



## PROFILE OF BLOOD GROUPS AMONG MEDICAL STUDENTS IN THANE, MAHARASHTRA

### Physiology

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### ABSTRACT

This study was conducted in a municipal medical college in Thane, Maharashtra state to determine the distribution of ABO and Rh blood types among medical students and compare the results with that of similar studies on medical students in India. Blood groups of 375 medical students – 195 (52%) females and 180 (48%) males – were analyzed. “B” blood group was the commonest blood group amongst the medical students (37.07%), followed by “O” (30.67%), “A” (21.07%) and “AB” (11.20%) blood groups, respectively. 95.47% medical students were Rh positive and 4.53% were Rh negative. The most prevalent pattern of distribution of ABO blood group types among medical students viz. (B>O>A>AB), was also found in the present study. Diversity in patterns of blood groups among Indian medical students may be attributed to the medical admission procedure, which indirectly contributes to heterogeneous genetic distribution of medical students.

### KEYWORDS

ABO system, Blood group, Medical students, Rh blood type

### INTRODUCTION

In 1900, Karl Landsteiner, an Austrian scientist, discovered A, B and O blood groups, for which, he was awarded the Nobel Prize in 1930. [1] In 1902, the fourth type (blood group AB) was discovered by Landsteiner's associate, Alfred von Decastello and Adriano Sturli. [2] The Rhesus (Rh) blood type was discovered Karl Landsteiner and Alexander Wiener. [3] Depending on the presence or absence of Rh antigen on the red blood cells, Rh phenotype is classified as Rh-positive and Rh-negative. ABO blood groups are genetically determined by the presence of agglutinogens on the cell walls of red blood cells and the frequency of distribution of ABO and Rh groups varies across regions and ethnic groups. [4] The “Bombay” blood group belongs to the ABO blood group system and is an H antigen deficient phenotype.

The genes that code for ABO and Rh blood groups are located on Chromosome 9 and 1, respectively. Individuals are divided into four major blood groups A, B, AB and O, according to the presence of antibodies against red blood cells, called “agglutinins”. [5] Blood group A has the A antigen, blood group B the B antigen, blood group AB has both, and blood group O has neither. [6] Blood group antigens are found on RBCs, platelets, leukocytes, plasma proteins, certain tissues, and various cell surface enzymes, [7] salivary glands, saliva, pancreas, kidney, liver, lungs, testis and amniotic fluid and also exist in soluble form in body secretions such as breast milk, seminal fluid, saliva, sweat, gastric secretions, urine, and amniotic fluid. [8]

The antigens found in ABO blood group system are useful in blood transfusion, organ transplantation, determining associations between blood groups and diseases, [2] genetic research, anthropology and tracing ancestral relation of humans. [9] Studies seem to suggest that the severity of some infectious diseases can be directly linked to ABO Blood Group. Blood group O seems to provide a selective advantage against severe malaria. [10] There is a low prevalence of group O in the Ganges Delta, probably because non-O blood group phenotypes seem to have lower risk of cholera. [11]

The purpose of this study was to determine the distribution of ABO and Rh blood types among medical students and compare the results with that of similar studies on medical students in India.

### MATERIALS AND METHODS

This study was conducted in a municipal medical college in Thane, Maharashtra state. As per the curriculum for the subject of Physiology for the first-year MBBS course, the blood group is determined using the spot tile method, [12] at room temperature. The reagent used was Eryscreen® Reagent Combipack (manufactured by Tulip Diagnostics

(P) Limited, Goa, India) containing Anti-A, Anti-B and Anti-D monoclonal anti-sera. Depressions in the spot tile in the top row were labeled “A”, “C” (for control) & “B”; while the depression in the second row was labeled as “D”. Using separate droppers, one drop each of anti-A serum, citrated normal saline (for control), anti-B serum were placed in the respective depressions in the upper row of the spot tile and anti-D serum was placed in the depression in the second row of the spot tile. The control was maintained for the purpose of detecting pseudo-agglutination. One drop of blood (aseptically drawn by finger prick method) was added to each depression. The anti-serum and blood was mixed using separate glass rods in the corresponding sections. By tilting the slide backwards and forwards, the slides were examined for agglutination after exactly two minutes. Clumps of red cells, seen floating in a clear liquid was taken as a “positive” agglutination reaction; while red cells floating homogeneously in a uniform suspension, was taken as a “negative” agglutination reaction. This method of determining blood group is based on antigen-antibody agglutination reaction with corresponding anti-sera. The oligosaccharides present as antigen on surface of RBCs agglutinate with antibodies in the anti-sera. If the positive agglutination reaction occurred in the depression labeled “A”, then the blood sample belonged to “A” blood group. Likewise, agglutination in depression labeled “B” meant that the sample belonged to “B” blood group. Agglutination in both depressions “A” & “B” indicated that the sample belonged to “AB” group, while the absence of agglutination in both depressions “A” & “B” indicated “O” blood group. Similarly, agglutination in depression labeled “D” was considered Rh positive & absence of agglutination as “Rh negative”. All the results were confirmed by experts.

The blood group-related data were entered in Microsoft Excel (Microsoft Corporation, Redmond, WA, USA) and were analyzed using EpiInfo Version 7.0 (public domain software package from the Centers for Disease Control and Prevention, Atlanta, GA, USA).

### RESULT AND DISCUSSION

The data on blood groups were obtained for a total of 375 medical students. Of these, 195 (52%) were females and 180 (48%) were males. The gender-wise distribution of blood groups in the present study is outlined in table-1.

**Table-1: Gender-wise distribution of ABO blood groups**

BloodGroup	Females(n=195)	Males(n=180)	Total(n=375)
APos	24.62	14.44	19.73
ANeg	1.03	1.67	1.33
BPos	32.82	40.00	36.27
BNeg	0.51	1.11	0.80

ABPos	9.74	10.56	10.13
ABNeg	1.54	0.56	1.07
OPos	28.72	30.00	29.33
ONeg	1.03	1.67	1.33

Figures indicate percentages

Some studies [13-16] conducted amongst Indian medical students reveal that the most prevalent pattern of distribution of ABO blood group types was (B>O>A>AB). This pattern was also found in the

**Table-2: Comparison of results of several Indian studies amongst medical students**

Details of the study	Place of study	Sample size	Blood groups (Per cent distribution)						
			A	B	AB	O	Rh+ve	Rh-ve	
<b>Pattern: B&gt;O&gt;A&gt;AB</b>									
Present study	Thane, Maharashtra	375	21.07	37.07	11.20	30.67	95.47	4.53	
Md Selim et al, 2019 [13]	Siliguri, WB	590	18.1	44.6	6.8	30.5	94.1	5.9	
Kumar & Kumar, 2018 [14]	Dhanbad, Jharkhand	308	25.80	43.95	7.66	42.33	96.0	4.0	
Hemalatha, 2017 [15]	Mandya, Karnataka	82	26.8	39.02	2.4	31.7	95.1	4.9	
Tiwari et al, 2014 [16]	Gwalior, MP	119	28.57	30.25	10.09	31.09	92.43	7.57	
<b>Pattern: A&gt;B&gt;O&gt;AB</b>									
Deori & De, 2016 [17]	Silchar, Assam	84	33.33	30.95	10.72	25.0	97.62	2.08	
<b>Pattern: O&gt;B&gt;A&gt;AB</b>									
Gavali & Patil, 2013 [18]	Pune, Maharashtra	412	26.21	30.58	9.70	33.73	91.5	8.49	

## CONCLUSION

"B" blood group was the commonest blood group amongst the medical students (37.07%), followed by "O" (30.67%), "A" (21.07%) and "AB" (11.20%) blood groups, respectively. 95.47% medical students were Rh positive and 4.53% were Rh negative.

## REFERENCES

- Garraty, G., Dzik, W., Issitt, P.D., Lubin, D.M., Reid, M. E., & Zelinski, T. (2000). "Terminology for blood group antigens and genes-historical origins and guideline in the new millennium". *Transfusion*, 40(4), 477-489.
- Purandare, V. R., & Prasad, N. B., (2012), "Distribution of ABO blood groups in healthy young adults in Pune city." *Int J Bas App Med Sci*, 2(3), 74-78.
- Landsteiner, K., & Weiner, A. S., (1940), "An Agglutinable Factor in Human Blood Recognized by Immune Sera for Rhesus Blood." *Exp Biol Med*, 43(1): 223.
- Nag, I., & Das, S. S. (2012), "ABO and Rhesus blood groups in potential blood donors at Durgapur Steel city of the district of Burdwan, West Bengal." *Asian J Transfus Sci*, 6(1), 54-55.
- Barret, K., Barman, S., Boitano, S., & Brooks, H. (2005), "Blood types". In: *Ganong's Review of Medical Physiology*, 22nd ed. Stanford, CT: Appleton and Lange, 537-539.
- Guyton AC, & Hall J. E., (2013), "Blood typing." In: *Text book of Medical Physiology*. 12th Ed., Philadelphia: Saunders, 156-158.
- Green, C. (1989), "The ABO, Lewis and related blood group antigens; a review of structure and biosynthesis." *FEMS Microbiol Immunol*, 1, 321-330.
- Ewald, D. R., & Sumner, S. C. (2016), "Blood type biochemistry and human disease." *Wiley interdisciplinary reviews. Systems biology and medicine*, 8(6), 517-535.
- Khurshid, B., Naz, M., Hassan, M., & Mabood, S. F. (1992), "Frequency of ABO and Rh (D) blood groups in district Sawabi NWFP Pakistan." *J Sci Tech Univ Peshawar*, 16, 5-6.
- Cserti, C. M., & Dzik, W. H. (2007), "The ABO blood group system and Plasmodium falciparum malaria." *Blood*, 110(7), 2250-2258.
- Liumbruno, G. M., & Franchini, M., (2013), "Beyond immunohaematology: the role of the ABO blood group in human diseases." *Blood Transfus*, 11, 491-499.
- Malongre, W., & Neumeister, B. (2009), "Recent and future trends in blood group typing." *Anal Bioanal Chem*, 393(5), 1443-1451.
- Md Selim, Modak, P.K., Barpanda, S.K., Haroon, A. S., Kumar, S., Chaudhury, S., et al. (2019), "Incidence of blood group and Rh type among the medical students of North Bengal Medical College, Siliguri, West Bengal." *Paripex - Ind J Res*, 8(6), 66-67.
- Kumar, A., & Kumar, G. (2018), "Study of Blood Group Distribution among Koyalanchal Medical Students." *J Med Sci Clin Res*, 6(12), 283-285.
- Hemalatha, N. R., (2017), "ABO and Rh blood group distribution among medical students in Mandya." *Int J Contemp Med Res*, 4(8), 1655-1658.
- Tiwari, R., Jain, V., Rajput, A.S., Goyal, M., Bhargo, L., & Jain, S. (2014), "A study to assess prevalence of blood groups in II semester medical students of G. R. Medical College, Gwalior, MP, India." *Int J Res Health Sci*, 2(2), 555-562.
- Deori, J. P., & De S, K. (2016), "Frequency and distribution of blood groups among medical students in a tertiary care hospital of north east India." *J. Evolution Med Dent Sci*, 5(32), 1704-1706.
- Gavali, M. Y., & Patil, K. B. (2013), "Frequency Distribution of ABO, & RH Blood Group amongst Medical Students in SKNMC & GH, Pune." *Ind J Appl Res*, 3(12), 458-460.

present study. (Table-2).

The other patterns of distribution, reported by other Indian studies (Table-2) were (A>B>O>AB) [17] and (O>B>A>AB). [18]

Diversity in patterns of blood groups among Indian medical students may be attributed to the medical admission procedure, which indirectly contributes to heterogeneous genetic distribution of medical students.