

Frequency Distribution of ABO and RH Blood Groups among Medical students of KRIMS, Karwar

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Abstract

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Background: The knowledge of blood group distribution is important for clinical studies, for reliable geographical information and blood bank management. *Aims and Objectives:* To determine the blood group and study frequency distribution of ABO and Rh blood groups among medical students. *Materials and Methods:* Our study aimed to find out the frequency distribution of ABO and Rh blood groups among the students of Karwar medical college. For this study 299 (161 males and 138 females) medical students were included. Blood was collected by finger prick method. A drop of monoclonal anti-A, anti-B and anti - D was added to a drop of RBC suspension prepared from finger prick blood and normal saline on clean glass slides and mixed well. Results of agglutination were recorded immediately. The data was expressed as percentages. *Results:* This Study shows most frequently occurring blood group was O with 41.14% followed by B, A and AB. The frequency of B was 27.09%, A was 25.75% and AB was 6.02%. The Rh-positive percentage was 94.65% and that of Rh-negative was 5.35%. In Rh-positive blood group distribution, 'O' had maximum frequency of 39.13%, followed by 'B' 26.42%, 'A' 23.41% & 'AB' 5.69%. In Rh-negative 'A' blood group had maximum frequency of 2.34%, followed by 'O' 2.01%, 'B' 0.68%, 'AB' 0.33%. *Conclusion:* It can be concluded that among ABO system, O blood group frequency is more common in both sexes than other blood groups and AB being the least. Rh-positive blood group distribution frequency is more common than Rh-negative.

Keywords: ABO Blood Group; Rh Typing; Frequency Distribution; Medical Student.

Introduction

The membranes of human red cells contain a variety of blood group antigens, which are also called agglutinogens. The most important and best known of these are the A and B antigens, but there are many more. The A and B antigens are inherited as Mendelian dominants, and individuals are divided into four major blood types on this basis. Type A individuals have the A antigen, type B have the B, type AB have both, and type O have neither. Aside from the antigens of the ABO system, those of the Rh system are of the greatest clinical importance. The Rh factor, named for the rhesus monkey because it was first studied using the blood of this animal, is a system composed primarily of the C, D and E antigens, although it actually

contains many more. Unlike the ABO antigens, the system has not been detected in tissues other than the red cells. D is by far the most antigenic component, and the term Rh-positive as it is generally used means that the individual has agglutinin D. The D protein is not glycosylated and its function is unknown. The Rh-negative individual has no D antigen and forms the anti-D agglutinin when injected with D positive cells [1].

ABO and Rh blood groups are the most important blood groups despite the long list of several other blood groups discovered. All human populations share the same blood group systems and they differ in the frequencies of specific types. The frequency distribution of ABO and Rh groups varies markedly in different races, ethnic groups, and socio-economic groups in different parts of the world [2-3].

Knowledge of frequency distribution of blood group is essential for clinical studies and it provides access to safe supply of blood which will help significantly in reducing the preventable deaths. Therefore, it is essential to have statistics on the frequency distribution of these blood groups in any given population.

The frequency distribution of ABO and Rh blood groups vary from one population to another. In this regard, present cross sectional study was conducted to find out the ABO and Rh blood group frequency distribution among medical students of KRIMS, Karwar.

Methodology

This study was conducted on medical students who volunteered to take part in the study, in the Department of Physiology at Karwar Institute of Medical Sciences (KRIMS), Karwar. The Institutional ethical committee clearance was obtained and informed consent was taken from volunteers. All the students included in the study were 18 to 22 years of age group, healthy and were apparently free from diseases.

Total of 299 medical students, volunteered to participate in the study. Out of 299 students, 161 were males and 138 females. The ABO blood grouping and Rh typing was determined by glass slide method, after collecting blood samples by finger prick method under aseptic precautions. Blood samples were collected from one of the middle three fingers and three separate glass slides marked as A, B and D were used to detect A, B, AB, O group and whether they belonged to Rh-positive or Rh-negative. Commercially available standard anti sera - anti A, anti B and anti D were used for the agglutination test for detection of blood group. Glass slides marked as A, B and D was used to mix suspended RBCs with monoclonal anti-A, anti-B and anti-D anti sera. Separate applicator sticks were used to mix blood drop with anti sera for three glass slides to avoid false results. The mixture observed for agglutination, both macroscopically and microscopically for confirmation and carefully compared with the control.

The glass slide method of blood group determination is based on antigen antibody agglutination. The antigen present on the membrane surface of RBC agglutinates with the agglutinins present in the antisera. Hence, blood group was determined based on agglutination with

the corresponding anti sera. If agglutination was observed in the blood drop on slide marked A, then it belongs to A blood group, agglutination in blood drop slide B, B group, agglutination in both A and B drops, AB group and if there was no agglutination in both A and B drops, then O group. Similarly, agglutination in blood drop on glass slide marked D was considered as Rh-positive and no agglutination as Rh negative. The data was expressed as percentages

Statistical Analysis

The data was analyzed and final results were listed according to frequency distribution of ABO and Rh blood groups. Data was expressed in percentages.

Results

The study was conducted on healthy 299 medical students. Out of 299 students, 161 were males and 138 females. The frequency distribution of the ABO blood group is shown in Table 1. The ABO blood group frequency distribution of the medical students showed that blood group 'O' was most common which showed highest frequency 123 (41.14%), followed by 'B' 81 (27.09%), 'A' 77 (25.75%), & 'AB' 18 (6.02%) as shown in Table 1. The frequency distribution of the Rh blood group is shown in Table 2. It shows that frequency of Rh-positive is highest 283 (94.65%) and Rh-negative being lowest 16 (5.35%). The distribution of the ABO and Rh blood group is shown in Table 3. The gender wise distribution of the ABO and Rh blood group is shown in Table 4. Among most frequently occurring 'O' group, males were 69 (56.1%) & females 54 (43.9%) while among least frequent 'AB' blood group, females were 10 (55.6%) & males 8 (44.4%). In Rh positive blood group distribution, 'O' blood group had maximum frequency of 117 (41.4%), followed by 'B' 79 (27.91%), 'A' 70 (24.73%) & 'AB' 17 (6 %). In Rh Negative blood group distribution, 'A' blood group had maximum frequency of 7 (43.8%), followed by 'O' 6 (37.5%), 'B' 2 (12.5%), 'AB' 1 (6.2%). Among Rh positive males & females same blood group distribution was there i.e. 'O', 'B', 'A' & 'AB'. In Rh negative males 'A' blood group had maximum frequency followed by 'O' with equal distribution in 'A' & 'AB', while in females 'A' blood group had maximum frequency followed by 'O' and 'B' while there was no single female from blood group 'AB'.

Table 1: Distribution of ABO Blood Group System among medical Students

S. No	Blood Group	Subjects	Percentage
1	A	77	25.75
2	B	81	27.09
3	AB	18	6.02
4	O	123	41.14

Table 2: Showing Distribution of Rh group among Medical Students

S. No	Blood Group	Subjects	Percentage
1	Rh Positive	283	94.65
2	Rh Negative	16	5.35
3	Total	299	100

Table 3: Showing distribution of ABO and RH blood groups among medical students

S. No	Blood Group	Subjects	Percentage
1	A Positive	70	23.41
2	B Positive	79	26.42
3	AB Positive	17	5.69
4	O Positive	117	39.13
5	A Negative	7	2.34
6	B Negative	2	0.68
7	AB Negative	1	0.33
8	O Negative	6	2.01
9	Total	299	100

Table 4: Showing gender wise distribution of ABO and RH blood groups among medical Students

ABO	Males (n=161)			Females (n=138)			Total (n=299)		
	Rh Pos.	Rh Neg	Total	Rh Pos.	Rh Neg.	Total	Rh Pos.	Rh Neg.	Total
A	37	4	41	33	3	36	70	7	77
B	42	1	43	37	1	38	79	2	81
AB	7	1	8	10	0	10	17	1	18
O	66	3	69	51	3	54	117	6	123
Total	152	9	161	131	7	138	283	16	299

Discussion

Blood group distribution knowledge is important because of access to safe and sufficient blood supply. This helps in reducing many preventable deaths. This knowledge is also important for clinical studies and geographical information. Even in modern medicine, the blood group system is important because of the relation between different blood groups with different diseases and environment.

In the current study the distribution of blood group O was the highest and the commonest with 41.14% followed by B, A and AB. The frequency of B was 27.09%, A was 25.75% and AB was 6.02% as shown in Table 1. Our study findings are in agreement with previous studies. The same prevalence O>B>A>AB has been reported by many research

studies, Hemlatha [4], Hussain et al. [5], Swamy GG et al. [6], Thenmozhi S et al. [7], Mahaptra B, Mishra N [8], Kohli PG et al. [9], Sasekala M, Saikumar P [10], and Manjit Kaur et al. [11]. Contrary to our study prevalence of blood groups was found in other studies, SK Mishra et al. [12], Singh et al. [13], Ajay Kumar et al. [14], Tulika C et al. [15], Sidhu S et al. [16], Patil SV et al. [17], Roy B Banerjee et al. [18], and Abhishekh B et al. [19].

Our study further confirmed that Rh-positive has the highest percentage frequency while Rh-negative has the lowest percentage frequency. The total Rh-positive percentage was 94.65% and that of Rh-negative was observed to be 5.35%. In Rh-Positive blood group distribution, 'O' blood group had maximum frequency of 39.13, followed by 'B' 26.42%, 'A' 23.41% & 'AB' 5.69%. In Rh-negative blood group distribution, 'A' blood group had maximum frequency of 2.34%, followed by 'O' 2.01%, 'B' 0.68%,

'AB' 0.33%. These findings are similar to previous studies conducted by Hemlatha [4], Parmanik T, Parmanik S [20], and Khan MN et al. [21], etc. There were no gender wise differences in the frequency distribution of ABO and Rh blood group systems as shown in Table 4, but in Rh negative males 'A' blood group had maximum frequency followed by 'O' with equal distribution in 'A' & 'AB', while in females 'A' blood group had maximum frequency followed by 'O' and 'B' while there was no single female from blood group 'AB'.

The distribution of ABO blood group varies regionally, ethnically and from one population to another. Every transfusion centre must have a statistical record of frequency of blood group system in their population.

Our study findings are consistent with observations of many previous and current studies conducted in India and around the world on frequency distribution of major blood groups that was reporting 'O' blood group as the most common and the of Rh-positive factor frequency more than Rh-negative.

Conclusion

This study highlights the frequency distribution of ABO and Rh-blood group among medical students and from our study it can be concluded that blood group O was observed to be more common in both sexes among the medical students studied whereas AB blood group was observed to be the least. Rh-positive blood group was most common in both sexes than Rh negative. Everyone must know their blood group. This knowledge helps to save lives during medical emergency when a transfusion is required. Printing blood group information of individuals on identity cards driving licenses etc will be of tremendous use in case when urgent transfusion is required. Knowledge of blood group and routine practice of blood typing and cross matching may reduce complications caused by the mismatched transfusion reactions.

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