

Research Article

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ABO and Rh-D blood group frequency and distribution: a tertiary care hospital experience

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ABSTRACT

Background: This study was carried out to determine the frequency and distribution of ABO and Rhesus (Rh) blood groups in blood donors of tertiary care hospital-attached blood bank.

Methods: This study was conducted among the blood donors of Hyderabad Telangana State (India), who donated blood during the period from July 2013 to December 2014. ABO and Rh blood grouping was performed by forward blood grouping (cell grouping) using test tube agglutination method using antisera A, antisera B and antisera D and by reverse grouping using pooled known A, B and O cells.

Results: Out of 1740 blood donors, 1702 (55.6%) were male and 38 (44.4%) were female. Majority of blood donors were in 21-40 years of age group. The most frequent blood group positions in the descending order are 'O', 'A', 'B' and 'AB' respectively. One group was 'Oh' (Bombay Phenotype).

Conclusions: 'O' group is the most frequent position of ABO blood group system followed by 'A' group. Rh+ is the most frequent group than Rh- in the Rh system. Blood donations by females are very low.

Keywords: ABO, Rh, Blood group

INTRODUCTION

Thirty-three major blood group systems (including the AB and Rh systems) were recognized by the International Society of Blood Transfusion (ISBT) in Oct 2012.¹ But, the ABO and Rhesus (Rh) blood groups remain clinically most important. Karl Landsteiner in 1901 discovered the first human blood group, which was the ABO group.² Another important breakthrough came in 1939-40 when Karl Landsteiner, Alex Wiener, Philip Levine, and R.E. Stetson discovered the Rhesus blood group system, which was found to be the cause of the majority of transfusion reactions up to that time.³ Knowledge regarding the frequency of red blood cell antigen phenotypes in a population can be helpful in the creation of a donor data bank for the preparation of indigenous cell panels and for providing antigen-negative compatible blood to patients

with multiple alloantibodies.⁴ Hence this study was conducted to determine the frequency of ABO and Rhesus (Rh) blood groups in a tertiary care teaching hospital.

METHODS

During the period from July 2013 to December 2014, a total of 1740 voluntary and replacement donors who were considered as medically fit donated their blood in our hospital. ABO and Rh blood grouping was performed on those donors.

Age range of those donors was 18 to 60 years. ABO and Rh blood grouping was performed by forward blood grouping (cell grouping) using test tube agglutination method. Antisera A, antisera B and antisera D were used.

After that with pooled known A, B and O cell reverse blood grouping (serum group) was done by using test tube agglutination method. Final blood was confirmed when both forward blood grouping and the reverse blood grouping became identical. By antiglobulin technique Rh negative blood groups were confirmed. The blood group data were recorded in specially made proforma, tabulated and then analysis was done for comparing with similar studies by other authors.

RESULTS

Table 1 shows that among total 1740 donors 1702 were males and 38 were females.

Majority of the population of the blood donors came from the age group of 21 to 30 followed by age group 31 to 40.

Table 2 shows the distribution of blood group systems. It shows that in case of population of donors, O (32.81%) group are in maximum numbers followed by A (29.71%) group and B (28.33%) group respectively; whereas minimum are from AB groups (9.08%). In case of female population also maximum are from O and A groups; whereas minimum are from AB groups. Considering the Rhesus group system, maximum numbers of donors were from Rh +ve group (97.01%). Among 1740 numbers of donors 1702 (97.81%) numbers were males and other 38 (2.18%) were females. Sex does not show any effect on the ABO and Rh blood grouping of the donors.

Table 1: Age group and gender-wise distribution of blood donors.

Serial number	Age (years)	Male	Female	Total (Male + Female)
1	18-20	44 (2.52%)	02 (0.11%)	46 (2.63%)
2	21-30	660 (37.93%)	20 (1.14%)	680 (39.08%)
3	31-40	596 (34.25%)	14 (8.04%)	610 (35.05%)
4	41-50	328 (18.85%)	02 (0.11%)	330 (18.96%)
5	51-60	74 (4.25%)	----	74 (4.25%)
	Total	1702 (97.81%)	38 (2.18%)	1740 (100%)

Table 2: Age group and gender-wise distribution of blood donors.

ABO Blood group	Male			Female			Total Rh+	Total Rh-	Total
	Rh+	Rh-	Total	Rh+	Rh-	Total			
O	540 (22.98%)	16 (0.91%)	556 (31.95%)	13 (0.74%)	02 (0.11%)	15 (0.86%)	553 (31.78%)	18 (1.03%)	571 (32.81%)
A	493 (28.33%)	11 (0.63%)	504 (28.96%)	12 (0.68%)	01 (0.05%)	13 (0.74%)	505 (29.02%)	12 (0.68%)	517 (29.71%)
B	477 (27.41%)	08 (0.45%)	485 (27.87)	08 (0.45%)	--	08 (0.45%)	485 (27.87%)	08 (0.45%)	493 (28.33%)
AB	143 (8.2%)	13 (0.74%)	156 (8.96%)	02 (0.11%)	--	02 (0.11%)	145 (8.33%)	13 (0.74%)	158 (9.08%)
O _h Bombay phenotype	--	01 (0.05%)	01 (0.05%)	--	--	--	--	01 (0.05%)	01 (0.05%)
Total	1653 (95%)	49 (2.81%)	1702 (97.81%)	35 (2.01%)	03 (0.17%)	38 (2.18%)	1688 (97.01%)	52 (2.99%)	1740 (100%)

Table 3: Comparison study on frequency of ABO and Rh phenotype (%) at different geographical areas in India.

Place of Study	A	B	AB	O	Rh+	Rh-
Davanagere [9]	26.15	29.85	7.24	36.76	94.8	5.52
Shimoga-Malnad [13]	24.27	29.43	7.13	39.17	94.93	5.07
Eastern Ahmedabad [7]	23.3	35.5	8.8	32.5	94.2	5.8
Punjab [8]	21.9	37.6	9.3	31.2	97.3	2.7
Bangalore [10]	23.85	29.95	6.37	39.82	94.2	5.79
Chittoor [11]	18.95	25.79	7.89	47.37	90.6	8.42
Vellore [12]	18.85	32.69	5.27	38.75	94.5	5.47
Western Ahmedabad [6]	21.94	39.40	7.86	30.79	95.05	4.95
Tripura [5]	23.77	32.8	9.64	32.95	97.06	2.94
Pondicherry [14]	29.5	20.5	6.5	34.0	93.5	6.0
Present study	29.71	28.33	9.08	32.81	97.01	2.99

DISCUSSION

Almost all the previous studies within India except the study in Tripura⁵ have found that numbers of male blood donors are much more comparing to the female donor which is in agreement with this present study. Present study shows that 97.81% of donors were male and other 2.18% were female. The reason of lesser number of female donors is because of social taboo, cultural habits, and lack of motivation and fear of blood donation. Another cause for less number of female donors is their rejection as they were suffering from nutritional anaemia and low body weight.⁶ In Tripura because of better implementation of primary health care system less numbers of women are suffering from nutritional anaemia than many other parts of India and also because of continuous motivation less numbers of women are afraid of blood donation. As a result more numbers of women are participating in donation of blood.⁵ Majority of blood donors came from the 21-40 years age group which is in agreement with the previous studies as they are the main work force and as majority belongs to age groups above this usually suffer from various disease conditions.⁵

The distribution of ABO blood group varies regionally, ethnically and from one population to another.⁶ Comparison study on frequency of ABO and Rh phenotype at different geographical areas in India is described in Table 3. Present study shows 'O' group as the most frequent position which is also in agreement with other studies. Similar studies done at Eastern Ahmedabad⁷, Punjab⁸ and Western Ahmedabad⁶ described 'B' as the most frequent and 'O' as the second most common blood group. Studies in the Southern India⁹⁻¹² described 'O' as the most frequent and 'B' as the second most common blood group. The study conducted in Tripura showed 'B' and 'O' almost equally sharing the most frequent position.⁵ All these studies have described 'AB' as the least common blood group which is comparable to the present study.⁵⁻¹⁴ Regarding Rh

grouping, like other similar studies in India, present study shows that more than 90% donors are detected as Rh +ve. Study conducted in Bangalore shows only 2 (0.005%) donors out of 36,964 with Bombay blood group (Oh). In the present study also, one (0.05%) donor was with a Bombay blood group.¹⁰

CONCLUSION

The present study concludes that 'O' group is the most frequent position of ABO blood group system followed by 'A' and 'B' groups among the blood donors of tertiary care hospital in Hyderabad, Telangana State, India. Rh positive donors were 97.06% and Rh negative were 2.94%. Majority of the donors are in the age group of 21 to 40 years. Blood donations by females are very low. One rare case of Oh (Bombay group) was detected in our study. The study will help significantly in management of blood bank and transfusion services and also in keeping a record of donor details for further use.

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REFERENCES

1. Harvey GK. Why do people have different blood types? *Scientific American* 2005. Online 7 March 2005. Cited 10 February 2014.
2. 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.
3. International Society of Blood Transfusion. Online 2012. Cited 11 May 2013. Available from: <http://www.isbtweb.org/workingparties/red-cell-immunogenetics-and-bloodgroup-terminolog/blood-group-terminology/#c579>

4. Agarwal N, Thapliyal RM, Chatterjee K. Blood group phenotype frequencies in blood donors from a tertiary care hospital in north India. *Blood Res.* 2013;48(1):51-4.
5. Choudhury P, Chakrabarti JS, Choudhury PS. Frequency and distribution of blood groups in blood donors of Tripura. *The Health Agenda*, 2014;2(2).
6. 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 of Med Research*. 2012;2(2):202-06.
7. Wadhwa MK, Patel SM, Kothari DC, Pandey M, Patel DD. Distribution of ABO and Rhesus-D groups in Gujarat, India: a hospital based study. *Indian J Ped Oncol*. 1998;19(4):137-41.
8. Sidhu S. Distribution of the ABO Blood Groups and Rh (D) Factor Among the Scheduled caste Population of Punjab. *Anthropologist*. 2003;5(3):203-04.
9. Swamy CMM, Basavaraj PB, Kavitha GU, Shashikala P. Prevalence of ABO and Rhesus blood group among blood donors. *Indian Journal of Public Health Research and Development*. 2012;3(2):106-09.
10. Periyavan A, Sangeetha SK, Marimuthu P, Manjunath BK, Seema DM. Distribution of ABO and Rhesus-D groups in and around Bangalore. *Asian J Transfus Sci*. 2010;4(1):41.
11. Reddy KS, Sudha G. ABO and Rh (D) blood groups among the DesuriReddis of Chittur District, Andhra Pradesh. *Anthropologist*. 2009;11:237-8.
12. Das PK, Nair SC, Harris VK, Rose D, Mammen JJ, Bose YN, et al. 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.
13. Girish CJ, Chandrashekhar 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(3):25-30.
14. Subhashini AB. Distribution of ABO and Rh (D) blood groups among Irulas, a tribal population of Pondicherry, India. *Anthropologist*, 2007; 9(2): 163-64.

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