



## The ABO and Rhesus Blood groups distribution profile among voluntary blood donors in Belgavi District, Karnataka

### KEYWORDS

Blood groups, ABO, Rhesus (Rh), Agglutination method

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**ABSTRACT** Background: ABO and Rhesus (Rh) blood group antigens are hereditary characters and are useful in population genetic studies, in resolving medico-legal issues and more importantly for the immunologic safety of blood during transfusion.

Objectives: To document the distribution pattern of the ABO and Rh blood groups among blood donors Belgavi District, (Karnataka).

Methods: The distribution of ABO and Rh blood group was analyzed among 2537 blood donors, over a period of March 2012 to Sep 2014. The age group and sex of donors, frequency of ABO blood groups and Rh status were calculated.

Results: Majority of the donors belonged to the age group between 18-50 years. Male to female ratio among donors was 9.5:0.5. The most prevalent blood group was O (34.92%), followed by group B (26.99%) and group A (22.19%). The least common blood group was AB (15.88%). The prevalence of Rh positive and negative distribution in the studied population was 97.87% and 2.13% respectively.

Conclusion: Knowledge of frequencies of the different blood groups is very important for blood banks and transfusion service policies that could contribute significantly to the National Health System.

### Introduction

The ABO blood group system was the first human blood group system to be discovered by Landsteiner in 1900. The ABO blood group system is the only system in which antibodies are consistently and predictably present in the serum of normal individuals whose red cells lack the antigens (1). The second type of blood group is the rhesus system. There are only two Rh phenotype such as Rh positive and Rh negative, depending on whether Rh antigen is present on the red cell or not. Determination of ABO blood groups is done by detecting A and B antigens. In addition, known red cells are used to detect anti-A and anti-B in the serum, by a process called 'reverse' grouping. The resultant polymorphism remains important in population genetic studies, estimating the availability of compatible blood, evaluating the probability of hemolytic disease in the new born, resolving disputes in paternity/maternity and for forensic purposes (2,3). Different blood groups have been shown to be particularly associated with different diseases (4,5). Rh system emerged as second most important blood group system due to hemolytic disease of newborn and its importance in Rh D negative individuals in subsequent transfusions once they develop Rh antibodies (1). The D antigen, after A and B, is the most important red cell antigen in transfusion practice.

The incidence of ABO and Rh varies markedly in different races, ethnic groups in different parts of the world (7). Blood group antigens are known to have some association with diseases. Group-A associated with gastric cancer (8). Group-B has increased incidence of ovarian cancer (9) and Group-O has increased risk of infections like cholera, UTI, ABO incompatibility and Rh incompatibility (7). Knowledge of blood group distribution is also important for clinical

studies, for reliable geographical information, genetic studies resolving medico legal issues particularly of disputed paternity cases (6,7). Blood groups are indicated on identity cards for driving license, school and office.

### Material and methods

The present retrospective study was carried out at blood bank Civil Hospital, Belgavi and camps arranged in Belgavi district during period from March 2012 to Sep 2014. The blood collections were taken from the voluntary donors at blood bank. Total 2537 donors were considered medically fit and accepted for blood donation during the study period. All were of age between 18-60 years. 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 antiglobulin technique. All weak D groups were considered as Rh positive. The donor blood group data were recorded on specially formed proforma, tabulated, analyzed and compared with the similar studies by other authors.

### Result and observation

It can be seen from table no. 1 that 93.97% of accepted donors (2384 out of 2537) were male. And only 6.03 % (153 donors) were female found to have no effect on ABO blood grouping of the donor. While looking at the rhesus grouping, on an average, 97.87 % accepted donors (2483

donors) were Rh positive and remaining 2.13% (54 donors) were Rh negative. On gender wise examination, 2336 out of 2384 male donors (95.15 %) were Rh positive whereas remaining 48 male donors (2.02 %) were Rh negative. Regarding female donors, the rates were 96.07 % (147 female donors) and 3.93% (6 female donors) respectively. The ABO blood group incidence shows O blood groups is commonest with 886 donors (34.92%) followed by B group of 685 donors (26.99%). A group of 563 donors (22.19%) and the least was AB group of 403 donors (15.88%) (Table 2).

### Discussion

The present study has been carried out to determine the distribution pattern of ABO and Rh-D blood groups in blood donors in Belgaum District. The collected data on blood group system can be used for development of donor data base for collection of blood and blood products which will be helpful for establishment of blood bank as well as transplant services. Currently a number of studies have been suggested that the use of stem cell product hold a huge prospective for treating damage or diseased tissues of the body (11). These data will also help in organ transplantation, development of legal medicine and anthropological study of a group or society (10).

There is a wide variation of blood group frequency in different parts of the world due to the influence of genetic and environmental factors. The distribution of blood groups varies regionally, ethnically and from one population to another. Majority of studies in India has described a large number of male donors compared to female donors (6). This is because India is a developing country with illiteracy, malnutrition and social taboos, where females are most affected with anemia and are under weight, hence differed as per donor criteria.

ABO and Rh grouping was compared to studies within India and outside India. Studies of northern India showed B group is the most frequent and AB group is the least. South India studies of Vellore and Chittoor district of AP showed O is the most frequent group and AB group is the least. Our present study showed O group is most frequent similar to study as that of Vellore, Chittoor, Karnataka, Jammu and Kashmir (6,7,12). (Table 3). Studies outside India of Niger-Delta, Australia, Britain, U.S.A. had O group in common followed by A,B and AB the least. In Rh system majority of Rh positive (85%) throughout world population and Rh negative incidence is slightly higher in Britain, U.S.A. and Pakistan (6,7,14). (Table 3 & 4).

### Conclusion

-The present study concludes that 'O' blood group is the commonest blood group amongst the blood donors at Belgavi district. This is followed by 'B', 'A' and 'AB' blood group respectively.

- Regarding Rhesus blood group system, Rh positive donors were 97.87% and Rh negative were 2.13%.

- Blood donation by the females was very low and it needs to be increased by improving health status and awareness about blood donation.

-Knowledge of blood group distribution is also important for clinical studies, for reliable geographical information and for forensic studies in the population.

- Besides, these studies will help a lot in reducing the ma-

ternal mortality rate, as access to safe and sufficient supply of blood will help significantly in reducing the preventable deaths. Such studies need to be carried out at all the regional levels of India.

- The data generated in the present study and several other studies of different geographical region of India will be useful to health planners while making efforts to face the future health challenges in the region.

### Acknowledgement

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**Table 3: Comparison of distribution (%) of ABO and Rh blood groups in different regions of India**

Place of study	O	B	A	AB	Rh+ve	Rh-ve
<b>Present study</b>	34.92	26.99	22.19	15.88	97.87	2.13
Chittoor	47.37	25.79	18.95	7.89	96.6	8.42
Bangalore	39.82	29.95	23.85	6.37	94.2	5.79
Shimoga malnad	39.17	29.43	24.27	7.13	94.93	5.07
Vellore	38.75	32.69	18.85	5.27	94.5	5.47
Da- vanagere	36.76	29.85	26.15	7.24	94.8	5.52
Western Ah- madabad	30.79	39.40	21.94	7.86	95.05	4.95
<b>Punjab</b>	9.3	37.6	21.9	9.3	97.3	2.7
Eastern Ah- madabad	32.5	35.5	23.3	8.8	94.2	5.8

**Table 1: Age Group and Sex Wise Distribution of Accepted donors**

AGE GROUPS	Male (N=2384)	Female (N=153)	Total (N=2537)
18-20	288	52	340(13.40%)
21-30	1051	64	1115(43.94%)
31-40	531	22	553(21.79%)
41-50	392	15	407(16.04%)
51-60	96	0	96(3.78%)
TOTAL	2384 (93.97%)	153 (6.03%)	2537 (100%)

Table 2: Distribution of ABO & Rh Blood Group Systems

ABO Blood group	Male			Female			Total		
	Rh+ve	Rh-ve	Total	Rh+ve	Rh-ve	Total	Rh+ve	Rh-ve	Total
O	314 34.14%	19 0.79%	333 34.93%	51 33.34%	2 1.39%	53 34.64%	365 34.89%	21 0.83%	386 34.92%
A	317 21.88%	12 0.50%	329 22.18%	33 21.56%	1 0.65%	34 22.21%	350 21.87%	13 0.52%	363 22.19%
B	335 26.83%	9 0.37%	344 27%	39 25.49%	2 1.39%	41 26.79%	374 26.54%	11 0.43%	385 27.99%
AB	370 15.52%	8 0.33%	378 15.85%	24 15.68%	1 0.65%	25 16.33%	394 15.53%	9 0.35%	403 15.88%
Total %	2336 97.98%	48 2.02%	2384 100%	147 96.87%	9 5.93%	156 100%	2483 97.87%	54 2.13%	2537 100%

Place of study	O	B	A	AB	Rh+ve	Rh-ve
Present study	34.92	26.99	22.19	15.88	97.87	2.13
Pakistan	10	38	23.8	10	89.1	10.9
Nepal	33	29	34	4	96.7	3.33
Australia	49	10	38	3	NA	NA
Britain	46.7	8.6	41.7	3	83	17
U.S.A.	46	9	41	4	85	15
Niger-delta	52.7	20.7	23.8	2.8	93.9	6.12

Figure -1 Percentage of Rh Positive and Negative According to blood groups

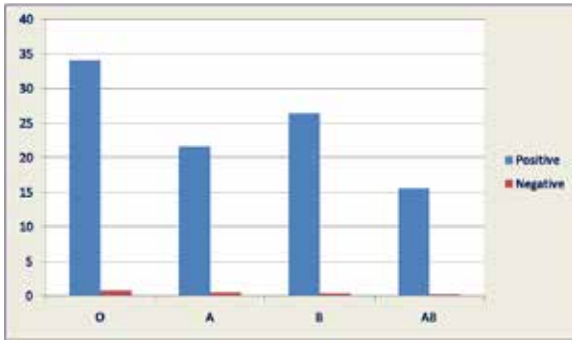


Figure -2 Percentage of Rh Positive and Negative#

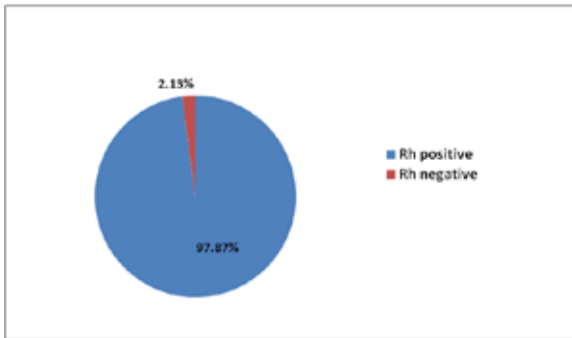


Table 4: Comparison of distribution (%) of ABO and Rh blood groups in different countries of the world.

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