



## Variation of ABO and Rh Blood Groups among Undergraduates

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### Abstract

**Aim/Objective:** The present study aim is to determine the most common blood groups for purpose of emergency blood transfusion and to compare with other studies.

**Research Methodology:** The observational cross-sectional study was done at Department of Pathology at Santhiram Medical college, Nandyal, Andhrapradesh of South India during July 2013 to June 2014.

**Results:** During the observation, total number of subjects studied were 176, among them 79 were males and 97 were females. Study showed Blood group O was more predominant in both males and Females.

**Conclusion:** It was observed that in both male and females the most frequently occurring ABO blood group was O (46.9%), followed by B (29.7 %), A (17.1 %), and AB (5.1%). Rh positive seen in 94.9% of the students. Only 5.1 % of the students in our study group were Rh negative.

**Keywords:** Blood groups, emergency blood transfusion, ABO, Rh Typing.

### Introduction

Apart from their importance in blood transfusion practice, the ABO and Rh blood groups are useful in population genetic studies, researching population migration patterns as well as resolving certain medico legal issues, particularly of disputed paternity cases and may have some association with diseases like duodenal ulcer<sup>12</sup>, diabetes mellitus<sup>13</sup>, urinary tract infection<sup>14</sup>, Rh incompatibility and ABO incompatibility of newborn. In modern medicine besides their importance in evolution, their relation to disease and environment is being increasingly important.<sup>15,16</sup> It is, therefore imperative to have information on the distribution of these blood groups in any population group. In the present study we attempted to explore the frequency

distribution of ABO and Rh (D) blood groups among the MBBS students of our institute and to compare the results with the available data of other places. Medical students of our institute came from different communities and various places of Andhrapradesh.

### Research Methodology

The study was conducted in the Department of Pathology at Santiram medical college and Hospital, Nandyal, Andhrapradesh, of Southern part of India. In this study, samples of blood were collected from 176 Medical students between the age group of 18 to 22 years; subjects from Eastern, Western and Northern India were excluded along with non residents of India. Informed consent was taken prior to the

procedure. All the subjects included in the present study were healthy and free from diseases.

ABO blood group was determined by conventional glass slide method. Total 175 were considered final study group medically fit and accepted for blood donation whenever necessary. Blood group was determined by forward blood grouping (cell grouping) by test tube agglutination method. Commercially available standard anti sera A, anti sera B, anti sera AB and anti sera D were used after validation at blood bank. Reverse blood grouping (serum grouping) was performed by test tube agglutination method with Pooled known A, B and O cells, being prepared daily at the blood bank. Final blood group was confirmed only if both forward group (cell group) and reverse group (serum group) were identical. Rh negative blood groups were confirmed by antiglobulin technique. All weak D groups were considered as Rh positive. The donor blood group data were recorded on specially formed proforma, tabulated, analyzed and compared with the similar studies by other authors.

Blood collected with an anticoagulant potassium oxalate was used to determine the blood group. As soon as possible after collection of the sample the tests were conducted. The samples usually stored at 2-6° C in case of delay. ABO grouping was carried out at room temperature by rapid slide test. Three areas were marked out on a glass slide and they were labeled as A, B and AB. Then corresponding anti serum was added to the above areas. One drop of anti coagulated blood sample which were collected from medical student was added to each of the three labeled areas. Mixed well with separate sticks. Then the slide was tilted back and forth and observed for agglutination both macroscopically and microscopically. Tests that failed to show agglutination within two minutes were considered negative. With every batch of test samples of known A, B and O cells as controls were included. Agglutination of red blood cells in the presence of anti serum indicated a positive result. Absence indicates negative.

Rh grouping was done separately. Human monoclonal anti Rh (D) antibody and negative control reagent was obtained from standard company. The antibodies agglutinated in a saline medium and were active at room temperature. Incubation with red blood cells was necessary. Using a dropper bottle one drop of anti Rh reagent and one drop of negative control reagent were put side by side. Underneath each drop of reagent a small drop of unwashed packed red cells, taken with glass stirring rod was put. The blood and the reagent were mixed. They were left for 30 seconds and the plate was rocked gently side by side. The agglutination reaction appears immediately. A positive reaction with the anti Rh was correctly interpreted, so far as the reaction with the control serum was completely negative.

If any Rh negative was detected in slide method, it was confirmed by tube method and coombs' test to detect whether there was presence of any D<sup>u</sup> antigen.

### Observation and Results

The results illustrated in table 1 and 2. It can be seen from table 1 that 44.57% of our students (79 out of 176) were males and 55.42 % (97 students) were females. In table 2, it was observed that in both male and females the most frequently occurring blood group was O (46.9%), followed by B (29.7 %), A (17.1 %), and AB (5.1%). Rh positive seen in 94.9% of the students. Only 5.1 % of the students in our study group were Rh negative. We observed from table 3, Rh positive is the commonest in both males and females and also showed slightly incidence of Rh negative more in females (six cases in females and three cases in males among the study group of 176). The complete analysis of ABO group and Rh type of all the students in the study group is illustrated in table 4. It was observed that O positive was the commonest group in both sexes. Followed by B positive and A positive. AB positive least common one. AB negative was not found in our study group.

**Table 1:** Students in the study group (Gender wise)

<b>Total number of students in the study group = 176</b>		
	Number	Percentage
<b>Male</b>	79	44.57%
<b>Female</b>	97	55.43%

**Table 2 :** Blood Group frequency & distribution

<b>Sex</b>	<b>Number of cases ( % )</b>				
	<b>O</b>	<b>B</b>	<b>A</b>	<b>AB</b>	<b>Rh -ve</b>
Male (n= 79 )	38(48.7%)	28(35.8%)	09(11.5%)	03(3.8%)	03(3.8%)
Female (n= 97)	44(45.4%)	24 (24.7 %)	21(21.6%)	08(8.2%)	06(6.2%)
<b>Total (n= 175 )</b>	<b>82(46.9%)</b>	<b>52(29.7%)</b>	<b>30(17.1%)</b>	<b>11(6.3%)</b>	<b>09(5.1%)</b>

**Table 3.** Rh factor distribution among medical students

<b>Study Group</b>	<b>Subjects</b>	<b>Rh+</b>	<b>Rh -</b>
Males	79 (44.57%)	75 (96.15%)	3(3.85%)
Females	97 (55.43%)	91 (93.81%)	6 (6.19%)
<b>Total</b>	<b>176 (100%)</b>	<b>167 (94.85%)</b>	<b>9 (5.15%)</b>

**Table 4.** Complete analysis of ABO group and Rh type of all the students in the study group

<u>Male</u> <u>Female</u> <u>Blood Group</u>	subjects	percentage	subjects	percentage
A +ve	09	11.53 %	21	21.64 %
A - ve	01	1.28 %	02	2.06 %
B + ve	28	35.89 %	24	24.74 %
B - ve	01	1.28 %	02	2.06 %
AB +ve	03	3.84 %	08	8.24 %
AB - ve	00	00 %	00	00 %
O + ve	37	47.43 %	44	45.36 %
O - ve	02	1.28 %	02	2.06 %
<b>Total</b>	<b>79</b>	<b>100 %</b>	<b>97</b>	<b>100 %</b>

**Table 5:** Incidence of ABO and Rh blood groups types at different geographical areas (in percentage)

Place of Study	A	B	AB	O	Rh +ve	Rh - ve
<b><u>Within India</u></b>						
Ahmedabad	23.3	35.5	8.8	32.5	94.2	5.8
Punjab	21.9	37.6	9.3	9.3	97.3	2.7
Bangalore	23.85	29.95	6.37	39.82	94.2	5.79
Chittoor	18.95	25.79	7.89	47.37	90.6	8.42
<b>Present study</b>	<b>17.1</b>	<b>29.7</b>	<b>6.3</b>	<b>46.9</b>	<b>94.85</b>	<b>5.15</b>
<b><u>Outside India</u></b>						
Nepal	34	29	04	33	96.7	3.33
Pakistan	23.8	38	10	10	89.1	10.9
Australia	38	10	3	49	NA	NA
Britain	41.7	8.6	3	46.7	83	17
USA	41	9	4	46	85	15

**Discussion**

The membrane of a human red blood cell contains a variety of blood group antigens, the most important and best known of these are A and B antigens. The Rh blood group system is the second most important in blood transfusions<sup>17</sup>. It has been observed that percentage of blood group distribution in different parts of the world is different depending upon the ethnic origin of the

races<sup>18</sup>. South African Indians all belong to group ‘O’. The commonest groups in Australian origins are ‘O’ and ‘A’. In Europeans there is a higher frequency of A, while in Africans B group is much commoner. In the United States of America, 46% constitute group O, 41% A, 9% B and 4% AB.<sup>18</sup>

The blood group studies from these entire population groups, the males and females together

this is because blood groups are autosomal, thus frequencies are not different in the two sexes, nearly 5% of our population was Rhesus negative compare to 17% in UK<sup>19</sup>. Present study shows that commonest ABO blood group in both sexes was 'O' group followed by B, A & AB groups. The frequency of Rh +ve was about 95% while almost 5% was Rh -ve. The Rh blood group system has been distributed among any population to keep the frequency of Rh (D) negative very low since clinical situations could arise through Rh blood incompatibility, Rh (D) -ve is documented as 5.5% in south India.<sup>17</sup> We found the distribution of ABO blood groups in India according to the maps displayed on the website ([http://anthro.palomar.edu/vary/vary\\_3.htm](http://anthro.palomar.edu/vary/vary_3.htm))

which were kept here and showed. According to these maps, 60-70% Indians seem to have O blood group, 10-30 % seem have B blood group and 15-25 % seem have A blood group. (AB blood group is known to have least prevalence, though it is not shown in the maps). According to these maps, prevalence of blood groups in Indians in descending order seems to be as follows: O>B>A>AB, which is similar to our findings. Comparison study on frequency of ABO and Rh phenotypes at different geographical areas<sup>19,20</sup> shown in the Table 5.

### Conclusion & Suggestions

- 1) The present study concludes that 'O' blood group is the commonest blood group amongst the medical students at medical college situated at southern part of India. This is followed by 'B', 'A' and 'AB' blood group respectively.
- 2) Regarding Rhesus blood group system, Rh positive donors were 94.85% and Rh negative were 5.15%.
- 3) Every individual be ABO grouped at birth since the antigens are naturally occurring. Groups of individual indicated on national identity cards, driving licenses and school/office identity cards will be of tremendous use in case of acute hemorrhage

or anaemia in children when urgent transfusion of yet to be cross marched blood is required.

- 4) Studies on frequency and distribution of Blood Groups among residents of various states and races in our country are inadequate. It is necessary to conduct similar well designed studies in other states and races of India in order to determine the blood group frequencies in them.

The data generated in the present study and several other studies of different geographical region of India will be useful to health planners while making efforts to face the future health challenges in the region.

**Declaration on conflict of interest:** Nil

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