

**Distribution of Blood Groups in Donors and Functioning Pattern of a New Semiurban Blood Bank**

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**Original Research Article**

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**Abstract:** Blood transfusion system is a basic necessity of health care delivery system. As off now more than 700 antigens and about 30 blood group systems have been identified. ABO and Rhesus (Rh) blood group systems are most important tool for blood transfusion, parental testing, legal medicine and in population genetic study. It is immensely important to identify the working pattern of a blood bank of rural West Bengal as it will facilitate to generate appropriate policies for better service. The main objective of the study is to determine age and sex wise frequency and distribution of ABO and Rh blood group pattern among blood donors and working pattern of newly developed blood bank and compare with other data from similar studies. Retrospective study was conducted at Blood bank of Khatra Sub-divisional Hospital, West Bengal over a period of one year. Blood group of the donors was determined by standard monoclonal antisera test by tube agglutination technique. Out of 1802 blood donors, 88.62% were male and 11.38% were female. 63 donors were deferred due to hypertension and diabetes. The commonest blood group observed was O+Ve followed by B+Ve and the rare one was AB-Ve. The study had a significant implication regarding the inventory management of blood bank and transfusion services for the patient admitted in the sub-divisional hospital of rural West Bengal and also necessary for the health planners while making efforts to face the future health challenges in this region.

**Keywords:** Blood groups, ABO, Rhesus (Rh).

**INTRODUCTION**

Blood transfusion system is a basic necessity of health care delivery system. Access to safe blood and blood products and their judicious use remains a big challenge despite the current advances in technology in health-care delivery system.

There is a significant difference between the developed and developing nations as less than half of hospitals in developing nation provide blood transfusion service [1].

According to World Health Organization only 41% of hospitals in developing countries provide blood transfusion service [2].

Blood in different individuals differ immunologically according to the antigens presents in their RBCs. Blood group antigens are hereditary determined and plays an important role in transfusion safety, genetics, inheritance pattern, and susceptibility to disease. The International Society of Blood Transfusion described nearly 700 erythrocyte antigens and about 30 blood group systems, of which ABO and Rh are most important [3].

The ABO blood group system has been discovered by the Austrian scientist Karl Landsteiner in 1900 [4]. He got Nobel prize in 1930 for describing A,

B, and O Blood groups. Alfred Von Decastello and Adriano Sturli discovered the fourth type AB, in 1902 [5]. In the year 1937 Rh(D) grouping was discovered by Karl Landsteiner after the discovery of ABO blood groups which was an important achievement in the history of blood transfusion [6].

Karl's discovery was followed by a wide spectrum of discoveries in the field of immune hematology, blood transfusion among humans irrespective of their natives, unmatched pregnancy, legal medicine, paternity testing, anthropology and the discovery of other blood group systems [7].

Modern health care delivery system requires a competent blood bank facility to manage critical conditions and medical as well as surgical emergencies like road traffic accident, post partum haemorrhage, and chronic anemia due to carcinoma, thalassemia etc. 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 even in 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. It can be said that assessment of the functional capacities and limitations of blood bank which is catering the rural people is necessary to develop strategies to overcome the deficiencies [8].

For effective management of blood banks inventory knowledge of the distribution of ABO and Rh blood groups is essential. Knowledge of reliable geographical information of blood group distribution is also necessary for clinical studies and it will help in reducing the maternal mortality rate, as access to safe and sufficient supply of blood will help significantly in reducing the preventable deaths [9].

Apart from their importance in blood transfusion practice, the ABO and Rh blood groups are useful in population genetic studies as well as resolving certain medico legal issues, particularly of disputed paternity cases and researching population migration patterns. Some diseases like duodenal ulcer, diabetes mellitus, urinary tract infection, and Rh incompatibility and ABO incompatibility of newborn have known association with blood groups. In modern medicine besides their importance in evolution, their relation to disease and environment is being increasingly important [10].

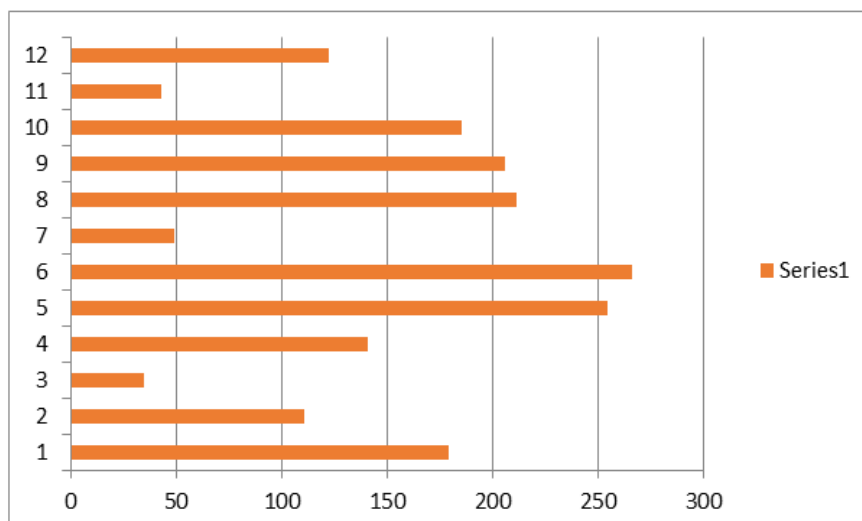
**MATERIALS AND METHODS**

The study was carried out at Khatra Sub-division Hospital, Bankura, West Bengal for one year from 1<sup>st</sup> January 2017 to 31<sup>st</sup> December 2017. This study was designed to collect the data retrospectively from the hospital records of donors. The blood collected from the

voluntary donors at outdoor blood donation camp. Total 1802 donors were examined medically fit and accepted for blood donation during the study period and 63 were deferred as they were detected clinically unfit mainly due to hypertension and Diabetes. All the donors were between 18 to 60 years of age. 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 anti-globulin technique. The donor blood group data were recorded, tabulated, analyzed and compared with the similar studies in India.

**RESULTS**

Out of 1802 blood donors, majority 1597 (88.62%) were male and 205 (11.38%) were female. New donors were 31.19% and rest were repeat donors. Most of donors were from age groups of 21 to 40 yrs. This finding was consistent with the other studies. 49% of donors were between 18 to 29 years 35.68% between 30 to 41years, 13.05% between 42 to 53years and 1.94% were >53years of age (Table-1). The month wise distribution of all blood donors from January to December 2017 shown in Figure-1. Amongst total 1802 donors most of the donors i.e. 678 were with blood group O+Ve (37.62%) followed by B+Ve(32.02%), A+Ve (22.26%) and AB+Ve (7.66%), B-Ve(0.99%), O-Ve(0.89%), A-Ve (0.39%), AB-Ve (0.17%) (Table-2 and Figure-2).



**Fig-1: Monthly Distribution of Blood Donors**

\*Y Axis: 1-12 (January to December)

X Axis: Blood Donors

**Table-1: Distribution of donors according to Age and Month**

Months	18-29yrs	30-41yrs	42-53yrs	>53Yrs
January	90	65	22	2
February	42	39	23	7
March	11	14	7	3
April	81	38	19	3
May	112	89	47	6
June	133	102	28	3
July	17	28	8	0
August	140	51	19	1
September	94	86	25	1
October	87	78	16	4
November	14	15	12	2
December	62	38	19	3
Total	883	643	245	35
Percentage	49	35.68	13.60	1.94

Table-2: Distribution of blood donor according to ABO Blood Group

Blood Group	Donor	Percentage
A+Ve	365	22.26
B+Ve	577	32.02
AB+Ve	138	7.66
O+Ve	678	37.62
A-Ve	7	0.39
B-Ve	18	0.99
AB-Ve	3	0.17
O-Ve	16	0.89
Total	1802	100

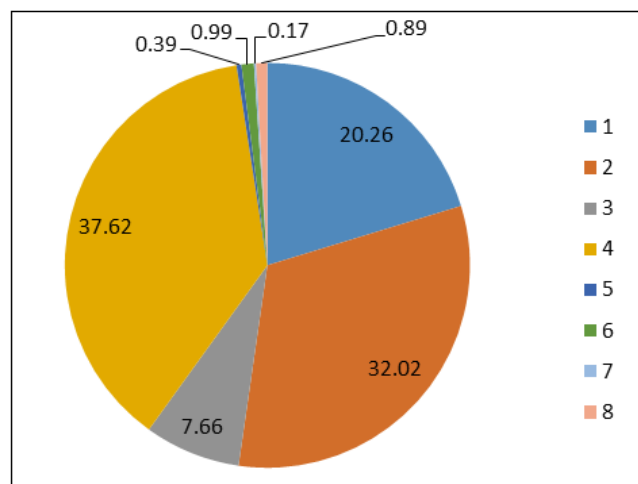


Fig-2: Distribution of different Blood Groups

\*22.26 A+Ve, 32.02 B+Ve, 7.66 AB+Ve, 37.62 O+Ve, 0.39 A-Ve, 0.99 B-Ve, 0.17AB-Ve, 0.89 O -Ve

**DISCUSSION**

The study was conducted in a Government set-up located in the underdeveloped area of a state of India. This blood bank was functional for last 3 years and serving the underprivileged population of this area to some extent. It can be assumed that before establishment of this blood bank to avail blood transfusion related service people had to travel a significant distance. Though this blood bank is functional more effort should be given for it's

upgradation to serve a larger section of people. The study finding also emphasizes the necessity of its upgradation.

Indian studies have shown that majority blood donors belong from male category. This study is also depicting similar finding 88.62% were male and 11.32% were female. This difference in gender related to blood donors is due to lack of social motivation, education, poverty in female population [11].

The results of distribution of ABO & Rh grouping is comparable to studies done at Southern India [12, 13]. All these studies had described 'O+Ve' as the most frequent and 'AB-Ve' as the least common blood groups. The second most common blood group was 'B+Ve' in present study. "O +Ve" was the second most common in a study carried out at Ahmedabad [14]. Studies at nearby areas of Punjab had shown "B+ve" most common and 'A+Ve' being the second most common blood group [15].

There is known genetic association of blood groups to certain diseases of specific population. It has been found that the persons of group A are more affected with heart disease and atherosclerosis while people of blood group O has some amount of protection against these diseases. O blood group is also least commonly affected by squamous cell carcinoma and gastric carcinoma, where as people of blood group A have a tendency towards gastric carcinoma. Blood grouping to be done in regional basis for preparing proper national policy for transfusion related issues [14].

Results of this study showed that 6 cases of Hepatitis B, 4 Hepatitis C and 2 cases of HIV seropositive had been detected. It signifies that proper screening is important even in small scale of blood collection to prevent infections related to blood transfusion.

Effective management of blood bank requires a balance between demand and supply. For the country like India with huge population the transfusion medicine department must be strengthen and voluntary blood donation programme should be given highest priority. Safety precautions and quality control should be strictly followed according to NACO guidelines [1].

New donors were 31.19% and rest were repeat donors. Most of donors were from age groups of 21 to 40 yrs. This finding was consistent with the other studies. 49% of donors were between 18 to 29 years 35.68% between 30 to 41years, 13.05% between 42 to 53years and 1.94% were >53years of age.

Reports from the study shows that the number of blood donors is significantly less in the month of July, October and November. The reason of poor response in blood collection may be harvesting of crops in the month of July that is rainy season of this region and October is predominantly the festive season for local Hindu community.

## CONCLUSION

The present study concludes that 'O+Ve' blood group is the commonest blood group amongst the blood donors in this study of blood banks in Khatra Sub-division Hospital. This is followed by 'B+Ve',

'A+Ve' and 'AB+Ve' blood group respectively. Regarding Rhesus blood group system, Rh positive donors were 97.56% and Rh negative were 2.44%. Blood donation by the females was very low and it needs to be increased by improving health status and awareness about blood donation.

Blood groups of individual mentioned on national identity cards, driving licenses and school/office identity cards will be of great importance in case of acute hemorrhage or anaemia when urgent blood transfusion of yet to be cross matched blood is required.

It is necessary to conduct similar well designed studies in other states of India as well as in other rural area of West Bengal in order to determine the blood group frequencies in them. The information, education and communication system must be strengthened and mass media campaign should be done to eradicate the fear and misconceptions about blood donation in common population. National hemovigilance program for continuous data collection and analysis of transfusion related adverse effect should also be done in every licensed blood bank for maintaining highest quality service. The data generated in the present study and several other studies of different geographical region of India will be helpful for the health planners while making efforts to face the future health challenges in this region.

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