

Distribution of Abo & Rhesus Blood Groups”**Medical Science**

KEYWORDS : blood bank, blood group, ABO, Rh

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ABSTRACT**BACKGROUND:**

Presence of different blood groups has always fascinated the medical fraternity. Various different blood group systems have been discovered over the years, but, among all these the ABO & Rh blood group systems have proven to be the most important for blood transfusion practices. The aim of our study is to determine the distribution of ABO & Rh blood group among the donor population which would help us to streamline our transfusion practices for the benefit of the society.

MATERIAL & METHODS:

A retrospective study of 5 years from January 2009 to December 2013 carried out at the Department of Immunohaematology & Blood Transfusion of MGM Hospital, Kamothe, Navi Mumbai. Data has been collected from blood bank donor grouping records. All blood samples processed during period of observation were included in the study.

RESULT:

During the period of observation total donors - 11628, out of which males - 10459 & females - 967. Frequency of 'O' blood group was found to be the highest (33.95%) while 'AB' blood group was found to be the least (8.35%). Preponderance of Rh +ve was more (94.2%) while that of Rh -ve was less (5.78%).

CONCLUSION:

'O' blood group is significantly higher in donor population while 'AB' is least. More common is Rh +ve than Rh -ve.

INTRODUCTION:

The study of blood groups plays an important role in various genetic studies, clinical studies, for reliable geographical information and in blood transfusion practice, which helps in reducing morbidity and mortality rate. Knowledge of distribution of ABO and Rhesus (Rh) blood group is also essential for the effective management of blood bank [1, 2] inventory.

Karl Landsteiner in 1901 discovered the first human blood group system which was the ABO group [3]. Later Rh blood group was defined by Landsteiner and Wiener in 1941 [4]. Together these two systems have proved to be the most important for blood transfusion purposes. In modern medicine, the need for blood group frequency and prevalence studies is multipurpose, as besides their importance in evolution, their relation to disease and environment is immensely important [5, 6]. Besides being important in relation to blood transfusion and organ transplantation, blood group antigens can also be utilized in genetic research, forensic pathology, for anthropology and tracing ancestral relation of humans [7].

Present study was aimed to identify the distribution of ABO & Rhesus blood groups among the donors at the Department of Immunohaematology & Blood Transfusion of MGM Hospital, Kamothe, Navi Mumbai.

MATERIAL AND METHODS:

A retrospective study carried out at the Department of Immunohaematology & Blood Transfusion of MGM Hospital, Kamothe, Navi Mumbai.

The blood group of donor of either sex presenting over a period of 5 years from January 2009 to December 2013 were studied.

Total 11628 donors were considered medically fit & donated blood during this study period. Out of 11628 total donors, 10459 were male & 967 were female. All belong to age group between 18-65 years. After blood donation the samples collected were tested for blood group systems ABO and Rhesus factor (Rh) using antigen - antibody agglutination technique. It was performed with the help of commercially available standard monoclonal Antiserum - Anti-A, Anti-B & Anti-D (Tulip Diagnostics) which were used after validation in blood bank.

Both Forward (cell grouping) & Reverse grouping (serum grouping) methods were done by the test-tube agglutination method. Final blood group was confirmed only when both forward & reverse grouping showed identical results. The donor group data was recorded on specially formed Performa.

OBSERVATION & RESULT:

Total donors studied from January 2009 to December 2013 were - 11628.

Our study shows the distribution of various blood groups in number as well as in percentage form. Percentages for male donors constitute 89.94% (10459) & female donors constitute 8.31% (967) of this study (Table 1). 'O' blood group was found as the most common (33.95%) followed by 'B' blood group (32.52%),

'A' blood group (25.16%) & 'AB' blood group was least common (8.35%). Distribution of the Rhesus factor was 94.21% Rh positive & 5.78% Rh negative (Table 2)

DISCUSSION:

Blood groups and Rh antigen are hereditary. Gene for ABO antigens is on the 9th chromosome and Rh antigen gene is

on the 1st chromosome [8]. The distribution of ABO blood group varies regionally, ethnically and from one population to another

Research on ABO & Rh blood group systems has been of immense interest, due to their medical importance in different diseases. They are not only important in blood transfusions, organ transplantation, genetics research, human evolution, forensic pathology but are also one of the strongest predictors of national suicide rate and a genetic marker of obesity [9, 10]. Some blood groups have shown associations with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection, cardiovascular diseases, erythroblastosis in neonates, Rh & ABO incompatibilities of newborn.

We compared our study with other studies carried out in different geographical areas. Study done in Eastern part of India by Nag I et al [11] at Durgapura, in Southern part of India by Periyavan A et al [12] at Bangalore, Das PK et al [13] at Vellore, Mallikarjuna S et al [14] at Devangari & by Girish CJ et al [15] at Shimoga-Melnad found that the commonest blood group was 'O' followed by B, A & AB. Our study also showed similar findings that is 'O' blood group was more frequent than B followed by A & lastly by AB.

Study done in the Northern part of India by Tulika C et al at Lucknow [16], Sidhu S et al at Punjab [17] & Behra R et al at Jodhpur [1], shows that the blood group 'B' was the commonest followed by O,A & AB. In Western part of India like in Eastern Ahmedabad by Wadhwa MK et al [18], Western part of Ahmedabad by Patel Piyush et al [19], study done at Surat by Mehta Nidhi et al [20] and at Maharashtra by Giri PA et al [21] showed that blood group 'B' was the commonest followed by O, A & AB, which is different from our study.

Outside India study done at Australia by Red Cross Society [22] & in USA by the Mollison PL et al [23] show that the commonest blood group was 'O' which is similar to our study. The study done at Nepal by the Pramanik T et al [24] found that the commonest blood group was 'A', study in Pakistan by Hamed A et al [25] shows that commonest blood group is 'B' which are different from our study (Table 3)

-Incidence of Rhesus blood group in most part of India varies from 94 - 98% for Rh +ve & 2-6% for Rh -ve. While in our study 94.2% were Rh +ve & 5.78% were Rh -ve. These figures are similar to other study carried out in Maharashtra, India [21, 26].

CONCLUSION:

Knowledge regarding the distribution of different blood groups in the donor population has become the need of the hour since blood transfusions have become an integral part of the modern science. So it is advisable to do the blood grouping study in each region for drafting proper national transfusion policy supplying blood to the needy patients during emergency. The 'O' blood group is significantly higher in our population while 'AB' blood group is comparatively lower. The Rh +ve blood groups are more common than the Rh -ve blood groups.

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Table1: Sex Distribution of ABO & Rh blood group among the study population (n=11628)

SEX	MALE		FEMALE	
	TOTAL No.	PERCENTAGE	TOTAL No.	PERCENTAGE
A+	2555	24.42%	212	21.92%
A-	141	1.34%	16	1.65%
B+	3232	30.90%	294	30.40%
B-	231	2.20%	25	2.58%
O+	3392	32.43%	344	35.57%
O-	205	1.96%	7	0.72%
AB+	862	8.24%	62	6.41%
AB-	41	0.39%	7	0.72%
TOTAL	10459	100%	967	100%

Table 2: Preponderance of ABO & Rh blood groups among different blood groups

ABO Blood Group	Rh +ve	%Rh +ve	Rh -ve	%Rh-ve	TOTAL	PERCENTAGE
A	2767	25.27%	157	23.32%	2926	25.16%
B	3526	32.18%	256	38.03%	3782	32.52%
O	3736	34.10%	212	31.50%	3948	33.95%
AB	924	8.43%	48	7.13%	972	8.35%
TOTAL	10955	100%	673	100%	11628	100%

Table 3: Comparison of frequency & percentage of ABO & Rhesus blood group at different geographical area.

Population In	A	B	AB	O	Rh +ve	Rh -ve
Northern India						
Lucknow[16]	21.73%	39.84%	9.33%	29.10%	95.71%	4.27%
Punjab[17]	29.99%	27.56%	9.3%	31.21%	97.3%	2.7%
Jodhpur[1]	22.2%	36.4%	9.4%	31.7%	91.75%	8.25%
Western India						
Western Ahmedabad[18]	21.94%	39.40%	7.86%	30.79%	95.05%	4.95%
Eastern Ahmedabad[19]	23.3%	35.5%	8.8%	32.5%	94.2%	5.8%
Surat[20]	24.1%	34.89%	8.69%	32.32%	94.18%	5.82%
Maharashtra[21]	23.38%	31.89%	8.72%	30.99%	95.36%	4.64%
Eastern India						
Durgapur[11]	23.9%	33.6%	7.7%	34.8%	94.7%	5.3%
Southern India						
Banglore[12]	23.85%	29.95%	6.37%	39.82%	94.2%	5.8%
Vellore[13]	21.86%	32.69%	6.7%	38.75%	94.5%	5.5%
Devangari[14]	26.15%	29.85%	7.24%	31.76%	94.8%	5.2%
Shimoga-Malnad [15]	24.27%	29.43%	7.13%	39.17%	94.93%	5.07%
Outside India						
USA[23]	41%	9%	4%	46%	85%	15%
Australia[22]	38%	10%	3%	49%	NA	NA
Pakistan[25]	22.4%	32.4%	8.4%	30.5%	93%	7%
Nepal[24]	34%	29%	4%	32.5%	96.7%	3.3%
Present Study	25.16%	32.5%	8.35%	33.95%	94.21%	5.78%

REFERENCE

- Behra R, Joshi YR. Distribution of ABO blood group and RH(D) factor in western Rajasthan. *National J Medical Res* 2013;3:73-5. | | 2. Eweidah MH, Rahiman S, Ali H, Dhas Al-shamary AM. Distribution of ABO and Rhesus (RHD) blood groups in Al-Jouf province of the Saudi Arabia. *Anthropologist* 2011;13:99-102. | | 3. Garraty G, Dzik W, Issitt PD, Lubin DM, Reid ME, Zelinski T. Terminology for blood group antigens and genes-historical origins and guideline in the new millennium. *Transfusion* 2000; 40:477-89. | | 4. Rahman M and Lodhi Y. Frequency of ABO and Rhesus blood groups in blood donors in Punjab. *Pak J Med Sci* 2004; 20:315-8. | | 5. Khan MS, Subhan F, Tahir F, Kazi BM, Dil AS, Sultan S. Prevalence of blood groups and Rh factor in Bannu region NWFP (Pakistan). *Pak J Med Res* 2004; 43(1):8-10. | | 6. Khaliq MA, Khan JA, Shah H, Khan SP. Frequency of ABO and Rh (D) blood group in Hazara division (Abbottabad). *Pak J Med Res* 1984; 23:102-3. | | 7. Khurshid B, Naz M, Hassan M, Mabood SF. Frequency of ABO and Rh (D) blood groups in district Sawabi NWFP Pakistan. *J Sci Tech Univ. Peshawar* 1992; 16:5-6. | | 8. Webert EK, Chan HW, Smith JW, Heddle NM, Kelton JG. Red cell, Platelet, and white cell antigens. In: *Wintrobe's Clinical Hematology*. Greer JP, Foerster J, Lukens JN, Rodgers GM, Paraskevas F, Glader B. Eleventh edition, Philadelphia, Lippincott Williams Wilkins, 2004: 791-829. | | 9. Mollison PL (1979) *Blood transfusion in clinical medicine*. (6th edn), Blackwell Scientific Publication: Oxford, UK 239-666. | | 10. Hein HO, Suadcani P, Gyntelberg F (2005) The Lewis blood group—a new genetic marker of obesity. *Int J Obes (Lond)* 29: 540-542. | | 11. Nag I, Das SS. ABO and Rhesus blood groups in potential blood donors at Durgapur steel city of the district of Burdwan West Bengal. *Asian J Transfus Sci* 2012;6:54-5. | | 12. Periyavan A, Sangeetha SK, Marimuthu P, Manjunath BK, Seema. Distribution of ABO and Rh-D groups in and around Bangalore. *Asian J Transfus Sci* 2010;4:41. | | 13. Das PK, Nair SC, Harris VK, Rose D, Mammen JJ, Bose YN, Sudarsanam A. Distribution of ABO and Rh-D blood groups among blood donors in a tertiary care centre in South India. *Trop Doct* 2001;31:47-8. | | 14. Mallikarjuna S. Prevalence of ABO and Rhesus blood group among blood donors. *Ind J Pub Health Research and Development* 2012;3:106-9. | | 15. Girish CJ, Chandrashekar TN, Ramesh Babu K, Kantikar SM. ABO and Rhesus blood group distribution among Malnad region blood donors. *Research and reviews in Biomedicine and Biotechnology* 2011;2:25-30. | | 16. Tulika C, Gupta A. Frequency of ABO and Rhesus blood groups in blood donors. *Asian J Trans Sci* 2012;6:52-3. | | 17. Sidhu S. Distribution of the ABO blood groups and Rh(D) factor among the scheduled caste population of Punjab. *Anthropologist* 2003;5:203-4. | | 18. Wadhwa MK, Patel SM, Kothari DC, Pandey M, Patel DD. Distribution of ABO and Rhesus D groups in Gujrat, India—a hospital based study. *Indian J Ped Oncol* 1998;19:137-41. | | 19. Patel PA, Patel SP, Shah JV, Oza HV. Frequency and distribution of blood groups in blood donors in western Ahmedabad - A hospital based study. *National J Med Res* 2012;2:207-10. | | 20. Mehta N, Swadas B. Prevalence of ABO blood groups at Mahavir Heart Institute Surat. *Asian J Trans Sci* 2012;6:74. | | 21. Giri PA, Yadav S, Parhar GS, Phalke DB. Frequency of ABO and Rhesus blood groups: A study from a rural tertiary care teaching hospital in India. *Int J Biol Med Res* 2011;2:988-90. | | 22. Australian Red Cross Society. All about blood. URL: www.donateblood.com.au/all-about-blood/blood-types. | | 23. Mollison PL, Engelfriet CP, Conteras M. The Rh blood group system. In *Blood Transfusion in Clinical Medicine*, 9th Edition. Oxford:Black well Scientific Publication. 1993;2008-9. | | 24. Pramanik T, Pramanik S. Distribution of ABO and Rh blood groups in Nepalese medical students: a report. *East Mediterr Health J*. 2000 Jan;6(1):156-8. | | 25. Hamed A, Hussain W, Ahmed J, Rabbi F, Quersh J A. Prevalence of Phenotypes and Genes of ABO and Rhesus (Rh) blood groups in Faisalabad, Pakistan. *Pak J Biol Sci*. 2002;5:722-724. | | 26. Warghat NE, Sharma NR, Baig MM, Sharma SH, Pachalare GS (2011) ABO & Rh blood group distribution among kunbin (maratha) population of amravati district. *Maharashtra Asiatic J Biotech Resouce* 2479-483