

Distribution of ABO Blood Groups and RH (D) factor in Haryana.

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Abstract

Introduction : blood group is a system of antigens present on the surface of red blood cells. The majority are inherited by Mendelian Fashion. The ABO & Rhesus (Rh) blood group system are the most prevalent & important for transfusion of blood & its components, organ transplant, genetic studies & in legal medicine study. **Aim and objective** of the study is to determine age and sex wise frequency and distribution of ABO and Rh blood group patterns among blood donors in Southern Haryana and compare the data with similar studies. A retrospective study was conducted at Blood bank of Maharaja Agrasen Medical College over a period of six months from 1st January to 30th June 2015. Blood group of the blood donors were determined by commercially available standard monoclonal antisera by test tube agglutination technique. **Results:** During the study period 3202 donors of different blood groups were screened by antigen- antibody agglutination method using commercially available antiseras. The study revealed that the commonest ABO blood group was B (37.82%), followed by O (30.82%), A (22.21%) and AB (9.15%) respectively. Rh Positive were 91.07% and Rh negative were 8.93%. **Conclusion:** The present study has a significant implication regarding the management of blood bank and transfusion services in this area . It also provides a database for the blood banks and also useful to health planner while making efforts to face future health challenges in the region.

Keywords: ABO blood group, Rh factor, Blood donors.

Introduction

The discovery of the ABO blood group system by Landsteiner in 1900 marked the beginning of modern blood banking and transfusion medicine [1]. He described the blood groups as A, B, and O. Several years later Landsteiner's associates, Von Decastello and Struli, added group AB to the original observations [2]. In his investigations, Landsteiner noted the presence of agglutinating antibodies in the serum of individuals who lacked the corresponding ABO antigen. He observed that group A red cells agglutinated with the serum from group B individuals.

This observation has been termed Landsteiner's rule. The genes of ABO & Rh (D) are located on chromosome 9 & 1 respectively. Blood groups are genetically determined. The vast majority are inherited in a simple Mendelian fashion and are stable

characteristics which are useful in paternity testing [3]. Blood groups are known to have some association with diseases like duodenal ulcer, diabetes mellitus, urinary tract infection, Rh incompatibility and ABO incompatibility of newborn [4].

There are differences in the distributions of ABO, & Rh (D) blood groups amongst different populations [5,6].

The study of blood grouping is important as it plays an important role in various genetic studies, researching population migration patterns as well as resolving certain medico legal issues, particularly of disputed paternity cases and in blood transfusion practice as it will help a lot in reducing the morbidity and mortality rate [7].

Knowledge of distribution of ABO & Rh blood group is also essential for effective management of blood bank inventory [8].

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Material and Methods

A retrospective study of six months was carried out at Blood Bank, Maharaja Agrasen Medical College, Agroha Distt. Hisar. Blood group determination of donors was done from 1st January 2015 to 30th June 2015 at Blood Bank, MAMC Agroha. Total 3202 donors were considered medically fit & donated blood during the study period. All belonged to age group between 18-55 years.

After blood donation, blood grouping ABO & Rh was done by antigen antibody agglutination test by

commercially available standard antiseras i.e Anti-A, Anti-B, Anti-AB and Anti-D were used in our Blood Bank. Blood Group was done by test tube agglutination method. Both forward (cell grouping) & reverse grouping (serum grouping) method were done. Final blood group was confirmed only if both forward & reverse groups are identical.

All weak D groups were considered as Rh positive. The donor blood group data were recorded on specially prepared proforma, tabulated, analyzed and compared with the similar studies by other authors.

Results

Out of 3202 blood donors, majority 3038 (94.88%) were male and 164 (5.12%) were female (Table 1). This finding was consistent with the other studies. 80% of donors were between 18 to 40 yrs. Amongst total 3202 donors most of the donors i.e. 1211 were with blood group B (37.82%) followed by O (30.82%), A (22.21%) and AB (9.15%).

Table 2 shows distribution of blood donors according to rhesus phenotype. Maximum blood donors i.e. 2916 (91.07%) were Rh+ve while only 286 (8.93. %) were Rh -ve. Amongst the ABO blood groups Rh +ve donors ranged from 90.30 to 91.33%. 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.

Table-1: Sex wise distribution of blood donors.

Sr. No	Blood groups	No. of Male Donors (%)	No. Of Female Donors (%)	Total
1	A	672 (22.12)	39 (23.78)	711 (22.20)
2	B	1156 (38.05)	55 (33.54)	1211 (37.82)
3	O	934 (30.74)	53 (32.32)	987 (30.82)
4	AB	276 (9.09)	17 (10.36)	293 (9.16)
Total		3038 (100)	164 (100)	3202 (100)

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	642 (90.30)	69 (9.70)	711 (100)
2.	B	1106 (91.33)	105 (8.67)	1211 (100)
3.	O	901 (91.29)	86 (8.71)	987 (100)
4.	AB	267 (91.13)	26 (8.87)	293 (100)
Total		2916 (91.07)	286 (8.93)	3202 (100)

Table-3: Comparative study on frequency of ABO and Rh phenotypes at different geographical areas (in percentage)

Place of Study	A	B	AB	O	Rh +ve	Rh -ve
Northern part of India						
Present study	22.20	37.82	9.16	30.80	91.07	8.93
Lucknow [5]	21.73	39.84	9.33	29.10	95.71	4.29
Western Rajasthan [7]	22.2	36.4	9.4	31.7	91.75	8.25
Punjab [6]	21.91	37.56	9.3	31.21	97.3	2.7
Western Part India						
Eastern Ahmedabad [9]	23.30	35.50	8.80	32.50	94.20	5.80
Western Ahmedabad [10]	21.94	39.40	7.86	30.79	95.05	4.95
Surat [11]	24.10	34.89	8.69	32.32	94.18	5.82
Central Part of India						
Indore [12]	24.15	35.25	9.10	31.50	95.43	4.57
Eastern part of india						
Durgapur(steel city)[13]	23.90	33.60	7.70	34.80	94.70	5.30
Southern Part of India						
Bangalore[14]	23.85	29.95	6.37	39.82	94.2	5.8
Vellore[15]	21.86	32.69	6.70	38.75	94.5	5.5
Devanagree[16]	26.15	29.85	7.24	31.76	94.8	5.2
Shimoga – malnad [17]	24.27	29.43	7.13	39.17	94.93	5.07
Outside india						
Pakistan [18]	22.40	32.40	30.50	8.40	93.00	7.00
Nepal [19]	34.00	29.00	4.00	32.50	96.70	3.30
Britain [20]	42.00	8.00	3.00	47.00	83.00	17.00
USA [21]	41.00	9.00	4.00	46.00	85.00	15.00

Discussion

Out of 3202 blood donors, majority 3038 (94.88%) were male and 164 (5.12%) were female (Table 1). This finding was consistent with the other studies. Eighty percent of donors were between 18 to 40 yrs. Amongst total 3202 donors, most of the donors i.e. 1211 were with blood group B (37.82%) followed by O (30.82%), A (22.21%) and AB (9.15%). Table 2 shows distribution of blood donors according to rhesus phenotype. Maximum blood donors i.e. 2916 (91.07%) were Rh +ve while only 286 (8.93. %) were Rh–ve. Amongst the ABO blood groups Rh +ve donors ranged from 90.30 to 91.33%. 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.

The studies done in Northern parts of India by authors like Tulika Chandra et al [5] at Lucknow, and by Sidhu et al [6] studies at Punjab, Behra Rajshree et al [7] at Jodhpur showed blood group B was the commonest, followed by O, A and AB. The same incidence was

found in our study i.e. Blood group B was more frequent than O and followed by A and AB blood groups. In Western parts of India like in Eastern Ahmedabad by Wadhwa MK et al [9], Western part of Ahmedabad by Patel, Piyush et al [10] and studies done at Surat by Nidhi et al [11], showed blood group B is the commonest followed by O, A and AB which is same as in our study. Study done at Central India like Indore by Narendra Kumar et al [12] revealed B group to be the most common followed by O, A and AB which is in consonance with present study. Study done in Eastern part of India, Durgapur by Nag I et al [13] showed O group to be the commonest group which is different from our study. In Southern part of India studies done by Periyavan A et al [14] at Bangalore, Das PK Nair et al [15] at Vellore, and at Davanagere by Mallikarjuna S et al [16] and at Shimoga- Malnad study done by Girish et al [17], found that the commonest blood group was O followed by B, A and AB whereas our study showed commonest blood group B followed by O, A & AB. Geographical distribution of Blood Groups in India

shows that in Northern & Western part of India, B is the commonest blood group where as in Eastern Southern and Central part, O is the most frequently occurring blood group. The incidence of Rh +ve blood group in most part of India varies from 91 to 97 % and incidence of Rh –ve varied from 2 to 8%, whereas in our study 91.07% were Rh+ve and 8.93%.were Rh –ve (Table-2) which depicts Rh-ve to be on the higher side in southern haryana as compared to other places in India.

Outside India, in Pakistan, the study was done by Rahman et al [18] the commonest blood group is B which is same as in our study. In Nepal [19] which is connected to western India, as well as, Britain and USA, 'O' and 'A' are the common blood groups that are followed by B and AB. While looking at Rh grouping, 89-95% donors all over the world are detected as Rh+ve except at Britain [20] and U.S.A. [21] 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.

There is known genetic association of specific blood groups to the 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 heartdisease, venous thrombosis and atherosclerosis, while its low in people with blood group 'O' which stated to have protective effect against these diseases [22,23]. 'O' group individuals are known to have a 14 % reduced risk of squamous cell carcinoma and 4 % reduced riskof basal cell carcinoma when compared to non-O group [24]. It is also associated with a reduced risk of pancreatic cancer [25,26]. The 'B' antigen links withincreased risk of ovarian cancer [27]. Gastric cancer has reported to be more common in blood group 'A' and least in group 'O' [28]. Apart from transfusion service, knowledge of the blood group system helps to take preventive measures against these diseases.

Conclusion

It is concluded that the total 3202 blood donors were studied for group wise distribution. We observed that the most common blood group was B (37.82%) followed by O (30.82%), A (22.20%) and AB (9.16%) amongst Rhesus (Rh) 91.07% were Rh+ve and 8.93% Rh-ve. Blood donation by the females was very low and it needs to be increased by improving health status and awareness about blood donation.The present study has a

significant implication regarding the management of blood bank and transfusion services in the area and helps to prepare a database for the blood banks. Simple database of blood groups provides data about the availability of human blood in case of regional calamities, but also suggests the further scope of improvement in blood transfusion services and also useful to health planner while making efforts to face future health challenges in the region.

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