

Original Research Article

Frequency and distribution of ABO and rhesus (D) blood groups in district Chamba, Himachal Pradesh: a study from rural tertiary care hospital

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ABSTRACT

Background: In 1901, ABO blood group was the first human blood group system to be discovered by Karl Landsteiner. After that Rh blood grouping was discovered by Landsteiner and Weiner 1941. Since then for blood transfusion purposes, these two systems have proved to be the most important systems. Agglutinins are the antibodies against red blood cell antigens and based on presence of these antigens and agglutinins human blood is divided into four major blood groups A, B, AB and O.

Methods: A retrospective study was conducted in the Department of Blood Bank of our college. A total of 600 fit donors were selected in the time period of seven months from 1st March 2017 to 30th September, 2017. The blood samples were obtained by standard procedures of venepuncture.

Results: From our study, it is observed that blood group B is commonest with 229 donors (38.16%), followed by A with 173 donors (28.82%), O blood group with 131 donors (21.82%) and blood group AB contributes minimum of study subjects, 71 donors (11.82%). Rh+ve donors were 93.83% whereas Rh-ve donors were 6.17% according to our study.

Conclusions: The present study is useful in providing information on the status of ABO and Rh-D blood group distribution of Chamba and knowledge of it will help in effective management of regional blood transfusion service of the area.

Keywords: Blood grouping, Blood bank, Blood donors

INTRODUCTION

In 1901, ABO blood group was the first human blood group system to be discovered by Karl Landsteiner.¹ After that Rh blood grouping was discovered by Landsteiner and Weiner 1941.² Since then for blood transfusion purposes, these two systems have proved to be the most important systems.

Agglutinins are the antibodies against red blood cell antigens and based on presence of these antigens and agglutinins human blood is divided into four major blood groups A, B, AB and O.³

Geographically, ABO and Rh-D blood group phenotypes vary widely across boundaries.⁴ ABO and Rh-D blood group distribution in different population groups is of great importance in healthcare and transfusion practices.⁵

ABO and Rh-D blood groups have important role in population genetic studies, research, population migration patterns, resolving paternal dispute as well as effective management of blood bank inventory.⁶

METHODS

A retrospective study was carried out on 600 blood donors (both voluntary and replacement) during a period of seven months from 1st March 2017 to 30th September 2017 in the department of blood bank of Pt. Jawaharlal Nehru Govt. Medical College Chamba (H.P).

The donors were required to fill up registration form which carried all the information like personal details, demographic details, occupational and medical history. Haemoglobin estimation was performed and donors with Hb<12.5 gm% were excluded from the study. The donors were then screened by medical officer according to blood donor selection criteria. Individuals with good health, mentally alert, physically fit were selected as blood donors. The donors were then asked to sign the donor questionnaire and informed consent.

A total of 600 donors were considered medically fit and accepted for blood donation. The blood samples were then obtained by standard procedures of venepuncture and subjected to determination of ABO and Rhesus blood groups using antisera by conventional slide agglutination method. The collected data was analysed using analytical tools such as MS Excel and Epi-Info.

RESULTS

Blood grouping of 600 fit donors was done. From our study, it is observed that majority of the donors belonged to blood group B. Out of total 600 donors who were included in the study, 229 donors belong to B blood group constituting 38.16%, followed by A blood group forming 173 donors (28.82%). O blood group constituted 21.82% with 131 donors and blood group AB was the least common with 71 (11.82%) study subjects (Figure 1).

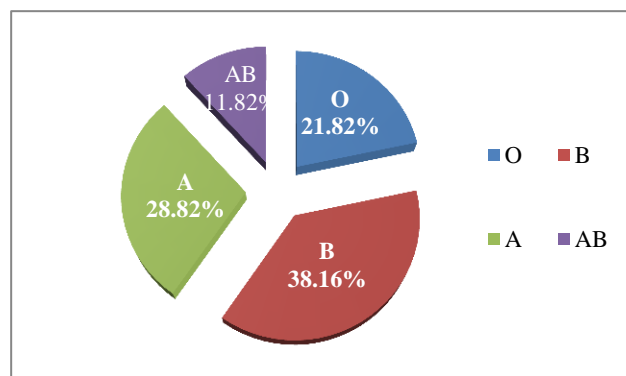


Figure 1: Pie chart showing frequency distribution of blood groups.

Out of the total 600 donors 589 were males (98.17%) and 11 subjects were females (1.833%) (Figure 3). From the Figure 1, it is evident that B+ve blood group is the commonest blood group (35.66%) followed by A+ve (27.66%) and then blood group O+ve (20.16%). AB-ve and A-ve blood groups are the least common blood groups, each constituting 1.17%. From our study, 563 donors were found to be Rh+ve forming 93.83% remaining 37 cases tested Rh-ve forming 6.17% (Figure 2).

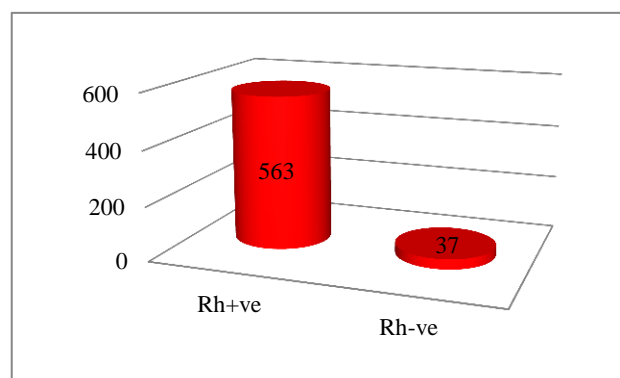


Figure 2: Distribution of blood donors based on Rh factor.

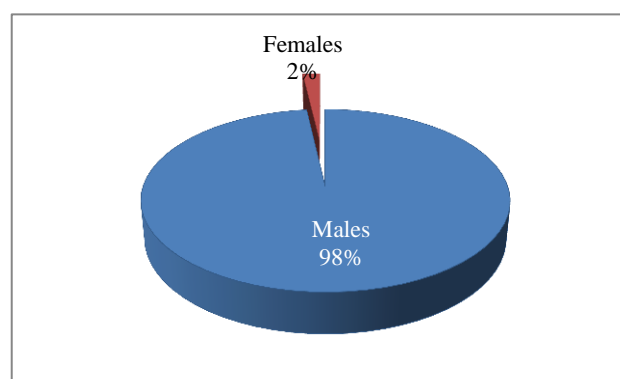


Figure 3: Gender distribution of blood donors.

DISCUSSION

We compared our results with other studies carried out in different regions of India and worldwide.

The study done in Northern India by Chandra et al Lucknow, Sindhu et al Punjab and Behra et al Jodhpur showed blood group B was the commonest, followed by O, A and AB.⁸⁻¹⁰ Our study is similar to these studies, as we also observed in our study that B blood group was the most frequent. But in our study, unlike other studies, A blood group was second most common in frequency, followed by O blood group. AB was the least frequent blood group in our study. This finding is in accordance with results of the above stated studies (Table 1).

Table 1: Distribution of blood groups in India.

Population	A	B	AB	O	Rh positive	Rh negative
Northern India						
1. Lucknow ⁸	21.73	39.84	9.33	29.10	95.71	4.29
2. Punjab ⁹	21.91	37.56	9.3	31.21	97.3	2.7
3. Jodhpur ¹⁰	22.2	36.4	9.4	31.7	91.75	8.25
Western India						
4. Western Ahmedabad ¹¹	21.94	34.90	7.86	30.79	95.0	4.95
5. Eastern Ahmedabad ¹²	23.30	35.50	8.80	32.50	94.20	5.80
6. Surat ¹³	24.10	34.89	8.69	32.32	94.18	5.82
7. Maharashtra ¹⁴	23.38	31.89	8.72	30.99	95.36	4.64
Eastern India						
8. Durgapur ¹⁵	23.90	33.60	7.70	34.80	94.70	5.30
Southern India						
9. Bangalore ¹⁶	23.85	29.95	6.37	39.82	94.2	5.8
10. Vellore ¹⁷	21.86	32.69	6.70	38.75	94.5	5.5
11. Devangere ¹⁸	26.15	29.85	7.24	31.76	94.8	5.2
12. Shimoga- Malnad ¹⁹	24.27	29.43	7.13	39.17	94.93	5.07
Present study	28.82	38.16	11.82	21.82	93.83	6.17

Table 2: Frequency of blood groups in different countries.

	A	B	AB	O	Rh-positive	Rh- negative
Britain¹⁹	42.0	8.0	3.0	47.0	83	17
USA²⁰	41.0	9.0	4.0	46.0	85	15
Nigeria²¹	21.60	21.40	2.80	54.20	95.20	4.80
N.Guinea²²	22.50	23.70	4.70	48.90	95.90	4.10
Saudi Arabia²³	24.0	17.0	4.0	52.0	93.0	7.0
Pakistan²⁴	22.40	32.40	8.40	30.50	93.0	7.0
Nepal²⁵	34.0	29.0	4.0	32.50	96.70	3.30

Western India, like in Eastern Ahmedabad by Wadhwa et al, Western part of Ahmedabad by Patel et al, studies done at Surat by Nidhi et al and Giri et al Maharashtra also showed predominance of blood group B similar to our findings.¹¹⁻¹⁴

Outside India, studies were carried out in different countries of the world like Britain, USA, Nigeria, New Guinea, Saudi Arabia, Pakistan and Nepal. All countries, except Pakistan and Nepal, showed O blood group to be most common in their respective studies, which is different from our observations, as B blood group was commonest in our study.

Our study coincides with the study done in Pakistan by Rahman et al, as B is the most frequently occurring blood group in both studies.

The study done in Nepal showed A was the commonest blood group followed by O, B and AB unlike our study as we found that B was the predominant blood group followed by A, O and then AB (Table 2).

The incidence of Rhesus (D) positive blood group in different parts of India varies from 91 to 98% and Rh

negative blood group varies from 2.7% to 8.25%. Our findings are in agreement with the rest of the studies as we reported 93.83% of Rh+ve blood group and 6.17% of Rh-ve blood group and our results are well within the above stated range. The present study, like other studies showed much greater number of male donors as compared to female donors. This is because of many reasons like poor health status of menstruating women, social taboo, and lack of motivation and fear of blood donation among females.

CONCLUSION

From our study, we established that among the various ABO and Rh-D blood groups, group B is the commonest, followed next in frequency by blood group A and then blood group O. Blood groups AB was the least common contributing only 7 study subjects (Table 1).

Blood donation by females was very low and it needs to be increased by improving health status of women and creating awareness in them about blood donation.

The present study is therefore useful in providing information on the status of ABO and Rh-D blood group

distribution of Chamba and knowledge of it will help us in effective management of regional blood transfusion service of the area. 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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