

**FREQUENCY AND DISTRIBUTION OF BLOOD GROUPS IN THE DONORS OF A RURAL HOSPITALS, BARASAT, 24 PARGANAS, WEST BENGAL, INDIA****DR. ASHIS KUMAR SAHA*¹ AND DR. BIBHAS SAHADALAL²**¹Associate Professor (General Medicine) K P C Medical College, Kolkata²Assistant Professor, (Pathology) IPGME & R, Kolkata**ABSTRACT**

Nearly 400 red blood cell antigens have been grouped into 30 major blood groups, of which, ABO and Rhesus blood group systems are most important for prevention of serious life threatening transfusion reaction, parental testing, legal medicine and extensive population based genetic studies. Our aim of this study was to determine as well as comparing the frequency of ABO and Rhesus blood group systems in the blood donors of Cancer Hospital, Barasat, West Bengal. A retrospective study was conducted in a blood bank of this cancer hospital over a period of three years. The blood was tested and grouped by test tube agglutination technique by commercially available standard monoclonal antisera. Out of total 5128 blood donors, male and females were 4227 (82.42%) and 901 (17.57%) respectively. Regarding ABO blood group systems, B was found to be the commonest (1873, 36.52%), followed by O (1604, 31.27%), A (1130, 22.03%) and AB (521, 10.15%). Regarding Rhesus blood grouping systems, 4987 (97.25%) was Rh positive and 141 (2.74%) Rh negative. This study may be a corner-stone of Improvement of the blood bank data base system as well as blood transfusion services required in case of emergencies. It can prevent mismatched severe life threatening blood transfusion reaction. It can be future predictor of several morbid and mortal diseases.

KEY WORDS: ABO blood group, Rhesus blood group, Barasat Cancer hospital, comparison with other study**DR. ASHIS KUMAR SAHA**

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INTRODUCTION

Blood groups are genetically determined. International Society of Blood Transfusion in 2012 recognized 30 major blood groups including ABO and Rhesus blood group systems.¹ In 1900, Austrian scientist Karl Landsteiner discovered first A, B, and O blood group and he subsequently was awarded Noble prize in 1930.² In 1902, Alfred Von Decastello and Adriano Studi discovered AB group, the fourth one.³ Subsequently in 1940, Land Steiner along with Alex Wiener, Philip Levine discovered Rhesus blood group systems.⁴ These groups are responsible for severe mismatched blood transfusion reaction in human being. Because blood group antigens having different biochemical compositions are the integrated part of red blood cell membrane.⁵ These are responsible for several essential functions in human body, like, membrane transporters and protein canals, ligand receptors, adhesion molecules, enzymes as well as different structural proteins. There are 400 different antigens in 33 blood group systems and in collections according to the International Society of Blood Transfusion.⁶ These blood group are usually inherited in Mendelian fashion and usually stable which is very useful for paternity testing.⁷ They are also responsible for many morbid and mortal diseases as well as ABO incompatibility in newborn.⁸ So perfect and complete

knowledge in red blood cell antigen phenotypes in any population is absolutely necessary so that proper donor data base may be prepared for preparation of indigenous cell panels. It also provides antigen negative compatible blood to patients having multiple alloantibodies.⁹ Our main aim of this study was to determine the ABO and Rhesus blood systems in donors of Cancer Hospital in Barasat, 24 parganas, West Bengal.

MATERIALS AND METHODS

This retrospective study was performed after getting permission from our local Ethical Committee. Total 5128 number of medically fit persons of rural areas of 24 parganas, Nadia and Hooghly districts donated their blood in this rural hospital. ABO and Rhesus blood grouping were tested in t5he donated blood. Age ranges of the donor are between 15 to 60 years. Agglutination tests were performed using antisera A, B and D to detect blood group. Then A, B and O cells reverse blood grouping were done by the test tube agglutination method. When both forward and reverse blood grouping were identical, then the blood groups were confirmed. Rh blood grouping system was also confirmed by antiglobulin technique. Then the data of blood grouping were recorded in a tabulated form and analysis of the data was performed.

RESULTS

Table 1
Age and sex distribution in blood donors in rural areas

Serial number	Age(years)	Total patients (%)	Males (percentage)	Females (percentage)
1	11-20	664	594 (89.45%)	70 (10.54%)
2	21-30	2303	1942 (84.32%)	361 (15.67%)
3	31-40	1434	1102 (76.84%)	332 (23.15%)
4	41-50	600	478 (79.66%)	122 (20.33%)
5	51-60	127	111 (87.40%)	16 (12.59%)
	Total	5128	4227	901

Table 2
Age and sex wise distribution of blood donors

Blood Group	Total patients %	Total Rh+ %	Total Rh- %	Males			Females		
				Rh+	Rh-	Total	Rh+	Rh-	Total
A	1130 (22.03%)	1091 (21.27%)	39 (0.76%)	901 (17.57%)	34 (0.66%)	935 (18.23%)	190 (3.70%)	5 (0.09%)	195 3.80%
AB	521 (10.15%)	514 (10.02%)	7 (0.13%)	427 (83.26%)	7 (0.13%)	434 (8.46%)	87 (16.96%)	0(0%)	87 1.69%
B	1873 (36.52%)	1812 (35.33%)	61 (1.18%)	1503 (29.30%)	57 (1.11%)	1560 (30.42%)	309 (60.25%)	4 (0.07%)	313 6.10%
O	1604 (31.27%)	1570 (30.61%)	34 (0.66%)	1266 (24.68%)	32 (0.62%)	1298 (25.31%)	304 (59.28%)	2 (0.009%)	306 5.96%
Total	5128	4987 (97.25%)	141 (2.74%)	4097	130	4227	890 17.35%	11 0.21%	901 17.57%

Among 5128 patients, number of males and females were 4227 (82.42%) and 901 (17.57%) respectively. Highest number of donor were in the age group of 21 to 30 years (2303, 44.91%) followed by 31 to 40 years (1434, 21.96%). In all age group number of males was significantly higher than female donors ($p < 0.001$). [Table

1]. Rh positive blood donors were higher than Rh negative donors (97.25% vs. 2.74%). Number of group B donors were maximum (1873 of total 5128, 36.52%) followed by group O (1604, 31.27%), group A (1130, 22.03%). Minimum number of donors were of AB group (521, 10.15%). In case of female donors, maximum

number were from B group (313, 6.10%) followed by O group (306, 5.96%) and minimum number were from AB group (87, 1.69%). Male blood donors behaved in similar fashion in this study, i.e. group B was maximum (1560, 30.42%) followed by group O (1298, 25.91%). [Table2].

DISCUSSION

Our present study showed the preponderance of male over female (82.42% vs. 17.57%) which was similar to the study done by Sanagapati PF et al and Choudhury et al.^{10, 11} There are several reasons for which number of female donors were small as compared to males, like, firstly, Social taboo for which the females specially of rural areas are usually not interested and not allowed to give blood in front of large gathering. Secondly, Cultural

habit of Hindus and Muslim community prevents the female to give blood in blood donation camp. Thirdly, Female person in any community usually not motivated to give blood rather than advised not to give blood as because it may deteriorate the health as well as produce anemia. Fourthly, Most patients in the fear of inviting infection which may endanger the life and hamper the reproductive life are not interested to give blood. Again, many females are declared unfit for blood donation because either they present with anemia or low body weight. Large number of female donors in our country are in the menstrual age group. Again, many aged persons have been suffering from morbid disease, like, diabetes, hypertension, ischemic heart disease, so they are also considered as unfit donors.¹²

Table 3
Comparison of frequency of ABO and Rh phenotypes in different regions in the World

Areas of study	Group A	Group B	Group AB	Group O	Rh+	Rh-
Within India						
Shimoga-Malnad ¹³	24.27	29.43	7.13	39.17	94.93	5.07
Davanagere ¹⁴	26.15	29.85	7.24	36.76	94.8	5.52
Eastern Ahmadabad ¹⁵	23.3	35.5	8.8	32.85	94.2	5.8
Punjab ¹⁶	21.9	37.6	9.3	9.3	97.3	2.7
Bangalore ¹⁷	23.85	29.95	6.37	39.82	94.2	5.79
Chittoor ¹⁸	18.95	25.79	7.89	47.37	90.6	8.42
Vellore ¹⁹	18.85	32.69	5.27	38.75	94.5	5.47
Hyderabad ¹⁰	29.71	28.33	9.08	32.81	97.01	2.99
Western Ahmadabad ¹²	21.94	39.40	7.86	30.79	95.05	4.95
Tripura ¹¹	23.77	32.8	9.64	32.95	97.06	2.94
Present study	22.03	36.52	10.15	31.27	97.25	2.74
Outside India						
Pakistan ²⁰	23.8	38	10	10	89.1	10.9
Nepal ²¹	34	29	4	33	96.7	3.33
Australia ²²	38	10	3	49	NA	NA
Britain ²³	41.7	8.6	3	46.7	83	17
USA ²⁴	41	9	4	46	85	15
Niger-Delta ²⁵	23.8	20.7	2.8	52.7	93.9	6.12

Ethnic and regional distributions of ABO and Rhesus blood grouping system with in India and Outside India along with our study are tabulated in table 3. It was shown that studies from Eastern Ahmadabad¹⁵, Punjab¹⁶ and Pakistan²⁰ demoed the preponderance of blood group B over other blood groups and the least common was AB group. This was also demonstrated in our present study. In our present study, "O" group second most common group which is similar to the study carried out in Eastern Ahmadabad¹⁵. But in Punjab¹⁶ and Pakistan²⁰ second one was A group. On the contrary, a South Indian study carried out in Davanagere¹⁴, Bangalore¹⁷, Chittoor¹⁸ and Vellore¹⁹ demoed O group as most common blood group followed by B,A and AB groups. Again, study carried out in Nepal²¹, Australia²², Britain²³ and USA²⁴ demonstrated O and A as most common blood groups followed by B and AB group. In all the studies in India (including our study) and outside India showed AB as least common blood group in human being. Study in Tripura demoed incidence of O and B groups were almost equal. Studies all over the world except Britain²³ and USA²⁴ demoed evidence of Rh positivity as 89% to 95%. In our study, 97.25% donors

were Rh positive. On the contrary, in Britain²³ and USA²⁴ evidence of Rh positive donors were 83% to 85%. But it should be remembered that many people from Britain migrated to USA for either study or service. Knowledge about the blood groups helps the doctors to prevent the blood group related diseases and to prevent the dreaded complications of mismatched transfusion. There are common genetic association between blood groups and human diseases in certain populations. There is a common association between cardiovascular diseases and ABO blood groups. Persons having blood group A may suffer from ischemic heart disease, venous thrombosis, and atherosclerosis. On the contrary, people with blood group O have some protection against the above diseases.^{26, 27, 28} Again people with blood group O have about 14% and 4% increased risk of squamous cell carcinoma and basal cell carcinoma respectively as compared with other blood group.²⁹ Incidence of pancreatic cancer is reduced in patients with blood group O.^{30, 31} Again, incidence of ovarian cancer and gastric cancer are increased in patients with blood group B and A respectively.^{32, 33, 34}

CONCLUSION

In our study commonest blood group is B followed by O, A and AB respectively in respect of percentage of incidence. In our study, regarding Rhesus blood grouping systems 97.25% were Rh positive. Female donors are significantly low. So motivation of the female is absolutely necessary in this regards. At the same time periodic health check up of females of reproductive age group is absolutely necessary to maintain good health. Every individual requires detection of blood group at the time of birth or in infancy. At the same time blood group status should be written in all the commonly used cards, like, identity cards, driving license card. Because it may be required in case of life threatening accidents requiring urgent blood transfusion, when there will be no time to

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send the blood for cross-matching. It is advised to perform blood grouping studies worldwide. At the same time, these should be National policies for supplying blood to the needy patients requiring urgent transfusion, because one bottle may save the life of that patient. One proper data base of blood group should be maintained in each blood bank, so that it will be easily available in case of natural calamities in different regions of the World. This knowledge of blood grouping may predict the future possibility of the disease.

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