve as blood donors for either O, A, B, or AB individuals. AB individuals, on the other hand, do not produce antibodies against either A or B antigens, and may therefore be recipients for either O, A, B, or AB blood cells. The A and B antigens are found not only on red blood cells but often in the body fluids as well. Individuals who possess such antigens in their fluid such as saliva, are called 'secretors' and can be shown to be either homozygous (Se Se) or heterozygous (Se se) for dominant secretor allele (controlled by a different gene pair than the

ABO blood group genes). Whether secreted or attached to red blood cells, the ABO antigens are now known to represent only slight modification of the sugar (saccharides) portion of either the protein- sugar compounds (mucosaccharides) present in the red blood cells or the fat sugar compound (lipopolysaccharides) present in secretion.[1]

Rh (Rhesus) blood group system

Rh antigen

The antigen responsible this blood grouping system are called Rh antigen or Rh agglutinogen or Rh factor because this were first discovered in the RBC of rhesus monkey. Based on the presence of Rh antigen two types of blood group are discovered: Rh positive blood group and Rh negative blood group.

Rh antigen was discovered by Landsteiner and Weiner in 1940. They notice that when RBC of the rhesus monkey (monkey with red ischieal callosity) were injected into a rabbit, antibodies were formed against these RBCs. When this rabit serum was tested against human redcells, agglutination occurred in 85% of the cases, i.e., this person's RBCs contained antigen which reacted with antibodies formed against the rhesus monkeys RBC. They labelled this antigen as Rh antigen and such as person as Rh +ve. The remaining 15% were labeled as Rh –ve.

Three types of Rh antigen, *viz.* C, D and E has been recognized. Havy D antigen is the common and produces the worst transfusion reaction. Therefore, for all practical purposes the term Rh antigen refer to D antigen. Consequently, the Rh +ve and Rh – ve individuals are also sometime call D +ve and D –ve individual respectively.

Rh antigens are integral membrane proteins. These are not found in any tissue other than RBCs.[2]

Landsteiner's law

According to Landsteiner's law, there are no isoagglutinin. It states that "if an agglutinogen is present in red blood cell of a person, the corresponding agglutinin must be absent in the plasma" and "if an agglutinogen absent in red blood cell, the corresponding agglutinin must be present in the plasma". Though the second part of the law is a fact, it is not applicable to Rh factor.[3]

Clinical application of blood grouping is many. They are as follows– blood transfusion, in preventing haemolytic disease, paternity dispute, medico-legal case, and in knowing susceptibility to disease.

The incidence of certain diseases is related to blood group, *e.g.* individual with blood group O (non-secretor) are said to be more susceptible to duodenal ulcer (peptic ulcer) than the individual with blood group A and B (secretor). Individual with blood group A are more susceptible to carcinoma of stomach, pancrease and salivary glands. To some extent incidence of diabetes mellitus is more in individual with blood group A.[2] The demonstration of associations between blood groups and certain disease is important contribution of human genetics.

This study was carried out with an objective to provide data regarding distribution of ABO and Rh blood groups among people visiting various department of tertiary hospital of Dibrugarh district of Assam, India.

METHODS

It is a hospital based cross-sectional study. The present study was carried out in the department of physiology, AMC and cases were selected from medicine OPD and indoor patient of medicine department of Assam Medical College and Hospital after taking ethical approval from institutional ethics committee (H), NO.AMC/EC/PG 5463 DIB. Dated 10 October 2022. The study population was adult patient and accompanying person with more than 18 years of age irrespective of sex. 200 number of subject were included of more than 18 years old and of both sexes. Two consecutive cases every week on a particular day attending all the medicine OPD and indoor patient of medicine department is enrolled for a period of one year (from 01 August 2021 to 31 July 2022).

The blood for blood grouping was obtained by finger prick or by venipuncture in aseptic condition and the ABO and Rhesus blood group was determined by using anti-sera by slide method.

Exclusion criteria

Patient suffering from diabetes mellitus, renal disease, hyperthyroidism, coronary artery disease, congestive heart failure; patient with H/O alcoholism; and persons on other medications besides anti-hypertensive drugs were excluded.

Parameter estimated

The parameters estimated included: ABO and RH blood group.

Instrument used

Instruments used were: reagent to determine ABO and RH blood group; 1% sodium citrate solution; microscope; and watch glass, cotton, rectified spirit, pricking needle, marking pencil, and applicator stick.

RESULTS

ABO blood groups of 200 adult subjects from age 18 to 69+ years of age was carried out. We found that the percentage of ABO blood groups in the following order: O=B>A>AB. Out of 200 subjects, 66 (33%) were of blood

group O, 66 (33%) of B, 46 (23%) of A and 22 (11%) were of blood group AB (Table 1).

Table 1: Blood groups.

Blood groups	Total (%)
A	46 (23)
B	66 (33)
AB	22 (11)
O	66 (33)
Total	200 (100)

Out of 200 participants Rh positive blood group were186 (93%) and Rh negative are 14 (7%) (Table 2).

Table 2: Rh blood groups.

Rh blood group	Total (%)
Rh +ve	186 (93)
Rh -ve	4 (7)
Total	200

DISCUSSION

The distribution pattern of ABO and Rh groups vary widely across different races and geographical areas of the world. Only a few study is done to find out this variation and to provide data to health care community.

In our study the most common blood group were O (33%) and B (33%) followed by A (22%) and blood group AB was least common (11%). In Rh blood group, the frequency of Rh D +ve was 93% and Rh D –ve was 7%.

According to the studies done in Northern India and Western India, B group was having highest prevalence (34-40%) followed by O, A and AB blood group.[4-6]

Studies done in Eastern India and Southern India showed blood group O has highest prevalence (34-40%) followed by B, A and AB blood group.[7,8]

In the present study, 93% blood group of the subjects shows Rh positivity for D antigen while 7% showed Rh negativity. Similar ABO blood group distribution pattern was detected in studies conducted in different states of India such as in New Delhi, Rajasthan, Punjab.[10-12]

However, the present study had some limitation. One should be very cautious to draw any firm conclusion from this study as it was undertaken for a short span of one-year time with limited no. of cases w/o considering race, ethnic background and geographical boundaries. It was a hospital based cross-sectional study which does not cover a study of the whole population in the vicinity of this region of country. We also emphasize that further researches has to be done in larger population to fully elucidated these findings.

CONCLUSION

To conclude, the commonest blood group were O and B irrespective of gender and ethnicity in the vicinity of Dibrugarh district of Assam, India. Regarding Rh D negativity is only 7% of population. Based on the findings of the present study and other reference studies, it can also be concluded that B blood group has highest frequencies in northern and western India, O blood group has highest frequency in eastern and Southern India.

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