

PATTERN OF DISTRIBUTION OF ABO AND RHESUS BLOOD GROUPS AMONGST FIRST YEAR MEDICAL AND DENTAL STUDENTS IN A GOVERNMENT MEDICAL COLLEGE IN WEST BENGAL: AN OBSERVATIONAL STUDY



Physiology

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ABSTRACT

The ABO system is the most important of all blood group systems because of presence of natural A and B antibodies in individuals who lack corresponding antigen on their red cells. This cross-sectional observational study, was conducted on 262 Medical and Dental students in the Department of Physiology, in a government Medical College in Kolkata, West Bengal. The frequency distribution of ABO and Rh system among the students were studied with respect to sex and religion for our institutional blood bank. ABO grouping and Rh typing were done by glass slide method. The study established that B positive (36.3%) was the commonest and AB negative (0.4%) group was least among the study population. Rhesus positivity were in 96.2% cases while Rhesus negativity in 3.8%. Rh positive individuals showed similar pattern of distributions like ABO group but in Rh negative individuals group O was predominant.

KEYWORDS

ABO system, Rhesus group, Medical Students, Dental Students, West Bengal

INTRODUCTION:

In 1900, Karl Landsteiner an Australian scientist, discovered the human ABO blood group (1). AB type was discovered by Alfred Von Decastello and Adriano Sturli (2). The Rh blood group system was discovered during 1939-1940 by Landsteiner, Weiner, Levine and Stetson. In 1945, Coombs, Mourant and Race described the use of antihuman globulin (Coombs test) for incomplete antibodies LI (3). Later these two systems have substantiated to be the most important in transfusion medicine. Besides their importance in relation to blood transfusion and organ transplantation, blood group antigens can also be applied in genetic research, forensic pathology, anthropology and ancestral evolution of human (4).

In the ABO system there are 2 antigens A and B. Based on the presence or absence of these antigens, blood groups are classified as Group A, Group B, Group AB and Group O. The antibodies in the ABO system are of 2 types, anti-A (α) and anti-B (β).

These antibodies are naturally occurring and are present in the blood of individuals in whom the respective antigens are absent. Thus, Group A (having A agglutinin on the red cell membrane) will have anti-B and Group B (having B agglutinin on the red cell membrane) will have anti-A agglutinins in their plasma. The AB Group will have no antibody and Group O will possess both the antibodies (5). The Rhesus system was first discovered in Rhesus monkeys. Here there are six antigens (C, D, E, c, d, e). Of these six antigens, immunologically, D is the most significant. In Rh positive individual D antigen is present and in Rh negative, D antigen is absent. Anti-D antibody is produced only when an Rh-negative individual receives Rh-positive blood. This has an importance in Rh incompatibility in pregnancy where a Rh-negative mother carries a Rh-positive foetus and in the pathophysiology of Hemolytic Disease of the Newborn. In the Indian population, the distribution of the ABO and Rhesus (Rh) blood group is as follows:

A: 28%, B: 22%, AB: 5%, O: 45%. Rh-positive: 95-98%; Rh negative: 2-5% (5)

In order to avoid danger of mismatched blood transfusion, it is important to perform the blood grouping and cross matching of those involved prior to a transfusion. Nowadays, to eliminate the risk of transfusion reaction, the practice of autologous transfusion is followed by many physicians (6). The knowledge of distribution of ABO Blood Group is important as certain diseases and malignancies have predilection for certain blood groups (7,8,9). It was found that carcinoma of cervix had higher frequency in blood group A (10). A significant association was identified for cholera in which cholera patients were twice as likely to have blood group O and one ninth as likely to have blood group AB as community controls (11). An association has been found between distribution of finger print (dermatographic) pattern and blood groups. The correlation is more consistent for blood group A and loops, arches are more common in blood group AB (12).

MATERIAL AND METHODS:

This cross-sectional observational study was performed on first year medical and dental students, in the Department of Physiology at NRS Medical College, Kolkata in the Period of February to March, 2020. After prior informed consent and institutional ethical clearance samples were collected from 217 medical and 45 dental students, respectively. All the students were from various areas of West Bengal. Students in the same batches who were from other states of India were excluded from this study.

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 are Rh positive or negative. Monoclonal Reagents Kit (Biolab Diagnostics) containing antisera A, antisera B and antisera D kits were used for this study. Blood samples were treated with anti-A, anti-B and anti-D antisera over glass slides and mixed uniformly over an area of 2.5 cm by mixing stick. Separate applicator sticks were used to mix blood drop with antisera for three glass slides to prevent false results. After two minutes of gentle rocking samples were observed for agglutination, both macroscopically and microscopically (13).

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

RESULTS:

Out of total 262 students who volunteered, 168 (64.1%) were males and 94 (35.9%) females as illustrated in Table 1. In our study, the most frequently occurring blood group was B (36.3%) followed by O group (34.7%), A group (19.1%) and AB group (9.9%) (Figure 1). 252 (96.2%) students were Rh positive whereas only 10 (3.8%) were Rh negative (Table:2). Among the most frequently occurring B group, males were 72.6% and females 27.4% while in AB group which was least frequent were 65.4% in males and 34.6% females.

In Rh-positive blood group distribution, B blood group had highest frequency of 35.1% (N=92) followed by O (33.2%, N=87), A (18.3%, N=48) and AB (9.5%, N=25). Rh-negative blood group distribution showed 1.5% (N=4) belonging to O group followed by B (1.1%, N=3), A (0.8%, N=2) and AB (0.4%, N=1).

We divided our study population in three groups according to religion. Students from Hindu community were majority 218 (83.2%), 38 (14.5%) were Muslim and rest 6 (2.3%) Christian and Buddhist who were included in others category.

Sex and religion wise distribution pattern of individual blood group showed blood group B (72.6%) was commonest among male students where blood group A (40%) was most frequent among female individuals (Table:4). Blood group A (92%) was most prevalent among Hindus followed by O (86.8%), then B (77.9%) and least frequent was AB (73.1%). Moreover among Muslim students most frequent blood group was AB (23.1%), B (20%), O (13.2%) and A (2%). No students were found in O group from others category (Table: 5).

Table1: Sex and Religion wise Frequency distribution of study population

SEX	Percentage	p value	Religion	Frequency (n=262)	Percentage	p value
Male (n=168)	64.1%	0.214	Hindu	218	83.2%	0.089
Female (n=94)	35.9%		Muslim	38	14.5%	
			Others	6	2.3%	

Table 2: Frequency distribution of ABO and Rhesus blood groups

Blood group	Percentage	Rhesus	Percentage
A(n=50)	19.1%	Positive (n=252)	96.2%
B (n=95)	36.3%	Negative(n=10)	3.8%
AB (n=26)	9.9%		
O (n=91)	34.7%		

Table 3: Frequency distribution of Rh status amongst different blood groups

Blood group	Rh positive	Rh negative
A(n=50)	48(18.3 %)	2(0.8%)
B (n=95)	92(35.1%)	3 (1.1%)
AB (n=26)	25(9.5%)	1(0.4%)
O (n=91)	87(33.2%)	4(1.5%)

Table 4: Sex wise distribution of individual blood group

Blood Group	Male (Percentage)	Female (Percentage)
A(n=50)	30(60%)	20(40%)
B(n=95)	69 (72.6%)	26 (27.4%)
AB(n=26)	17 (65.4%)	9 (34.6%)
O(n=91)	52 (57.1%)	39 (31.9%)

Table 5: Religion wise distribution of individual blood group

Blood Group	Hindu (Percentage)	Muslim (Percentage)	Others (Percentage)
A(n=50)	46 (92%)	1 (2%)	3(6%)
20%)B(n=95)	74 (77.9%)	19(20%)	2(2.1%)
AB(n=26)	19 (73.1%)	6 (23.1%)	1(3.8%)
O(n=91)	79(86.8%)	12 (13.2%)	

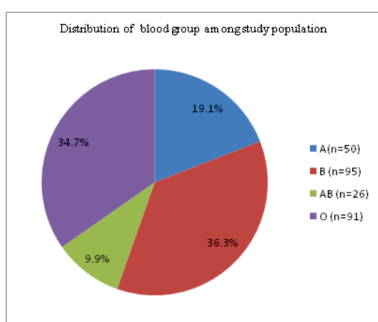


Figure1: Distribution of blood group among study population

DISCUSSION:

ABO and Rh blood group systems are important cornerstone for any transfusion related laboratory work especially for transfusion of blood and blood products, organs transplantation, genetic research, and investigations related to forensic pathology. Some blood groups are more prone for some diseases like diabetes mellitus, duodenal ulcers, UTI. Fewer studies have been conducted on the Indian population and common studies are limited to particular regions of the country and limited studies have yet been reported from West Bengal especially on medical and dental students. Our study is unique in that sense we tried to evaluate the prevalence of most frequent occurring blood group among medical and dental students in a tertiary care hospital in West Bengal which will provide us an important database in any emergency situation and useful documentary for our institutional blood bank.

In our study we have found blood group B was most frequent followed by group O, group A and least prevalent was group AB. Among Rh positive individuals we have found the same pattern of distributions of ABO blood group system though the frequency distribution of different blood groups in Rh negative individuals showed different pattern of occurrences where group O was most frequent followed by group B, group A and least in AB.

Our findings were quite similar with the study findings done by Deori J P et al in a tertiary care hospital of north east India (14). Outside the State in Guwahati, a study done by Talukdar et al revealed blood group O was the commonest (37.23%) followed by blood groups B (31.0%), A (24.83%) and AB (6.93%)(15).

Another Punjab and Lucknow based Studies done by Chandra et al and Sindhu et al found blood group B was the commonest, followed by O, A and AB which was quite similar with our study findings. A hospital based study on male blood donors conducted in western Ahmedabad by Patel et al reported the commonest ABO blood group was B (39.40 %) followed by O (30.79 %), A (21.94 %) and AB (7.86 %) (16,17,18) . Another Study by Chandra et al in North East India found among female blood donors the B positive blood group was most prevalent (16).

Study on the distribution of blood groups among south Indian medical students of the Great Eastern Medical School, Andhra Pradesh done by Swamy et al (19) found O was the commonest blood group in both sexes, though in our study we found blood group B was commonest among male students where blood group A was most frequent among female individuals which was quite similar with the study findings done by Deori J P et al (14)

One North Indian Muslim population based study done by Hussain et al observed the most frequent blood group was group O, followed by A, B and AB (20). In our study on comparing different blood group pattern according to religion, among Hindus most prevalent blood group was group A, followed by O, B and AB. Moreover among Muslim students most frequent blood group was AB, B, O and A.

In Davangere, Karnataka, a study done on 152 medical students by Hemlatha et al observed the most common blood group was O (41.5 %) followed by B (32.2 %), A (19%) and least being AB (7.2%). Among the Rh blood group, 94% students were Rh positive and 6% Rh negative. In our study we observed that 96.2% students were Rh positive and only 3.8% study population were from Rh negative. In their study among all one hundred medical students A, B and O blood groups were seen in equal proportion, each in 30 % cases and least being AB group (10%) and 97% students were Rh positive (21).

CONCLUSION:

From our present cross sectional observational study among 262 medical and dental students we found that blood group B was commonest among ABO system followed by group O, A and lastly AB. Same pattern of distribution were seen in Rh positive individuals but distribution in Rh negative individuals differ being O group was more common followed by B, A and least was AB. Majority was Rhesus positive. Blood group A was more frequent among female students where group B was commonest among male individuals. Group A was most frequent among Hindu community but group AB was more frequent among Muslim individuals. Our present study not only provide an important database for our institutional blood bank but it will provide reliable information about an individual student as it would be written in institutional identity card which will further help in any emergency situation in future.

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Conflict of Interest: None

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