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Distribution of ABO and Rhesus Blood Group among Blood Donors in Latur District of Maharashtra

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Abstract

Background: The ABO and Rhesus (Rh) blood group systems are the most important human blood group systems and are responsible for most of the blood transfusion reactions, transplant rejections, parental testing and legal purposes. *Settings and Design*: A retrospective study was conducted at Blood Bank, GMC, Latur, Maharashtra. A total of 6224 blood donors were studied, during the period from 1st January 2016 to 31st May 2017. *Materials and Methods:* ABO and Rhesus grouping of the donors were determined using the standard monoclonal antisera by slide agglutination method and reverse grouping. *Statistical Analysis*: The frequency of ABO and Rh blood group typing was expressed in simple percentages. *Results:* Out of 6224 donors, 6117(98.28%) were male and 107(1.72%) were female donors. The commonest ABO blood group was B (32.97%) followed by O (30.14%), A (26.38%) and least common AB (10.51%). Among 6224 donors, 298 (4.79%) were Rh negative while 5926 (95.21%) were Rh positive. *Conclusion*: Our study throws light on the distribution of blood groups in Latur region, which is important for blood banks and transfusion service policies that could contribute to National Health System.

Keywords: ABO; Rhesus; Blood Group; Donors.

Introduction

Approximately 700 erythrocyte antigens have been described and organized into 30 blood group systems by the International Society of Blood Transfusion.[1] The ABO blood group system was first described by Karl Landsteiner in 1900, remains the most important blood group system in transfusion medicine. The Rhesus blood group system was identified by Landsteiner and Weiner in 1940.

Depending upon the presence or absence of A or B antigens on the red blood cells, blood groups are divided into the four types as- A, B, O and AB. A and B are highly antigenic and there are naturally occurring antibodies anti-A and anti-B (agglutinins) in the serum of individuals whose red cells lack the corresponding antigen. Hence ABO compatible blood should be transfused to the recipient to avoid the destruction of transfused RBCs due to mismatched transfusion.

Other than the A and B antigens, Rh D is the most important red cell antigen in transfusion practice, especially in case of haemolytic disease of newborn. Rh D antigen is strongly immunogenic. Persons who lack Rh D antigen do not regularly have corresponding antibody (in contrast to the A and B antigens) in their serum, unless they are exposed to red cells possessing the Rh D antigen [2].

Along with their importance with in transfusion practice, ABO and Rh system also plays important role in clinical studies, genetic studies and solving various medico legal issues especially disputed paternity cases [3].

It has been shown association of different ABO blood groups with several types of genetic diseases including cancers [4]. Therefore it is necessary to study distribution of blood group in different populations.

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Materials and Methods

The present retrospective study was conducted at Blood Bank of Government Medical College, Latur, Maharashtra. The study was carried over the period of approximately one and half year from 1st January 2016 to 31st May 2017.

All the voluntary donors coming to the blood bank for blood donation and who are eligible as per NACO guidelines are included in the study. Donor information was noted according to the donor questionnaire as personal details, demographic details, occupation and past medical history. Donors with good health, mentally alert, physically fit were selected as blood donors. Finally the donors were asked to sign the donor questionnaire along with informed consent form.

After blood donation ABO and Rh typing was done by slide agglutination method by using commercially available monoclonal anti-seras i.e. anti-A, anti-B and anti-D. Tube agglutination test and reverse grouping was used to confirm doubtful cases. The frequency of ABO and Rh typing was expressed in simple percentages.

Results

Out of 6224 donors studied, 6117(98.28%) were male and only 107(1.72%) were female donors (Table 1). Male to female ratio was approximately 57:1. The predominant donors belonged to the age group between 18-35 yrs (83.25%)(Table 2).

The most common blood group was B (32.97%) and the least common was AB (10.51%). Blood group B was the commonest having frequency of 32.97% (B Rh positive 31.41% and B Rh negative 1.46%). Blood group O was the second most common in the population studied with frequency of 30.14% (O Rh positive 28.81% and O Rh negative 1.33%). Frequency of blood group A was 26.38% (A Rh positive 24.92% and A Rh negative 1.46%). AB was the least common group 10.51% (AB Rh positive 10.07% and AB Rh negative 0.43%).

95.21% of donors were Rh positive and only 4.79% donors were Rh negative.

Table 1: Sexwise Distribution of blood donors

Sex	Number of Donors	Percentage
Male	6117	98.28%
Female	107	1.72%
Total	6224	100

Table 2: Agewise distribution of blood donors

Age group in years	No. of Donors	Percentage
18-25	2747	44.14%
26-35	2434	39.11%
36-45	860	13.82%
46-55	178	2.86%
≥56	5	0.08%

Table 3: Distribution of ABO and Rhesus blood groups among donors

Blood Group	A (%)	B (%)	AB (%)	O (%)	Total
Rh positive	1551(24.92%)	1955(31.41%)	627(10.07%)	1793(28.81%)	5926(95.21%)
Rh negative	91(1.46%)	97(1.56%)	27(0.43%)	83(1.33%)	298(4.79%)
Total	1642(26.38%	2052(32.97%)	654(10.51%)	1876(30.14%)	6224(100%)

Discussion

In the present study, male donors significantly outnumbered the female donors which are comparable to the most of the studies in India [3,5]. In developing countries like India, large numbers of females in the menstruating age group are anaemic and underweight, hence make them unfit for blood donation. Other factors like pregnancy an breast feeding also restrict females from donation. In addition, certain social taboos, cultural habits and fear of blood donation among females are responsible for less female donors. Hence it is needed to improve the health of females by proper nutrition and they should be motivated for blood donation.

Most of the donors belonged to the age group between 18-35yrs. This finding is comparable with other studies [3,5]. Because donors between this age

Table 4: Distribution of ABO and Rhesus blood groups in India and outside India

Sr. No.	Within India	Location of study	A	B	AB	O	Rh+ve	Rh -ve
1	North India	Lucknow[6]	21.73	39.84	9.33	29.1	95.71	4.29
2		Amritsar[7]	18.01	38.06	9.62	34.31	91.28	8.72
3		Haryana[8]	22.9	38.83	9.54	28.7	90.72	9.28
4	Central India	Present study	26.38	32.97	10.51	30.14	95.21	4.79
5		Maharashtra[9]	28.38	31.89	8.72	30.99	95.36	4.64
6	West India	Eastern Ahmedabad[10]	23.3	35.5	8.8	32.5	94.2	5.8
7		Western Ahmedabad[5]	21.94	39.4	7.86	30.79	95.05	4.95
8	East India	Durgapur[11]	23.9	33.6	7.7	34.8	94.7	5.3
9	South India	Bengaluru[12]	23.85	29.95	6.37	39.82	94.2	5.8
10		Vellore[13]	18.85	32.69	5.27	38.75	94.5	5.47
11		Mangalore[14]	25.8	27.3	4.8	42	94.64	5.35
12	Outside India	Pakistan[15]	27.92	32.40	10.58	29.10	90.13	9.87
13		Nepal[16]	34	29	4	33	96.7	3.3
14		Iran[17]	45	11	4	40	92.40	7.60

group are medically fit and fulfil the criteria for blood donation. The least common age group was greater than 56yrs, as most of the donors at this age group are suffering from hypertension, diabetes, ischemic heart disease, are unfit for donation.

In the present study, frequency and distribution of ABO and Rh group in the blood donors in Latur (Maharashtra) region are compared with the similar studies carried out within and outside India (Table-4). Frequency of blood groups of present study (B>O>A>AB) was comparable to the studies done at Lucknow [6], Amritsar [7], Haryana [8], Maharashtra [9] and Ahmedabad [5,10]. Studies done at Durgapur [11], Bengaluru [12], Vellore [13], Mangalore [14] showed that O was the most common blood group which is different from present study. So geographical distribution of blood groups according various studies in India showed that, group B was the commonest group in Northern, Western and Central parts of India. But group O was the most frequently occurring in the Southern and Eastern parts of India.

Rhesus typing showed that, 95.21% groups were Rh positive while only 4.79% were Rh negative. Rh positive are the predominant groups in all the studies in India (Table 4), though frequency is somewhat different. Among various studies in India, study in Haryana [8] showed maximum frequency of Rh negativity (9.28%), although predominant group was Rh positive.

The main aim of this study is to provide idea about the common and rare blood groups in the society, so that patients can be managed efficiently in various emergencies. Patients and their relatives with rare blood groups can be warned beforehand to arrange for blood during elective surgeries, or in case of patients with repeated need of blood. Knowledge of distribution of ABO and Rh grouping different geographical areas will be helpful to plan and coordinate efficient management the blood banks, to meet the need of the population for blood transfusion.

Apart from transfusion services, there is a known genetic association of specific blood groups to certain diseases in particular population. Various studies have confirmed that, group A persons are affected more frequently with coronary heart disease, ischemic heart disease, venous thrombosis, and atherosclerosis while blood group "O" people were stated to have protective effect against these [18]. Group O individuals are shown to have low risk of pancreatic cancer [19]. Studies have shown that, group B is associated with increased risk of ovarian cancer [20]. Group A has increased risk of gastric cancer while O has protective effect [21].

Hence present study is important to plan good transfusion practices and to encourage donors with rare blood group to donate and help to preventive measures against the diseases which are associated with different blood groups.

Conclusion

The present study concludes that, blood group B is the most common group in Latur district of Maharashtra and least common is AB. Rhesus positivity outnumbered the rhesus negative blood groups. Female donors are very less; hence they should be encouraged to donate by increasing awareness about blood donation. Present study will provide reliable information about geographical distribution

of blood groups which will be helpful to plan various strategies to future health challenges in the region.

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