

Prevalence of ABO and Rhesus Blood Groups in First Year Medical Students of Zoram Medical College, Mizoram.

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Abstract

Background: ABO and Rhesus (Rh) blood group antigens are inherited hereditary characters and are useful in selecting appropriately matched blood group during blood transfusion, organ transplantation, finding out association of blood groups and diseases, resolving medico-legal issues, prevention of ABO & Rh incompatibility etc. The frequency of ABO and Rh phenotypes in different population has been extensively studied. The present study has been undertaken to assess the prevalence of ABO blood group, Rh system and also determination of predominant blood groups among first year medical students.

Materials & Methods: The present study was undertaken to know the frequency distribution of blood groups among first year medical students. This study was conducted on 99 medical students in the Department of Physiology at Zoram Medical College, Aizawl, Mizoram. Capillary blood sample obtained by finger prick method and red cell suspension was prepared. Based on the principle of

antigen-antibody reaction, ABO blood grouping and Rh typing determined by glass slide method using commercially available blood grouping antiserum.

Statistics: The data was expressed as frequency and percentages using Microsoft excel.

Results: Out of 99 medical students, 40 (40.4%) were males and 59 (59.59%) females. 98.9% were Rh positive and only 1.01% Rh negative. Prevalence of blood group O positive was highest 37.37%, followed by A positive 28.28%, B positive 24.24% and AB positive 9.09%.

Conclusion: In our study most frequently occurring blood group was O (37.37%). Most of the students were Rh positive individuals (98.9%), with Rh negativity of only 1 (1.01%) among 99 students.

Keywords: Blood grouping; Rh typing; Blood group prevalence; Medical students.

Introduction

The term “blood group” refers to the entire blood group system comprising red blood cell (RBC) antigens whose specificity is controlled by a series of genes which can be

allelic or linked very closely on the same chromosome. “Blood type” refers to a specific pattern of reaction to testing antisera within a given system. Over a period of time, our understanding on blood groups has evolved to encompass not only transfusion-related problems but also specific disease association with RBC surface antigens. Karl Landsteiner has been credited for the discovery of ABO blood group system in 1900.¹ His extensive research on serology based on simple but strong scientific reasoning led to identification of major blood groups such as O, A and B types, compatibility testing and subsequent transfusion practices. He was awarded Noble Prize in 1930 for his discovery. At present, 33 blood group systems representing over 300 antigens are listed by the International Society of Blood Transfusion.^{2,3} Among the 33 systems, ABO remains the most important in transfusion and transplantation since any person above the age of 6 months possess clinically significant anti-A/or anti-B antibodies in their serum. Blood group A contains antibody against blood group B in serum and vice-versa, while blood group O contains no A/B antigen but both their antibodies in serum. Rhesus-system is the second most important blood group system after ABO,⁴ discovered on RBCs of rhesus monkey by Landsteiner and Weiner in 1940. Currently, the Rh-system consists of 50 defined blood group antigens out of which only five are important. RBC surface of an individual may or may not have a Rh factor or immunogenic D-antigen. Accordingly, the status is indicated as either Rh-positive (D-antigen present) or Rh-negative (D-antigen absent). In contrast to the ABO system, anti-Rh antibodies are, normally, not present in the blood of individuals with D-negative RBCs, unless the circulatory system of these individuals has been exposed to D-positive RBCs. Agarwal et al, carried out a study on automated analysis

of blood groups in north Indian donor population and observed that the common blood groups in order of frequency were B, O, A and AB; 94.4% being Rh-positive.⁵

An important milestone in the history of blood transfusion was the discovery of the ABO blood groups by Karl Landsteiner, followed by discovery of Rh antigen. Landsteiner’s achievements lead to several discoveries in the field of immunohematology. The blood group of a person depends upon the presence or absence of two genes A and B. The majority of ABO determinants are expressed on the ends of long polylactosamine chain.⁶ The gene for ABO group is present on chromosome 9 and on chromosome 1 for Rh system. No diseases are known to result from the lack of expression of ABO blood group antigens, but susceptibility to number of diseases has been interrelated to a person’s phenotype.⁷ Since the discovery of ABO system by Karl Landsteiner in 1901, many researchers have made attempts to determine the significance of particular ABO phenotype for susceptibility to disease.^{8,9} People have always been fascinated by blood, ancient Egyptians bathed in it, Aristocrats drank it, authors and play wrights used it as a theme and modern humanity transfuses it.¹⁰ Rh system emerged as 2nd most important blood group system due to haemolytic disease of newborn and its importance in Rh D negative individuals in subsequent transfusions once they develop Rh antibodies.¹¹ Blood Bank was established at State Referral Hospital attached to Zoram Medical College, Mizoram on 18th January, 2019. Our Blood Bank has the storage capacity of 600 units at its present stage, and looking forward to further expansion of capacity and premise. All study group first year medical students stay in the hostel within the campus, very near to the State Referral Hospital.

Aim of the study

The aim of this study was to find the frequency of different blood groups among the medical students so as to prepare the database for the blood bank for this institution.

Materials & Methods

The present study was undertaken to know the frequency distribution of blood groups among first year MBBS medical students. This study was conducted on 99 medical students within the age-group of 17 – 20 years, in the Department of Physiology at Zoram Medical College, Aizawl, Mizoram from October 2018 to November 2018. Ethical clearance was obtained from the Institution. After taking informed consent from each student, complete clinical details were noted. Blood Grouping was carried out on all 99 students by using commercially available Antisera manufactured by Spanclone ANTI-A, ANTI-B, ANTI-AB MONOCLONAL, ARKRAY Healthcare Pvt. Ltd, INDIA. Anti A & Anti B for ABO grouping and Anti D for Rh Grouping. Under aseptic precautions capillary blood was collected by sterile finger prick method. Red cell suspension was prepared by adding one drop of capillary blood into 3ml of normal saline (0.9% sodium chloride) in a watch glass. RBCs suspended in isotonic saline were treated with anti-A, anti-B and anti-D anti sera on separate glass slides, marked as A, B and D with a glass marking pencil and then mixed thoroughly with separate applicator sticks. The mixture observed for agglutination, both macroscopically (on a white background) and microscopically, also compared with the control (a drop of red cell suspension without any antisera). The blood group was determined based on agglutination (antigen-antibody reaction) with the corresponding anti sera. If agglutination was present in the blood drop A, then it belongs to A blood group,

agglutination in blood drop B, B group. Agglutination in both A and B blood drops, AB group and if no agglutination in both A and B drops, then O group. Similarly, agglutination in blood drop D was considered as Rh Positive and no agglutination Rh negative (Figure - 1). The advantage of preparing red cell suspension is that the test can be repeated in case of doubt, mixture will not dry up immediately and maintains zone phenomenon. The data was expressed as frequency and percentages using microsoft excel. Microsoft word was used to generate tables.

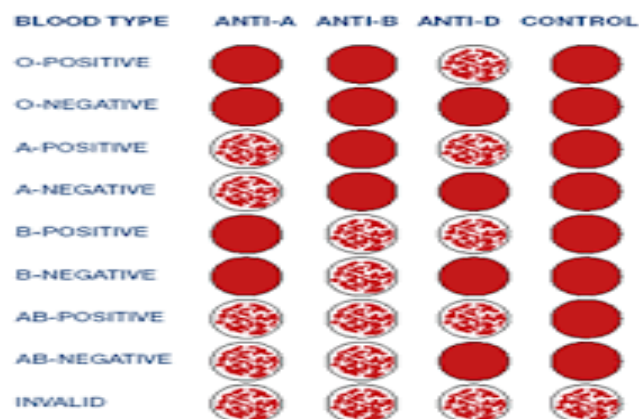


Figure 1: How to read Blood Group results.

Results

Out of 99 participants 59 (59.59%) were females and 40 (40.4%) were males (Table - 1).

Table – 2 depicts that most common blood group is O 37.37% followed by A 28.28%, B 25.25% and AB 9.09%.

Table – 3 shows that 98.9% students were Rh positive and only 1.01% were Rh negative. O positive (37.37%) is the commonest blood group among 99 students. A positive (28.28%) was the second and B positive (24.24%) was the third commonest in distribution of blood groups respectively. AB positive was observed in 9.09%. Only 1 (1.01%) was B negative among 99 students. A negative, AB negative and O negative blood groups was not prevalent (0%) respectively (Table – 4).

Tables

Table - 1: Gender and number of participant students.

Gender	Number of Students (99)	%
Male	40	40.4
Female	59	59.59
Total	99	100

Table - 2: Distribution of ABO blood group among study group.

Blood Groups	Number of Students	%
A	28	28.28
AB	9	9.09
B	25	25.25
O	37	37.37

Table - 3: Distribution of Rh blood group among study group.

Rh Typing	Number of Students	%
Rh Positive	98	98.9
Rh Negative	1	1.01

Table - 4: Details of ABO and Rh blood group distribution among 99 students.

Blood Group	Number of Students	%
A Rh Positive	28	28.28
B Rh Positive	24	24.24
AB Rh Positive	9	9.09
O Rh Positive	37	37.37
A Rh Negative	Nil	0
B Rh Negative	1	1.01
AB Rh Negative	Nil	0
O Rh Negative	Nil	0

Discussion

Blood grouping is an important parameter for society, professional, medical, individual and legal needs. It has been observed that percentage of the blood group distribution in different part of the world is different

depending upon the ethnic origin of the races.¹² Our State Referral Hospital is a tertiary care centre attached to Zoram Medical College, where many major, minor surgeries and medical emergencies require blood transfusions. Besides in Mizoram, Young Mizo Association, taxi drivers association & other NGOs, voluntarily donate blood to blood banks in and around the state. Only fewer data are published regarding blood group distribution in Mizoram. Our study will be add-on to the database for the blood bank of this institution, so that healthy student volunteers can be called from in-house for blood donation in case of emergencies.

In the present study the predominant blood group was O (37.37%) followed by A (28.28%), B (25.25%) and then AB (9.09%) [Table – 2]. Similar results was seen in a Profile of Blood Donors in Model Blood Bank Mizoram, India: A Record Based Case Series Study by Sangzuala & Lalmuankimi, O+ve blood group comprise of 38% followed by A+ve donors 32%.¹³ Our findings is in line with the study conducted by Rao C et al who report blood group O was 42.0% (40.1% O Rh positive and 1.8% O Rh negative) from 14,798 donors under study.¹⁴ In the study done by Tulika Chandra and Ashish Gupta the distribution of Blood Group was Group B (34.84%) followed by Group O (29.75%), Group A (21.50%), Group AB (13.91%)¹⁵ while in our study it is O (37.37%), B (25.25%), A (28.28%) and AB (9.09%) respectively.

In Rhesus system, the present study showed the prevalence of Rh positive as 98.9% while Rh negative as 1.01% (Table – 3). These figures are somewhat similar to other studies done in Northern India¹⁶ and other studies carried out in Maharashtra^{17,18} in relation to Rh positivity. In our study B Rh positive was 24.24% and B Rh negative blood group was found in only 1 (1.01%) student among 99 (Table – 4). Similar to this Rao C et al also reported the

frequency of blood group B in our population was 27.3% (25.6% B Rh positive and 1.62% B Rh negative).¹⁴ Because of smaller sample size, Rh negative percentage was less in our study and study group comprise a heterogeneous population as well.

Conclusion

Knowledge of blood group distribution is important for clinical studies, geographical information, medico-legal studies and blood bank management. In our study most frequently occurring blood group was O with Rh negativity of only 1 (1.01%). O positive (37.37%) is commonest blood group among 99 students. O negative, A negative and AB negative were rarest. Rhesus positive was commoner than Rhesus negative. This study will help to contact individuals belonging to a particular blood group at times of medical emergencies when blood transfusion is required.

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