

Research Article

Distribution of Blood Groups in Blood Donors in Blood Banks of Latur

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Abstract: Blood group is a system of antigens present on the surface of red blood cells. Up till now about 700 red cells antigen have been identified. The majority are inherited by Mendelian Fashion. The ABO and Rhesus (Rh) blood group system are major systems and most important for blood transfusion purposes, parental testing, legal medicine and in population genetic study. Aim and objective of the study is to determine age and sex wise frequency and distribution ABO and Rh blood group patterns among blood donors in Latur, Maharashtra and compare with other data from similar studies. A retrospective study was conducted at Blood bank, MIMSR Medical college, Blood bank Govt. Medical college and Bhalachandra blood bank, LATUR over a period of six years from 1st January 2007 to 31st December 2012. Blood group of the blood donors was determined by commercially available standard monoclonal antisera by test tube agglutination technique. Out of 106308 blood donors, 98707 (92.85%) were male and 7601 (7.15%) were female. The commonest ABO blood group observed was B (37.98 %) followed by O (27.64%), A (24.89 %) and AB (9.47 %); while in rhesus system, 95.19% donors were Rh-positive and 4.81% donors were Rh negative. The study had a significant implication regarding the inventory management of blood bank and transfusion services for the patient admitted in our secondary care teaching hospital.

Keywords: Blood groups, ABO, Rhesus (Rh)

INTRODUCTION

Blood group antigens are hereditary determined and plays a vital role in transfusion safety, understanding genetics, inheritance pattern, and disease susceptibility. Nearly 700 erythrocyte antigens are described and organized into 30 blood group systems by the International Society of Blood Transfusion of which ABO and Rh are important [1].

The ABO blood group system is widely credited to have been discovered by the Austrian scientist Karl Landsteiner, who found three different blood types in 1900 [2]. He described A, B and O blood groups for which he was awarded the Nobel prize in 1930.

Alfred Von Decastello and Adriano Sturli discovered the fourth type AB, in 1902 [3]. The Landsteiner's discovery opened the door to the birth of a wide spectrum of discoveries in the field of immune hematology, blood transfusion among humans irrespective of their natives, unmatched pregnancy, legal medicine, anthropology and the discovery of other blood group systems, all are deemed as an application or as a result of Karl's discovery [4, 5].

The discovery of ABO blood groups by Karl Landsteiner was an important achievement in the history of blood transfusion that was followed by discovery of Rh (D) antigen [6, 7].

Blood groups are genetically determined. The vast majorities is inherited in a simple Mendelian fashion and are stable characteristics which are useful in paternity testing [8]. Blood groups are known to have some association with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection, and Rh incompatibility and ABO incompatibility of newborn [9].

All human populations share the same blood group systems; although they differ in the frequencies of specific types. The incidence of ABO & Rh groups varies markedly in different races, ethnic groups, and socio-economic groups in different part of the world. The frequencies of ABO and Rh blood groups vary from one population to another and time to time in the same region. The knowledge of distribution of ABO & Rh blood groups at local and regional levels is helpful in effective management of blood banks & safe blood transfusion services. Identification of Rh system is important to prevent the erythroblastosis fetalis; which commonly arises when an Rh negative mother carries an Rh positive fetus.

Knowledge of the distribution of ABO and Rh blood groups is essential for effective management of blood banks inventory, be it a facility of a smaller local transfusion service or a regional or national transfusion service. It is, therefore imperative to have information on the distribution of these blood groups in any population [10, 11].

Knowledge of blood group distribution is also important for clinical studies, for reliable geographical information and it will help a lot in reducing the maternal mortality rate, as access to safe and sufficient supply of blood will help significantly in reducing the preventable deaths.

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. In modern medicine besides their importance in evolution, their relation to disease and environment is being increasingly important [12, 13]. It is therefore imperative to have information on the distribution of these blood groups in any population group.

MATERIALS AND METHODS

The present retrospective study was carried out at smt. Saraswati Karad blood bank, Bhalachandra blood bank and blood bank of GMC, Latur during the 6 year

period from January 2007 to December 2012. The blood collections were taken from the voluntary donors at outdoor blood donation camp and in-house blood bank as well as from replacement donors at blood bank. Total 106308 donors were considered medically fit and accepted for blood donation during the study period. All were of age between 18-60 years. After blood donation, blood group was determined by forward blood grouping (cell grouping) by test tube agglutination method. Commercially available standard antisera A, antisera B, and antisera 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 cell that are being prepared daily at the blood bank. Final blood group is confirmed only if both forward group (cell group) and reverse group (serum group) are 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.

RESULTS

Table 1: Sex wise distribution of blood donors

Sr. No.	Blood Groups	No. of Male donors (%)	No. of Female donors (%)	Total
1.	A	24603 (24.93)	1863 (24.51)	26466 (24.90)
2.	B	36824 (37.31)	3556 (46.78)	40380 (37.98)
3.	O	28185 (28.55)	1206 (15.87)	29391 (27.65)
4.	AB	9095 (9.21)	976 (12.84)	10071 (9.47)
Total		98707 (100)	7601 (100)	106308 (100)

Out of 106308 blood donors, majority 98707 (92.85%) were male and 7601 (7.15%) were female (Table 1). Most of donors were from age groups of 21 to 35 yrs. This finding was consistent with the other studies. 80% of donors were between 18 to 35 yrs. The

percentage of donors above 50 yrs was 2.48. Amongst total 106308 donors most of the donors i.e. 40380 were with blood group B (37.98%) followed by O (27.65%), A (24.90%) and AB (9.41%).

Table 2: Distribution of blood donors according to Rhesus Phenotype

Sr. No.	Blood Groups	No. of donors according to Rhesus Phenotypes (%)		Total
		Rh + ve	Rh - ve	
1.	A	25024 (94.55)	1442 (5.45)	26466 (100)
2.	B	38768 (94.95)	1612 (5.05)	40380 (100)
3.	O	27860 (94.79)	1531 (5.21)	29391 (100)
4.	AB	9541 (94.74)	530 (5.26)	10071 (100)
Total		101193 (95.19)	5115 (4.81)	106308 (100)

Table 2 shows distribution of blood donors according to rhesus phenotype. Maximum blood donors i.e. 101193 (95.19%) were Rh +ve while only 5115 (4.81 %) were

Rh -ve. Amongst the ABO blood groups Rh +ve donors ranged from 94.55 to 94.95%.

Table 3: Frequency of ABO and Rh phenotypes in different studies from India (in %) with reference to [15]

Sr. No.	Place of Study	ABO System				Rhesus Phenotypes	
		A	B	AB	O	Rh + ve	Rh - ve
1.	Bangalore	23.85	29.95	6.37	39.82	94.21	5.79
2.	Chittoor	18.95	25.79	7.89	47.37	90.58	8.42
3.	Vellore	18.85	32.69	5.27	38.75	94.53	5.47
4.	Shimoga-Malnad	24.27	29.39	7.13	39.17	94.93	5.07
5.	Davangere	26.15	29.85	7.24	36.76	94.80	5.20
6.	Punjab	21.90	37.6	9.2	39.3	97.3	2.7
7.	Sola, Ahmedabad	21.94	39.40	7.86	30.79	95.05	4.95
8.	Present study	24.90	37.98	9.47	27.65	95.19	4.81

Table 3 shows comparison of results of various studies conducted in other parts of India where most of the studies were in consistency with the present study.

DISCUSSION

Majority of the studies within India have described a large number of male donors compared to female donors [14]. This is because of the fact that in developing country like India, because of social taboo, cultural habits, lack of motivation and fear of blood donation, female donors were very less. In addition, large numbers of females from the menstruating age groups are usually anemic with low weight so declared unfit for blood donation and eliminated during the predonation screening and counseling. Hence, general health of females needs to be improved by good nutritional diet and iron supplements. The fear regarding blood donation in females needs to be driven out by making them aware about the advantages of blood donation. 21-40 years age group is the main work force of any of the society. So, they are the most common age group encountered donating blood. Many of the older people suffer from hypertension, diabetes mellitus, low hemoglobin and ischemic heart diseases and hence may abstain from donating or considered unfit during predonation counseling (2.48%).

Knowledge of frequency of ABO Blood Groups is an important tool to determine the direction of recruitment of voluntary donors as required for zone across the country. The distribution of ABO blood group varies regionally, ethnically & from population to another. The comparison of frequency and distribution of ABO and Rh group in the blood donors at present study with the similar studies carried out within India is described in Table 3.

While looking at ABO grouping, we observed that the distribution of ABO & Rh grouping was comparable to studies done at Punjab [18]. All these studies had described 'B' as the most frequent and 'AB' as the least common blood groups. The second most common blood group was 'O' in present study as well as in a study carried out at Ahmedabad [15]. Studies at nearby areas of Punjab had shown 'A' being the second most common blood group. Studies at Southern India

[19, 20] had contrast findings with 'O' being the most common blood group followed by 'B', 'A' and 'AB'.

While looking at Rh grouping, 89-95 % donors all over the world were detected as Rh +ve except at Britain and U.S.A. where the frequency of Rh positivity is 83-85%. Here it is a well known fact that many of the people residing at USA have migrated from Britain. Apart from transfusion service, knowledge of the blood group system helps to take preventive measures against the diseases which were associated with different blood groups, to prevent the dangerous transfusion reactions and efficient management of blood bank and transfusion services to the needy patients.

There is known genetic association of specific blood groups to certain diseases in certain population. Studies concerned about possible association between ABO blood group and cardiovascular diseases have confirmed that persons of group A are affected more frequently with coronary heart disease, ischemic heart disease, venous thrombosis and atherosclerosis, while it is low in people with blood group 'O' which stated to have protective effect against these diseases. 'O' group individuals are known to have a 14 % reduced risk of squamous cell carcinoma and 4 % reduced risk of basal cell carcinoma when compared to non-O group. It is also associated with a reduced risk of pancreatic cancer. The 'B' antigen links with increased risk of ovarian cancer. Gastric cancer has reported to be more common in blood group 'A' and least in group 'O'. So, it is advisable to do blood grouping studies in each region for drafting proper national transfusion policies and supplying blood to needy patients during emergency. In short, generation of a simple database of blood groups, not only provides data about the availability of human blood in case of regional calamities, but also serves to enables insight into possibilities of future burden of diseases. This study correlates with the study of Patel Piyush et al [15]. Similar studies are done in different parts of India [16- 18].

CONCLUSION

The present study concludes that 'B' blood group is the commonest blood group amongst the blood donors in this study of blood banks in Latur. This is

followed by 'O', 'A' and 'AB' blood group respectively. Regarding Rhesus blood group system, Rh positive donors were 94.74% and Rh negative were 5.26%. Blood donation by the females was very low and it needs to be increased by improving health status and awareness about blood donation.

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 great use in case of acute hemorrhage or anaemia in children when urgent transfusion of yet to be cross matched blood is required. It is necessary to conduct similar well designed studies in other states 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.

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REFERENCES

1. Table of blood group systems; International Society of Blood Transfusion (ISBT). Oct 2008, Available in <http://ibgri.blood.co.uk/isbt>.
2. Land steirier K; Zur Kenntnis der antifermentativen, lytischen und agglutinierendenwirkungen des Blutserums unter lympe. Zentralblatt Bakteriologic, 1900; 27: 357–362.
3. Von decastella A, Sturli A; Ueber die isoagglutinine in serumgesunder and Kranaker Menschen. Mfiner Med WSchr., 1902; 49: 1090–1095.
4. Jolly JG; Medicolegal significance of human blood groups. J Indian Med Assoc., 2000; 98: 340–341.
5. Khurshid B, Naz M, Hassan M, Mabood SF; Frequency of ABO and Rh (D) blood groups in district Swabi, NWFP, Pakistan. J Sci Tech University Peshawar; 1992; 16: 5-6.
6. arratty G, Dzik W, Issitt PD, Lublin D M, Reid ME, Zelinski T; Terminology for blood group antigens and genes—historical origins and guideline in the new millennium. Transfusion, 2000; 40: 477–489.
7. Mollison PL; The genetic basis of the Rh blood group system. Transfusion, 1994; 34: 539–541.
8. Hoffbrand AV and Pettit JE; Blood Transfusion in Essential Haematology. 5th edition, Oxford UK, Black well scientific Publication, 2006: 307–309.
9. Skaik Y, El-Zyan N; Spectrum of ABO and Rh (D) bloodgroups amongst the Palestinian students at Al-Azhar University-Gaza. Pak J Med Sci., 2006; 22: 333–335.
10. Sidhu S and Sidhu LS; ABO blood group frequencies amongst the Sansis of Punjab. Coll Anthropol., 1980; 4: 55–58.
11. Enosolease ME, Bazuaye GN; Distribution of ABO and Rh-D blood groups in the Benin area of Niger-Delta: Implication for regional blood transfusion. Asian J Transf Sci., 2008; 2 (1): 3–5.
12. 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.
13. 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- 103.
14. 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): 106-109.
15. 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 Journal of Medical Research, 2012; 2(2): 202 – 206.
16. 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 (4): 988–990.
17. Wadhwa MK, Patel SM, Kothari DC, Pandey M, Patel DD, Wadhwa MK et al. Distribution of ABO and Rhesus-D groups in Gujarat, India: a hospital based study. Indan J Ped Oncol., 1998; 19 (4): 137–141.
18. Sidhu S; Distribution of the ABO Blood Groups and Rh (D) Factor among the Scheduled Caste Population of Punjab. Anthropologist, 2003; 5: 203-204.
19. Reddy KSN, Sudha G; ABO and Rh (D) blood groups among the desuri Reddis of Chittoor District, Andhra Pradesh. Anthropologist, 2009; 11 (3): 237-238.
20. 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 (1): 47–8.