

International Journal of Scientific Research and Reviews

Frequency Distribution of Blood Groups “ABO” and “RhD” among people of African countries

Ahuja Pooja*

Faculty, Institute of Forensic Science, Gujarat Forensic Sciences University, Sector 09, Near DFS
Head Quarter, Gandhinagar- 382007 Gujarat, INDIA
E mail - pahuja159@gmail.com

ABSTRACT

The ABO and Rh blood groups are among the most important blood groups. Even if the ABO blood group system was introduced for the first time by Karl Landsteiner in 1901, it has vital application in forensic science. Cross sectional descriptive study was performed to find out the frequency of ABO and Rhesus blood groups among African Students of Gujarat Forensic Sciences university. The study was conducted on One hundred twenty-eight (128) of African students, for ABO, RhD blood group study. The blood of each student was collected on glass slide through finger prick and blood groupings were performed using commercially available anti-sera. Blood group ‘O’ was the highest with the percentage frequency of 50%, followed by blood group ‘A’ (35.71%), ‘B’ (10.71%) and the least frequent was blood group AB which is (7.14%). The RhD distribution also varies among the four ABO blood groups. The total percentage of RhD positive was 92.85% and that of RhD negative was found to be 7.14%. The height percentage of frequency in ABO blood system was seen in blood group O; While in case of Rh, the highest percentage of population was Rh positive.

KEY WORDS: Hemoglobin, ABO blood group, Rhesus blood group, Prevalence, blood.

***Corresponding Author**

Pooja Ahuja

Faculty, Institute of Forensic Science, Gujarat Forensic Sciences University, Sector 09, Near DFS
Head Quarter, Gandhinagar- 382007 Gujarat, INDIA
E Mail - pahuja159@gmail.com

1. INTRODUCTION

Blood is the most essential body fluid, which is responsible for the transportation of oxygen, as well as the circulation of various important nutrients, enzymes, and hormones. It also transports waste products. Blood is a mixture of two important parts: cells and plasma. The heart pushes blood through the arteries, capillaries and veins to supply oxygen and essential nutrients to each and every cell of the body. The human red blood cell contains various kinds of polysaccharide antigens, called agglutinogen. The antigenic substances are responsible for inducing a particular immune response which results in the production of antibodies. The ABO and Rh blood groups are among the most important blood groups¹. The ABO blood group system was introduced for the first time by Karl Landsteiner in 1901^{2,3}. Even after 100 years, this system is still in use for blood transfusion and in blood banking services to avoid morbidity and mortality⁴. A huge number of antigens have been identified on human blood cells, out of which approximately 10-15% form well-defined systems and only 1-2% play an important role in blood transfusion.

All humans and many other animals have four principal blood types: A, B, AB, and O. Two antigens and two antibodies are generally involved for the ABO types and a particular combination of these four types determines an individual's blood group. Type A blood has type A antigens and contains type B antibodies, which act against type B antigens. While type B blood has type B antigens and contains type A antibodies, which act against type A antigens. Type AB blood has both types of antigens and has no antibodies. Individuals with type O blood are universal donors for transfusions as they do not produce ABO antigens. While those who have type AB blood are universal receivers for transfusions, as they do not make any ABO antibodies. Clinically after ABO the Rh (Rhesus) is one of the most important blood group systems. The terms *Rh factor*, *Rh positive* and *Rh negative* are usually used to refer to the *D antigen*. The Rh blood group system, particularly the D antigen also has a significant role in determining the risk of hemolytic disease of the newborn. In some pregnancies a major problem happens due to Rh incompatibility, especially when the mother is Rh-negative and the foetus is Rh-positive⁵. In hemolytic disorder the fetal blood mixes with the mother's blood, and it may be fatal to the foetus⁶.

The need for the frequency distribution of blood groups studies is of multi-uses, in addition to their importance in transfusion and evolution; in new medicine their co-relation to different types of disease is also being increasingly required^{7, 8}. Blood group antigens also have been used in anthropology and genetic research⁷. Frequency distributions of ABO and Rh blood groups from various populations of the world have been reported. However, no such types of study have been

conducted. One research was conducted among University students in Ethiopia in Arbaminch University.

2. LITERATURE REVIEW

The distribution of ABO blood group varies from one population to another population. In some recent studies, blood group O has been found to be the most common blood group. In the American-Caucasians, the distribution is type O (47%), type A (41%), type B (9)% and type AB (3%) and for the African-Americans, the distribution is type O(46%), type A (27%), type B (2%) and AB (7%).

The segregation of the genes responsible for the ABO blood systems has always taken a particular pattern for its distribution with exceptional cases. Several Studies reported in different parts of Ethiopia , has showed that 'O' is the most common and AB is the least frequent blood group. Another research done in Arbaminch University, Ethiopia suggest that O blood group was dominant followed by A and B respectively while blood group AB was the rare.

In contrast in other studies performed in different Ethnic group suggest, for instance, in India the frequency of blood group B was highest (31.89%), followed by O (30.99%), A (28.38%) and AB (8.72%) 11. In other studies, Rh-D negative blood group is documented as 4.64% in India. and 7.55% in Ralwalpindi and Islamabad. Rh-D distribution also varies within any group of human population.

3. EXPERIMENTAL WORK

The overall aim of this study was to determine the Frequency Distribution of Blood Groups ABO and RhD among African countries Students of Gujarat Forensic Sciences University;Gujarat, India. To identify the Frequency Distribution of ABO Blood Groups among African countries Students. To determine the Frequency Distribution of Rh blood group system among African countries Students.

4. MATERIALS AND METHODS

The study was conducted at Gujarat Forensic Sciences University;Gujarat, India. Cross sectional descriptive study was performed to find out the frequency of ABO and Rhesus blood groups among African Students of Gujarat Forensic Sciences university from April 9-April 22,2018.

A total of 128 students ; all of these students came from Different Countries of African Continent that belonging different departments comprising 53 females and 75 males were screened for their blood groups. All of these students came from Different Countries of African Continent (Ethiopia, Rwanda, Mozambique, Uganda, Tanzania and Burkina Fasso). The blood of each student was collected through finger prick method ⁹.

For ABO and Rh tests, a drop of blood from each student was placed on a transparent glass slide in three places. A drop of each of the antisera, anti A, anti B and anti D was added and mixed with each blood sample, with the help of glass rods. Blood groups were determined on the basis of agglutination.

5. RESULTS AND DISCUSSIONS

Total donors incorporated for the study and tested were n=128 students of different departments studying at Gujarat Forensic Sciences University.

Sex of	Blood Group Distribution				
Students					
	A	B	O	AB	Total
Female	1(3.57)	0(0%)	4(14.28%)	0(0)	5(17.85)
Male	8(28.57%)	3(10.714%)	10(35.71%)	2(7.14)	23(82.134)
Total	9(35.71%)	3(10.71%)	14(50%)	2(7.14%)	28(100%)

Table 1: Shows ABO blood group distribution among African students of GFSU.

There are significant differences in the distribution of blood groups between the male and female students. Blood group 'O' was dominant in both the genders, followed by 'A' and 'B' While 'AB' was rare in both males as well as females.

The frequencies of RhD groups are shown in Table2.

The RhD+ and RhD- distribution varies among the four ABO blood groups.

	Rh positive	Rh negative
Female	5(100%)	0(0%)
Male	21(91.3%)	2(8.69%)
Total	26(92.85%)	2(7.14%)

Table2: RhD positive and RhD negative distribution.

In the study under discussion, the relative frequency of the various blood groups was determined. We found that the frequency of blood group ‘O’ was the highest with the percentage frequency of 50%, followed by blood group ‘A’ (35.71%) and ‘B’ (10.71%), while blood group AB was the least frequent with present only in 7.14% of the studied subjects. The RhD distribution also varies among the four ABO blood groups. The total percentage of RhD positive was 92.85% and that of RhD negative was found to be 7.14%.

Usually, the distribution of ABO blood group varies from one population to another. In some other studies also, blood group O has been found to be the most common blood group. In the American-Caucasians, the distribution is type O (47%), type A (41%), type B (9%) and type AB (3%) and for the African-Americans, the distribution is type O(46%), type A (27%), type B (2%) and AB (7%).

Thus, the segregation of the genes responsible for the ABO blood systems has always taken a particular pattern for its distribution with exceptional cases. Our study consistent with previous data reported by others in different parts of Ethiopia , that ‘O’ is the most common and AB is the least frequent blood group.A research done in Ethiopia Arbaminch University suggest that O blood group was dominant followed by A and B respectively while blood group AB was the rare.¹⁰

In contrast in other studies performed in different Ethnic group suggest, for instance, in India the frequency of blood group B was highest (31.89%), followed by O (30.99%), A (28.38%) and AB (8.72%). So our study coincide with Giri *et al.*, 2011,¹¹ that blood group AB has the least percentage, which is similar to other studies that found this particular group as very rare.

Rh-D distribution also varies within any group of human population.

6. CONCLUSION

In this study, it was observed that blood group with RhD-positive is the highest with percentage frequency of 92.85% while RhD negative was 7.14 % .Similar pattern of distribution is also observed in other studies. Rh-D negative blood group is documented as 4.64% in India. and 7.55% in Ralwalpindi and Islamabad.¹²As blood grouping system is one of the important ways used in criminal investigation, paternal and lost or interchanged child cases, further study has to be conducted with sufficient time of study by the concerned peoples.

The knowledge of the blood groups in view to the health of an individual is very essential. The various kinds of information are helpful for medical diagnosis, genetic information, genetic counseling and also for the general safety of individuals.

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