

DISTRIBUTION OF ABO AND RHESUS BLOOD GROUPS AMONG BLOOD DONORS IN A TERTIARY CARE CENTRE IN SOUTH KASHMIR: A 4 YEAR RETROSPECTIVE STUDY

Transfusion Medicine

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ABSTRACT

Background: Transfusion medicine works on the concept of individual uniqueness defined by the presence /absence of red cell antigens on the red cell membrane. Despite the discovery of more than 30 human blood group systems, ABO and Rhesus (Rh) blood group systems remains the most important tool for patient transfusion because of their potent immunogenicity. Incorrect transfusion of these blood group systems can lead to death of the patient. Blood groups are genetically determined and the frequency varies demographically and among different ethnic groups. Knowledge about distribution of blood groups is important for inventory management and studying disease trends in relation to blood groups. **Aim:** The aim of the present study is to determine the frequency and distribution of ABO and Rh blood group systems among both voluntary and replacement blood donors in South Kashmir and compare it with other studies of the Kashmir valley, other parts of country and worldwide. **Materials And Methods:** Data of 7087 blood donors was retrospectively collected and analyzed for determining the frequency and distribution of ABO and Rh blood groups from January 2019 to January 2023 at GMC Anantnag, Kashmir, J & K, and India. All the donors who were native to Kashmir Valley were included while those donors who did not belong from the valley were not included in the study. Blood grouping was done using forward and reverse grouping methods with commercially available standard monoclonal antisera anti-A, anti-B and anti-D. **Results:** Out of the 7087 blood donors, the most common blood group was found to be O(33.61%), followed by B(29.94%) and A(26.17%) while the least prevalent was AB(10.28%). Rh positivity was found out to be 89.90% while Rh negativity was seen in 10.10%. **Conclusion:** The study highlights that blood group O was the commonest of the ABO blood group system and AB blood group was least common among the blood donors studied in Kashmir. Rh positive is much more common than Rh negative.

KEYWORDS

blood group systems, donors, frequency, distribution, inventory.

INTRODUCTION:

Karl Landsteiner, an American scientist of Austrian origin pioneered the basis of transfusion medicine by discovering the first human blood group system.¹ He discovered A, B, and O blood types in 1900.² Alfred Von Decastello and Adriano Sturli, two of Landsteiner's associates, discovered the fourth type AB, in 1902.³ Despite ABO matching, blood transfusions still resulted in morbidity and mortality. Subsequently, Karl Landsteiner and Alexander S. Wiener discovered Rh blood group in the late 1930s.^{4,5}

These discoveries are the basis of modern-day blood grouping and transfusion medicine. Knowledge of these blood grouping systems is not only pivotal to the working of blood centres and its inventory management⁶ but has a significant role to play in genetic research, organ transplants, paternity claims, anthropology and training ancestral relation of humans.⁷ It is apt to mention here, that some blood groups are more prone for some diseases like diabetes mellitus, duodenal ulcers, etc.⁸

Several studies have shown that the frequency of blood group A was significantly higher among people suffering from pancreatic cancer⁹ whereas another study showed that blood type A was associated with a lower risk of thyroid cancer, glioma and biliary cancer.¹⁰

Frequency of blood groups is influenced by race, ethnicity, geographical conditions, genetic drift, environmental factors and migration frequency of population.¹¹ Hence, the knowledge of blood group distribution in diverse population is of utmost importance in health care and transfusion practices.¹²

The Rhesus blood group is the most polymorphic and its medical implication in transfusion medicine is only next to the ABO blood group system. Incidence of Rh blood groups varies in different parts of world. Factors attributed to such difference include racial differences, geographical variation, external environment and genetic makeup.^{13,14,15}

MATERIALS AND METHODS

The present study was conducted in the Department of Transfusion Medicine in our institute retrospectively over a period of 4 years from January 2019 to January 2023. The donors were selected for donation as per the standard donor selection criteria. All the donors who were native to our valley were included while those donors who did not belong from the valley were not included in the study. The blood samples were then obtained by standard procedures of

venepuncture and subjected to determination of ABO and Rhesus blood groups using forward and reverse grouping methods with commercially available standard monoclonal antisera anti-A, anti-B and anti-D. The collected data was then analyzed using SPSS version 19.

RESULTS

Out of the total 7087 blood donors, the most common blood group was found to be O(33.61%), followed by B(29.94%) and A(26.17%) while the least prevalent was AB(10.28%)(Figure 1). Rh positivity (+) was found in 89.90% of donors while Rh negativity (-) was seen in 10.10% donors (Figure 2). Combining both the blood group systems, O+ blood group was the most common (30.11%), followed by B+ (27.02), followed by A+ (23.60%) while the least common was AB- (1.11%) (Table 1).

O+ (30.11%) > B+ (27.02%) > A+ (23.60%) > AB+ (9.15%) > O- (3.49%) > B- (2.92%) > A- (2.56%) > AB- (1.11%)

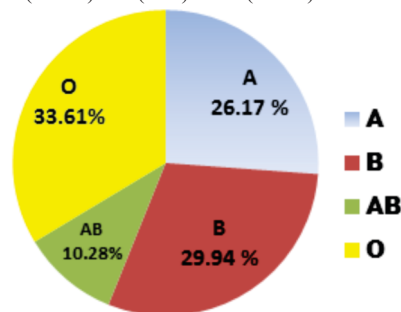


Figure 1: Distribution of ABO Blood Group

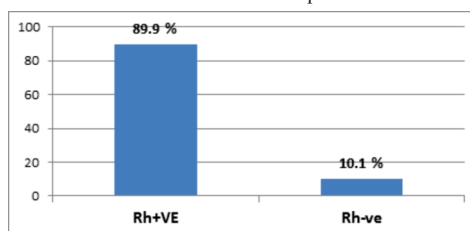


Figure 2: Distribution of Rh Blood Group(%age)

Table 1: Comparison Of Present Study With Other Studies Of Kashmir In Percentage (%age)

	A	B	AB	O	Rh +ve	Rh-ve
Present Study	26.17	29.94	10.28	33.61	89.9	10.1
Shazia et al	23.88	33.34	8.06	34.72	91.17	8.83
Dewaani et al	26.5	34.4	6.2	32.7	91	9
Calcutti et al	20.59	39.43	8.11	31.85	93.33	6.67
Baba et al	24.44	32.3	10.1	33.08	89.04	10.95

Table 2: Distribution Of ABO And Rh Blood Groups In Our Study

Blood Group	A (%age)	B (%age)	O (%age)	AB (%age)	Total
Rh Positive	1673 (23.60 %)	1915 (27.02%)	2134 (30.12%)	649 (9.15%)	6371 (89.89%)
Rh Negative	182 (2.56 %)	207 (2.92%)	248 (3.49%)	79 (1.11%)	716 (10.08)
Total	1855 (26.17%)	2122 (29.94%)	2382 (33.61)	728 (10.28%)	7087 (100%)

DISCUSSION

The present study was conducted to determine the frequency and distribution of ABO and Rh blood groups among the blood donors of South Kashmir where there is limited data on this subject. Knowledge of the distribution of ABO and Rhesus blood groups in a particular region is essential for recruitment of voluntary blood donors as well as for effective management of blood centre inventory.

We compared the results of our study with other studies carried out in Kashmir, other states of India and worldwide. Our study showed that the blood group O is the most common blood group and AB is the least common in our region. This is in conjunction with the other studies done in Kashmir valley by Shazia et al¹⁶ and Baba et al.¹⁷ However, other studies from our valley by Dewani et al¹⁸ and Calcutti et al¹⁹ showed that blood group B was the most common group followed by blood group O (Table 2). The reason for this difference may be the small sample size involved in these studies.

On comparison with the rest of the country, we observed that the ABO and Rh group distribution were comparable to a multicentric study done by Agarwal et al,²⁰ Nag et al²¹ in West Bengal, and studies in South India by Periyavan S et al²² and Das et al.²³ All studies show O>B>A>AB blood groups. "B" was the 2nd most prevalent blood type in these studies which was similar to our observation.

However, studies from North India by Sidhu et al²⁴ and Chandra et al²⁵ showed that blood group B was the commonest followed by O, A and AB. These regional diversities may be explained by genetic mapping and the different origins of different races.²⁶

Outside India, we compared our study with a few countries of the world like USA²⁷, Britain²⁸, Saudi Arabia²⁹, Pakistan³⁰ and Nepal.³¹ Except Pakistan and Nepal, all compared countries showed O blood group to be most common in their respective studies, which is similar to our observations.

Rh-positive donors are more (89.90%) and Rh-negative is less (10.10%) in this analysis. On comparison, the results were similar to all other studies in India.^{20, 21, 22, 23, 24, 25} However, USA²⁷ and Britain²⁸ show high numbers of Rh-negative donors.

In the present study males (96.60%) comprised the significant donation group as compared to female donors (3.40%) which is similar with other Indian studies.^{22,32}

The lower rate of donation is due to fear of donation, prevalence of low hemoglobin levels and social taboos among females.

CONCLUSION

The study highlights that blood group O was the commonest of the ABO blood group system among the blood donors studied and AB blood group was the least. Rh positive is much more common than Rh negative. This study helps us to prepare a database and provides us a good knowledge for management of blood bank inventory. However, more studies on this subject are required in order to determine the blood group frequencies of Kashmir valley more accurately.

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