

## Distribution Of Blood Groups In Blood Donors In The Blood Bank, Jhalawar Hospital & Medical College Society, Jhalawar, Rajasthan

Dr. Manish Kumar,<sup>1</sup> Dr. Sumit Prakash Rathore<sup>2</sup>

<sup>1</sup>M.D. Pathology Assistant Professor, Jhalawar Medical College, Jhalawar

<sup>2</sup>M.D. Pathology Associate Professor, Jhalawar Medical College, Jhalawar

Corresponding Author: Dr. Sumit Prakash Rathore

**Abstract:** *Aims and Objectives:* The incidence of ABO and rhesus (Rh) groups varies markedly in different races, ethnic groups, and socioeconomic groups in different parts 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. Hence this study was conducted to determine the Distribution of ABO and Rhesus (Rh) blood groups in blood donors in Blood Bank, Jhalawar hospital & Medical College Society, Jhalawar.

*Materials and Methods:* The present retrospective study was carried out at Blood Bank, Jhalawar hospital & Medical College Society, Jhalawar, Rajasthan, India, during the 1 year period from 1 January 2017 to 31 December 2017. 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. Totally donors were considered medically fit and accepted for blood donation during the study period. The frequency of ABO and Rh blood groups were reported in simple percentages.

**Results:** Out of the total 16495 donors, most of the donors, i.e., 6591 (39.957%) were with blood Group B followed by O (35.628%), A (15.465%), and AB (8.80%). Out of the 16495 blood donors, Maximum blood donors, i.e., 15039 (91.17%) were Rh positive while only 1456 (8.826%) were Rh negative. There was a higher rate of male blood donation (92.37%) than females (7.62%).

**Conclusion:** The present study concludes that most common blood group is 'B' and least common is AB amongst the blood donors in the Blood Bank, Jhalawar hospital & Medical College Society, Jhalawar.

**Keywords:** ABO, Blood Donors, Blood Groups, Rhesus (Rh), Blood Bank

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### I. Introduction

Blood group antigens are hereditary determined and play a vital role in transfusion safety, understanding population genetic studies, researching population migration patterns, inheritance pattern, medicolegal issues, disputed paternity cases, and disease susceptibility. In humans, 33 blood group systems with 298 antigens have been identified. Additional antigens have been identified but have not been assigned to established systems. [1]

The Landsteiner's discovery opened the door to the birth of a wide spectrum of discoveries in the field of immunohematology, 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 applications or as a result of Karl's discovery. [2,3]

The discovery of the ABO blood groups by Karl Landsteiner was an important achievement in the history of blood transfusion for which he received the Noble Prize that was followed by his and Wiener discovery of Rh (D) antigen. [4,5] Alfred Von Decastello and Adriano Sturli discovered the fourth type AB, in 1902. [3] Blood groups are known to have some association with diseases such as duodenal ulcer, diabetes mellitus, urinary tract infection, Rh incompatibility, and ABO incompatibility of newborn. The knowledge of the distribution of ABO and Rh blood groups at local and regional levels are imperative in the effective management of Blood Banks and safe blood transfusion services.

This study will document a blood group database and creates awareness as to which blood groups should be stored and given importance.

### II. Material And Methods

The present retrospective study was carried out at Blood Bank, Jhalawar hospital & Medical College Society, Jhalawar, Rajasthan during the 1 year period from 1 January 2017 to 31 December 2017 after Ethical clearance obtained by institute. The blood collections were taken from the voluntary donors at outdoor blood

donationcamp and inhouse Blood Bank as well as from replacementdonors at Blood Bank. Totally 16495 donors were consideredmedically fit according to blood donor selection criteria. Individuals with good health, mentally alert, physically fit were selected for blood donation . All were of age between 18 and 65 years.The blood were then obtained by standard procedures of venepuncture.

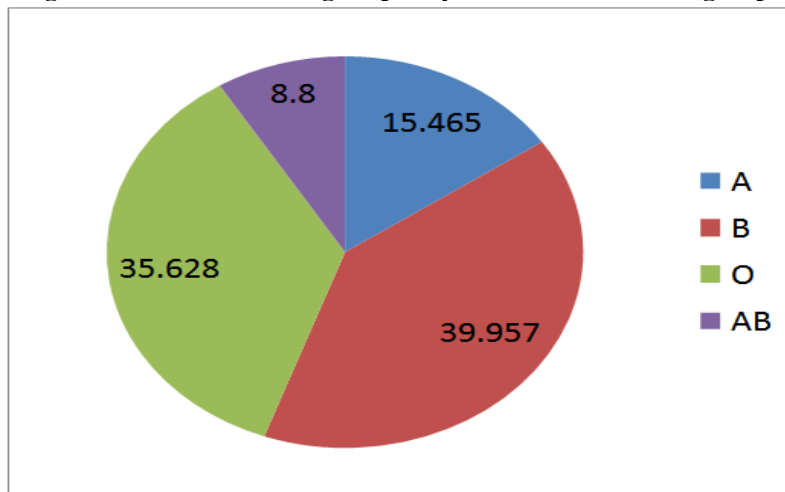
After blood donation, blood group was determined by forward and reverse grouping by conventional method from the samples of the donors following standard operative procedures of the Blood Bank. The forward grouping was performed using mono clonal anti A, anti B, anti AB antisera and reverse grouping performed using in house prepared A, B, O pooled cells. For Rh typing anti-D antisera was used.

The donor blood group data were recordedand tabulated, analyzed, andcompared with the similar studies by other authors.

### III. Results

Out of the total 16495 donors, most of the donors,i.e., 6591 (39.957%) were with blood Group B followed by O (35.628%), A (15.465%), and AB (8.80%)(*Figure 1*). Outof the 16495 blood donors, majority, i.e., 15238(92.37%)were male and 1257(7.62%) were female(*Figure 2*). Most of thedonors were from age groups of 20–40 years.

**Figure 1: Pie chart showing frequency distribution of blood groups.**



**Figure 2: Gender distribution**

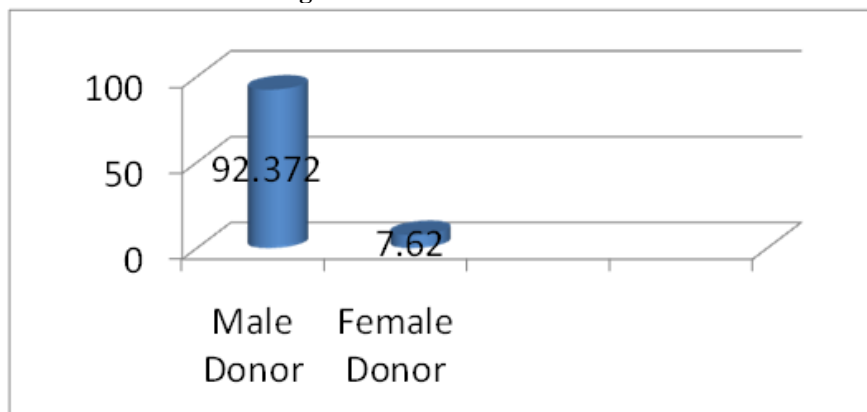


Table 1 showsdistribution of blood donors according to ABO and Rh phenotype.Maximum blood donors, i.e., 15039(91.17%) were Rhpositive while only 1456(8.826%) were Rh negative. AmongRhpositive donors, B blood group was common with 6238 (41.478%) donors,while in Rhnegative donors, blood groups Bwith 353 (24.24%)donors and Owith369 (25.34%) donors.

Blood groups	Number of donors according to rhesus phenotypes		Total (%)
	Rhesus positive	Rhesus negative	
A	2198	353	2551(15.465%)
B	6238	353	6591(39.957%)
AB	1095	358	1453(8.80%)
O	5508	369	5877(35.628%)
TOTAL	15039(91.17%)	1456(8.826%)	16495

**Figure 3: Distribution of blood donors based on Rh factor.**

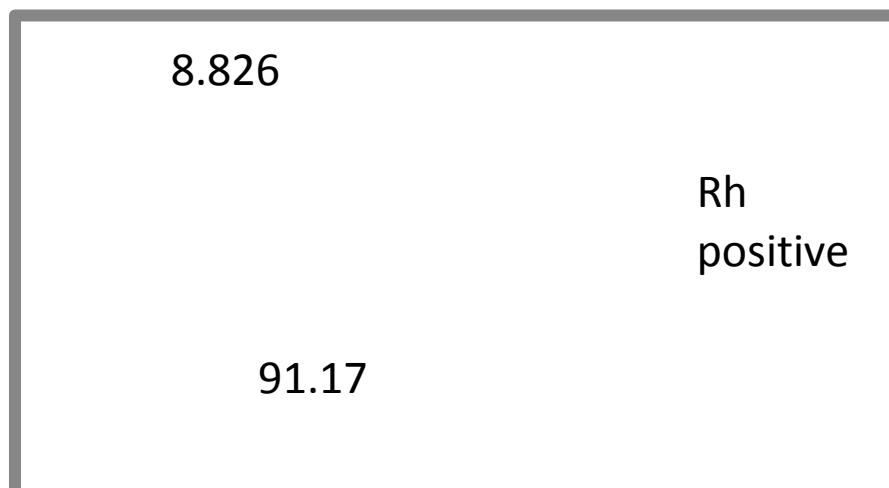


Table 2 shows comparison of various studies of blood group conducted in other parts of India where most of the studies are similar with the present study.

Place of study	Author	ABO system				Rhesus phenotypes	
		A	B	AB	O	Rhesus positive	Rhesus negative
Rajasthan	Behra R et al(12)	22.2	36.4	9.4	31.7	91.75	8.25
North zone	Agrawal A et al(13)	24.54	34.47	11.55	29.43	94.8	5.19
Lucknow	Chandra T et al (14)	21.38	39.92	9.43	29.27	95.71	4.29
Punjab	Sindhu S et al (15)	21.91	37.57	9.3	31.22	97.3	2.7
Karnataka	Periyavan S et al(16)	23.85	29.95	6.37	39.81	94.21	5.79
Present study	Manish kumar,sumit rathore	15.46	39.9577	8.80	35.68	91.17	8.826

#### IV. Discussion

Knowledge of the distribution of ABO and Rh bloodgroups is essential for effective management of BloodBanks. Therefore, imperative to have information on the distribution of these blood groups in any population. [6] 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 medicolegal issues, particularly of disputed paternity cases. In modern medicine, besides their importance in evolution, their relation to disease and environment is being increasingly important. [7] It is, therefore, imperative to have information on the distribution of these blood groups in any population group.

The ABO and Rh antigens are recognized as the major clinically significant blood group antigens. Blood group is based on the presence or absence of inherited antigenic substance on the surface of red

blood cells that can be determined by specific antibodies.[8] The importance of blood group discovery lies in the transfusion of blood among different populations irrespective of their ethnic origin, in organ transplantation and in the development of legal medicine, genetic research, and anthropology.[9] The major ABO blood group system is divided into four blood types on the basis of the presence or absence of A and B surface antigens. The blood groups are A, B, O, and AB. The frequency of four main ABO blood groups varies in the population throughout the world. ABO blood group system derives its importance from the fact that A and B are strongly antigenic and antiA and antiB naturally occurring antibodies present in the serum of persons lacking the corresponding antigen and these antibodies are capable of producing intravascular hemolysis in case of incompatible transfusion.[10] Rh antigens are highly immunogenic and till now, 49 Rh antigens are identified. D antigen is most significant and Dnegative individuals produce antiD antibodies if they encounter the D antigen through transfusion or pregnancy and causes hemolytic transfusion reaction or hemolytic disease of fetus and newborn. For this reason, the Rh status is routinely determined in blood donors, transfusion recipients, and in pregnancy.[11] There is known genetic association of specific blood groups to certain diseases in certain population. Studies concerned about a 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. Gastric cancer has reported to be more common in blood Group "A" and least in Group "O." Hence, 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. Majority of the studies within India have described a large number of male donors compared to female donors similar to our study. 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 are very less. In addition, a large number of females from the menstruating age groups are usually anemic with low weight, so they were 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. Age group of 21–40 years 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. Knowledge of frequency of ABO blood group 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, and from population to another.

The comparison of frequency and distribution of ABO and Rh group in the blood donors in the present study with the similar studies carried out within India is described in **Table 2**. While looking at Table 2, we observed that All these studies had described "B" as the most frequent and "AB" as the least common blood groups similar to our study except Periyavan S, Sangeetha S study (16) study where "O" is most frequent group. The second most common blood group was "O" in the present study similar to the abovementioned studies except Periyavan S, Sangeetha S study(16) where "B" is second most common group. While looking at Rh grouping, 90%–97% donors of most of the studies in India were detected as Rh positive. In our study also, Rhpositive donors were 91.17%.

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 for the efficient management of blood bank and transfusion services to the needy patients.

## V. Conclusion

The present study concludes that "B" blood group is the most common blood group among the blood donors in this study of Blood Bank, Jhalawar hospital & Medical College Society, Jhalawar. This is followed by "O," "A," and "AB" blood groups( **Figure 1**). Regarding Rh blood group system, Rhpositive donors were 91.17% and Rhnegative were 8.826%( **Figure 3**). Blood donation by females was only 7.62%(**Figure 2**)and it needs to be increased by improving health status and awareness in them about blood donation. The study helps to prepare a database for the Blood Banks and creates awareness as to which blood groups should be stored and given importance. So, it is advisable to do blood grouping studies in each region for drafting proper national transfusion policies and for supplying blood to the needy patients during emergency.

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