



**ORIGINAL RESEARCH PAPER**

**Physiology**

**INCIDENCE OF BLOOD GROUP AND RH TYPE AMONG THE MEDICAL STUDENTS OF NORTH BENGAL MEDICAL COLLEGE, SILIGURI, WEST BENGAL**

**KEY WORDS:** Blood group, Rh type, medical students, West Bengal, districts.

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**ABSTRACT**

**INTRODUCTION:** At present 36 blood group system genes have been identified and sequenced. Each blood group system represents either a single gene or a cluster of closely linked homologous genes.  
**MATERIALS AND METHODS:** A prospective study was carried out at the North Bengal Medical College, Siliguri, West Bengal from 2013 to 2018. The blood groups and Rh type of medical students were recorded. Haemoglobin concentration was obtained using cyanomethemoglobin method.  
**RESULTS:** Of the total 590 students B group was most prevalent (44.6%) followed by O group (30.5%). Prevalence of Rh positive type was 94.1% and Rh negative was 5.9%. Rh negative type amongst males was 3.0% and females it was 2.9%. In the study 35.9% were 19 years of age and 28.6% were 18 years. In the study 62.0% were male students and 38% were females. 16.3% of the female students had haemoglobin levels of 11 – 13 gms/dL compared to 11.2% male students. 14.4% of the female students had 13 – 15 gms/dL compared to 25.8% of male students. 11.7% of students were from the district of Coochbehar followed by Darjeeling (9.2%) followed by Kolkata (8.8%). No students were from Bankura and Jhargram districts, and 1.5% were from Alipurduar and 1.7% were from Paschim Mednapur and North Dinajpur.  
**DISCUSSION AND CONCLUSION:** B group was the most prevalent followed by O group. 94.1% were Rh positive and 5.9% were Rh negative. 20.9% of the students were from Coochbehar and Darjeeling districts, combined, due to their proximity to Siliguri and students from districts far distance were found in increasingly less numbers.

**INTRODUCTION**

A blood group system, as defined by the International Society of Blood Transfusion, consists of one or more antigens controlled at a single gene locus, or by two or more closely linked homologous genes with little or no observable recombination between them<sup>1</sup>. Each blood group system represents either a single gene or a cluster of closely linked homologous genes.

At present 36 blood group system genes have been identified and sequenced. The blood group antigens have been divided into high incidence and low incidence groups and designated as 901 and 700 series respectively<sup>1</sup>.

The seminal discovery of A, B, and O blood groups in 1901 by Karl Landsteiner, an Austrian immunologist, and the AB blood group in 1902 by Decastello and Sturli changed the medical landscape<sup>2</sup>.

With recognition and establishment of mendelian pattern of inheritance of blood groups it was used for testing biological parent-child relationship though at present it has been supplanted by genetic testing<sup>3</sup>.

The ABO blood group system is also known as the histo-blood system being present on the surface of erythrocytes, platelets and various tissues including vascular, intestinal, hepatic and renal cells. This blood group system assumes importance during organ transplantation. ABO incompatible solid organ

transplants have relatively poor graft survival rates compared to ABO compatible transplants. The same is also observed in ABO incompatible haematopoietic stem cell transplants<sup>4</sup>.

A, B and H antigens are not directly encoded by the corresponding genes; rather, the genes encode glycosyltransferases. The gene for H antigen encodes for fucosyltransferase that specifically adds fucose moiety to a terminal galactose. The genes for A and B antigens encode for glycosyltransferases that add N-acetylgalactosamine or galactose respectively to the same galactose of the H antigen. Thus, in effect, H antigen is needed as a substrate for the formation of A and B antigens. The gene for H antigen is located on chromosome 19q13.3 and those for A and B antigens on 9q34.1-q34.2<sup>5</sup>.

The "Bombay" blood group (O<sub>H</sub>), originally identified in Bombay (Mumbai), India, belongs to the ABO blood group system and is an example of H antigen deficient phenotype. The clinical importance of this blood group lies in the fact that the erythrocytes as O blood group but do not express any H antigens. Their sera contain high titre of IgM haemolytic H antibodies that induce complement mediated lysis of erythrocytes of any of the other ABO blood groups except of another H antigen deficient individual<sup>5</sup>.

**MATERIALS AND METHODS**

Blood group and haemoglobin concentration of 1<sup>st</sup> year

medical students of North Bengal Medical College, Siliguri, West Bengal were recorded after obtaining consent, for the years 2013 – 2018. ABO blood grouping and Rh typing was performed for each sample by slide agglutination method using monoclonal anti-sera (Tulip Diagnostics, India). Haemoglobin concentration was obtained using cyanomethemoglobin method. A total of 590 medical students were tested.

**RESULTS**

Of the total 590 students B group was most prevalent (44.6%) followed by O group (30.5%), A blood group was 18.1% and AB blood group 6.8% (table 1).

Prevalence of Rh positive type was 94.1% and Rh negative was 5.9%. Rh negative type amongst males was 3.0% and females it was 2.9% (table 2).

In the study 35.9% were 19 years of age and 28.6% were 18 years; 0.3% were 17 years and 1.0% were 24 years of age. In the study 62.0% were male students and 38% were females (table 3).

16.3% of the female students had haemoglobin levels of 11 – 13 gms/dL compared to 11.2% male students. 14.4% of the female students had 13 – 15 gms/dL compared to 25.8% of male students (table 4).

11.7% of students were from the district of Coochbehar followed by Darjeeling (9.2%) followed by Kolkatta (8.8%). No students were from Bankura and Jhargram districts, and 1.5% were from Alipurduar and 1.7% were from Paschim Mednapur and North Dinajpur (table 5).

**DISCUSSION AND CONCLUSION**

In our study B group was the most prevalent followed by O group. Similar findings have been reported by Sachdeva et al.<sup>6</sup> from Shimla in North India. Yasmeeen et al.<sup>7</sup> found a predominance of O group followed by B group, which is a reversal of findings in our study, in their study in Gulbarga in South India.

In our study 94.1% were Rh positive and 5.9% were Rh negative. Sachdeva et al.<sup>6</sup> obtained 93.15% Rh positive and 6.85% Rh negative in their study; it is close to findings of our study.

20.9% of the students were from Coochbehar and Darjeeling districts, combined, due to their proximity to Siliguri and students from districts far distance were found in increasingly less numbers.

**Conflict of interest-**None

**Table 1: Gender wise distribution with ABO Blood group**

ABO Blood group	Gender		Total
	Female	Male	
A	49 (8.3%)	58 (9.8%)	107 (18.1%)
B	99 (16.8%)	164 (27.8%)	263 (44.6%)
AB	13 (2.2%)	27 (4.6%)	40 (6.8%)
O	63 (10.7%)	117 (19.8%)	180 (30.5%)
Total	224 (38.0%)	366 (62.0%)	590 (100.0%)

**Table 2: Gender wise distribution with Rh type**

Rh type	Gender		Total
	Female	Male	
Positive	207 (35.1%)	348 (59.0%)	555 (94.1%)
Negative	17 (2.9%)	18 (3.0%)	35 (5.9%)
Total	224 (38%)	366 (62%)	590 (100%)

**Table 3: Age wise distribution with gender**

Age in yrs	Gender		Total
	Female	Male	
17	0 (0.0%)	2 (0.3%)	2 (0.3%)

18	62 (10.5%)	107 (18.1%)	169 (28.6%)
19	94 (15.9%)	118 (20.0%)	212 (35.9%)
20	57 (9.7%)	95 (16.1%)	152 (25.8%)
21	11 (1.9%)	31 (5.3%)	42 (7.1%)
22	0 (0.0%)	7 (1.2%)	7 (1.2%)
24	0 (0.0%)	6 (1.0%)	6 (1.0%)
Total	224 (38.0%)	366 (62.0%)	590 (100%)

**Table 4: Gender wise distribution with Hb gram/dL range**

Hb gm/dL	Gender		Total
	Female	Male	
11-13	96 (16.3%)	66 (11.2%)	162 (27.5%)
13-15	85 (14.4%)	152 (25.8%)	237 (40.2%)
15-17	43 (7.3%)	148 (25.1%)	191 (32.4%)
Total	224 (38.0%)	366 (62.0%)	590 (100%)

**Table 5: Gender wise distribution of various districts of West Bengal**

District	Gender		Total
	Female	Male	
24Pgs (North)	6 (1.0%)	12 (2.0%)	18 (3.1%)
24Pgs (South)	21 (3.6%)	18 (3.1%)	39 (6.6%)
Alipurduar	3 (0.5%)	6 (1.0%)	9 (1.5%)
Bankura	0 (0.0%)	0 (0.0%)	0 (0.0%)
Bardhaman	18 (3.1%)	33 (5.6%)	51 (8.6%)
Birbhum	21 (3.6%)	27 (4.6%)	48 (8.1%)
Coochbehar	15 (2.5%)	54 (9.2%)	69 (11.7%)
Darjeeling	20 (3.4%)	34 (5.8%)	54 (9.2%)
Hoogly	12 (2.0%)	20 (3.4%)	32 (5.4%)
Jalpaiguri	10 (1.7%)	24 (4.1%)	34 (5.8%)
Jhargram	0 (0.0%)	0 (0.0%)	0 (0.0%)
Kolkata	24 (4.1%)	28 (4.7%)	52 (8.8%)
Malda	8 (1.4%)	23 (3.9%)	31 (5.3%)
Murshidabad	10 (1.7%)	26 (4.4%)	36 (6.1%)
Nadia	8 (1.4%)	16 (2.7%)	24 (4.1%)
North-Dinajpur	6 (1.0%)	4 (0.7%)	10 (1.7%)
Paschim Bardhaman	8 (1.4%)	8 (1.4%)	16 (2.7%)
Paschim Mednapur	2 (0.3%)	8 (1.4%)	10 (1.7%)
Purba Mednapur	12 (2.0%)	9 (1.5%)	21 (3.6%)
Purulia	10 (1.7%)	6 (1.0%)	16 (2.7%)
South-Dinajpur	10 (1.7%)	10 (1.7%)	20 (3.4%)
Total	224 (38.0%)	366 (62.0%)	590 (100.0%)

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