

## Distribution of ABO and Rh Blood Groups among Blood Donors in HSK Blood Bank, Bagalkot.

Shilpa Biradar<sup>1</sup>, Jayashree Pawale<sup>2</sup>, Somashekhar P Biradar<sup>3</sup>, Vijay D Dumble<sup>4</sup>, Keshav Kulkarni<sup>5</sup>

<sup>1</sup>Asst. Professor, <sup>2</sup>Associate Professor, <sup>3</sup>Associate Professor (Ophthalmology), <sup>4</sup>Professor and Head, <sup>5</sup>Blood Bank Officer

<sup>1,2,4,5</sup>Department of Pathology, <sup>3</sup>Dept. of Ophthalmology, S. N. Medical College, Bagalkot-587102. Karnataka, India

### Abstract

**Introduction:** The knowledge of the distribution of ABO and Rh blood groups is essential for effective management of blood banks inventory, be it a facility of a smaller local transfusion service or a regional or national transfusion service. The ABO blood group system was first to be identified and Rh blood group system was the 4th one, both are most important for blood transfusion purposes. This study is conducted to determine the frequency of ABO and Rhesus (Rh) blood groups in Hangal Shri Kumarashwar (HSK) Blood Bank attached to S.N. Medical College and H.S.K. Hospital, Bagalkot (Karnataka) in Southern India

**Objectives:** To study the frequency distribution of ABO and Rh blood groups among blood donors in HSK Blood Bank Bagalkot.

**Materials and methods:** The distribution of ABO and Rh blood groups was studied among 45,534 blood donors screened at HSK Blood Bank, Bagalkot, over a period of 10 years (April 2002 to March 2012). Records of blood groupings of blood donors, were examined, and care was exercised to eliminate any repeat entry. All entries were double-checked by each author. Data on the frequency of ABO and Rh blood groups were reported in simple percentages.

**Results:** The blood group phenotype O predominates in distribution with the highest frequency (34.3%) followed by B (29%) and A (26.7%). The least common blood group was AB group (10%). The prevalence of Rh negative group was found in 1730(3.8%) donors.

**Conclusion:** It is concluded from this study that frequency of blood group O Rhesus Positive is highest followed by B and A.

The least common blood group was AB.

**Key words:** blood group, donors, transfusion

### Introduction

The discovery of the ABO blood groups by Karl Landsteiner was an important achievement in the history of blood transfusion followed by discovery of Rh D antigen [1]. The development of the Coombs test in 1945, advent of transfusion medicine and the understanding of haemolytic disease of the newborn led to the discovery of more blood groups and in total today there are 29 human blood groups systems (including the ABO and Rhesus system) as recognised by the International Society of Blood Transfusion (ISBT). Thus, in addition to the ABO antigens and Rhesus antigens, across the 29 blood groups, over 600 different blood group antigens have been found

depending on the RBC surface membrane, but many of these are very rare or are mainly found in certain ethnic groups [2]. The ABO blood group system is the most clinically important blood group system because antibodies against A or B or both antigens are naturally present in the serum of persons whose red cells express blood group B, A, or O. The ABO incompatible transfusions are potentially fatal. It follows that universal blood typing with DNA-based methods alone cannot be considered in the absence of a totally robust method for predicting ABO phenotype. The molecular basis of the ABO blood group system was elucidated in 1900 [3]. Blood classification into groups is based on the presence or

---

#### Address for correspondence

Dr. Shilpa S. Biradar. Asst. Professor, Dept. of Pathology  
S. N. Medical College, Bagalkot-587102, Karnataka India  
E- mail: shilpa.biradar@yahoo.co.in

absence of inherited antigenic substances on the surface of red blood cells (RBCs). Some of these antigens are also present on the surface of other types of cells and body secretions like saliva, sweat, semen, serum, tears, urine etc, which are used in forensic investigations [4].

The ABO blood types are controlled by a single gene located on the long arm of the ninth chromosome. With 3 alleles: i, IA, and IB. IA and IB alleles are dominant over i, expressing a special dominance relationship (co-dominance), which means that type A and type B parents can have an AB-type child and O-type child if they are both heterozygous (IBi, Iai) [5] Moreover, the Rhesus system is the second most significant blood group system in human blood transfusion; the most significant Rhesus antigen is the Rhesus D antigen because it is the most immunogenic of the five main Rhesus antigens [2]. The blood group antigens are of clinical importance in blood transfusion, organ transplantation, autoimmune haemolytic anemia and feto-maternal blood group incompatibility [6].

Studies of blood group antigens can be used to characterise populations which is one aspect of their use as genetic markers. Among the different blood group systems, the ABO system is the most widely studied for obvious reasons. An approximate estimate of ABO gene frequencies resulting from a compilation of various studies world-wide, is 0.63 for group O, 0.215 for A and 0.162 for B [1]. Geographic differences between frequencies of different blood groups may be striking. Gene frequency for group O may be higher than 0.9 (ie. 90%) among Central and South American Indians. On the other hand the B gene which is almost totally absent in these populations and in Australian aborigines with similarly very low frequencies in Egypt and West Africa, has a relatively high frequency in Central Asia and North India [7].

**Materials and methods**

The distribution of ABO and Rh blood groups was studied among 45,534 blood donors screened at HSK Blood Bank, Bagalkot, over a period of 10 years (April 2002 to March 2012). Records of blood groupings of blood donors, were examined, and care was exercised to eliminate any repeat entry. All entries were double-checked by each

author. Blood group of all donors were identified by forward grouping and reverse grouping using tube technique and gel cards. The presence of Bombay blood group was identified during the above said procedure and the donors with Bombay blood group were entered in separate register and were excluded from the study. Data on the frequency of ABO and Rh blood groups were reported in simple percentages.

**Table 1. Distribution of ABO blood groups among blood donors**

| Blood group | n     | Percentage |
|-------------|-------|------------|
| A           | 3205  | 26.7       |
| B           | 12158 | 29         |
| AB          | 4553  | 10         |
| O           | 15618 | 34.3       |
| Total       | 45534 | 100        |

**Table 2. Distribution of Rh blood group among blood donors.**

| Blood group | n     | Percentage |
|-------------|-------|------------|
| Rh positive | 43803 | 96.2       |
| Rh negative | 1730  | 3.8        |
| Total       | 45534 | 100        |

**Results**

The results of the analysis of the ABO and Rh blood groups of the present study have been summarized in the Table 1 and 2, respectively. Our results revealed the most common blood group to be group O [15,618 (34.3%)], followed by group B [13,205 (29%)], and group A [12,158 (26.7%)]. The least common blood group was AB group [4553(10%)]. The prevalence of Rh-D negative group was found in 1730(3.8%) donors.

## Discussion

Knowledge of the ABO and Rh distribution in a certain population is vital as the distribution of this blood group system varies from race to race. This study deals with frequency distribution of A, B, O and Rh blood groups among blood donors in HSK hospital, Bagalkot, north Karnataka. It was observed in the present study that there was preponderance of group O, closely followed by group B. The distribution of allele frequencies for ABO and Rh blood groups in the present study is similar to that observed in various other studies. These results were in accordance with the study conducted in Vellore, south India to screen the distribution of ABO and Rh-D blood groups among 150,536 blood donors revealed similar results as in our study [8]. This finding is in agreement with one more study done by Khan MN et al in Jammu and Kashmir [9]. The frequency of ABO\*B allele is higher (0.233) among Indian population as compared to ABO\*A allele (0.186) which is in comparison to our study [10]. These findings correlate with the studies conducted among Kaniyas in Mysore, Karnataka [11] and among HIV seropositive patients at an ICTC centre in Bangalore [12]. Our study is not in comparison with the study conducted among vokkaligas of Mysore which showed preponderance of group A than group B [13]. Studies conducted in U.P. [14], Punjab [15] and Maharashtra [10] showed preponderance of group B followed by group O.

This may be attributed to the different ethnic origin. Although the incidence of Rh-D negative group was identical to previously published data from North India, the most common blood group was O group in our study as opposed to B group. A study conducted in Bahrain [2] revealed that the frequencies of ABO AND Rh phenotypes are similar to our study where as blood group distribution among Saudi citizens [16], Kurds [17] and Sudanese [18] population showed preponderance of blood group O, followed by blood group A.

Rh (D) positive frequency (91.73%) in this study was similar to some neighboring Arabian countries, example, Saudi Arabia (91.22%), [16] Arians (91.7%), [19] and Iran (88.7%) [20]. Compared with racial groups, it is similar to African blacks (94%) [21], but with a marked differences from those of Caucasians (85%), including Europeans and their descents.

**Conclusion:** The present study is the first comprehensive study that documents the frequencies of ABO, subgroup ABO and Rh (D) blood groups among blood donor in Bagalkot. From our viewpoint, this could have a significant implication to the HSK blood bank in Bagalkot, where certain blood groups are needed more than others in emergency conditions. In addition, this study will give the chance to researchers to explore the reasons of increasing of one blood group to another by linking it to genetic influences and effect of consanguineous marriages.

---

## References

1. Garratty G, Dzik W, Issitt PD, Lublin DM, Reid ME, Zelinski T. Terminology for blood group antigens and genes – historical origins and guideline in the new millennium. *Transfusion* 2000; 40:477-89.
2. Oluwadare I, Shonekan S, *African Journal of Biotechnology* 2008;Vol. 7 (11), pp. 1641-1643.
3. Rai V. And Kumar P. Genetic Analysis of ABO and Rh Blood Groups in Backward Caste Population of Uttar Pradesh, India/ *Not Sci Biol*, 2011, 3(3):07-14
4. Hartmann G. *Group Antigens in Human Organs*. Copenhagen: Ejnar Munksgaard; 1941:87-92
5. Yazer M, Olsson M, Palcic M. The cis-AB blood group phenotype: fundamental lessons in glycobiology. *Transfus Med Rev.*2006; 20(3):207–217.
6. Hanania .SS, Hassami.S, Irshaid NM. Allele Frequency and Molecular Genotypes of ABO Blood group system in Jordanian Population.*J. Med.Sci.*2007; 7(1):51-58
7. Tills D, Kopec AC, Tills RE. The distribution of the human blood groups and other Polymorphisms. Supplement 1. Oxford: Oxford University Press, 1983:1-20.
8. Das PK et al. Distribution of ABO and Rh-D blood groups among blood donors in a tertiary care centre in South India.*Trop Doct.* 2001 Jan; 31(1):47-8.
9. Khan MN, Khaliq I, Bakhsh A, Akhtar MS, Amin-ud-Din M. Distribution of ABO and Rh D blood groups in the population of Poonch District, Azad Jammu and Kashmir. *East Mediterr Health J.* 2009;15(3):717-21.
10. Warghat NE, Sharma NR, Baig MM. ABO and Rh Blood Group distribution among Kunbis(Maratha) population of Amravati District, Maharashtra-India. *Asiatic J. Biotech Res.* 2011; 2(04)479-483
11. Devi OR, Gangadhar MR. ABO and Rh (D) Blood Groups Among the Kaniyas of Karnataka. *Anthropologist* 2006.8(2): 145-146
12. Banu A, Ahmed SM, Shastri S. Distribution Of ABO And Rh Blood Groups In HIV Seropositives At An Integrated Counseling And Testing Centre In Karnataka, India *SAARC J Tuber Lung Dis HIV/AIDS* 2011;8(2):42-45
13. Jai Prabhakar SC, Gangadhar MR. Study of ABO and Rh (D) Blood Groups among Gangadikara Vokkaligas of Mysore, Karnataka. *Anthropologist*, 2009.11(1): 63-64
14. Rai V, Patel Ram, Kumar. P. Study of ABO and Rh (D) Blood Groups in Scheduled Caste of Jaunpur District. *Anthropologist* 2009.11(2): 151-152
15. Sharda Sidhu. Distribution of the ABO Blood Groups and Rh(D) Factor Among the Scheduled Caste Population of Punjab. *Anthropologist* 2003;5(3): 203-204
16. Al-Himadi AR, Umar M.ABO blood group distribution among Saudi citizens related to their regional or original tribal location.*Kuwait J.Sci.Eng.*2002.29(1)75-81.
17. Jaff.MS. ABO and rhesus blood group distribution in Kurds. *Journal of Blood Medicine* 2010;1: 143–146
18. Hassan FM. Frequency of ABO, Subgroup ABO and Rh(D) Blood Groups in Major Sudanese Ethnic Groups. *Pak J Med Res.*2010;49( 1):21-24
19. Ali N, Anwar M, Bhatti FA, Nadeem M, Nadeem A, Ali AM. Frequency of ABO and Rh blood groups in major ethnic groups and casts of Pakistan.*Pak J Med Sci Q.* 2005;21(1):26–29.
20. Boskabady MH, Shademan A, Ghamami G, Mazloom R. Distribution of blood groups among population of the city of Mashhad (North East of Iran). *Pak J Med Sci Q.* 2005;21(2):194–198.
21. Enosolease ME, Bazuaye GN. Distribution of ABO and Rh-D blood groups in the Benin area of Niger-Delta: implication for regional blood transfusion. *Asian J Trans Sci.* 2008;2(1):3–5.

**How to cite this:** Biradar S, Pawale J, Biradar SP, Doble VD, Kulkarni K. Distribution of ABO and Rh blood groups among blood donors in HSK blood bank, Bagalkot. Med Inn 2013;2:95-7.

**Source of funding** - Nil

**Conflict of interest** - None declared