

ABO and Rhesus Blood Grouping in Voluntary Blood Donors and its gender association

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ABSTRACT

Aim: To establish the presence of different blood groups (ABO System) and Rhesus factors in voluntary blood donors from a blood donation drive organized in a teaching hospital in Lahore, Pakistan.

Design: Cross sectional prospective study

Method: ABO blood grouping and Rhesus factor establishment was done by antigen-antibody agglutination test from a blood donation drive in February 2016 and included 400 voluntary blood donors.

Place and duration: Sheikh Zayed Post graduate Medical Institute Lahor, Pakistan.

Results: There was no meaningful association between gender and blood groups. The percentages of ABO and Rhesus blood groups among voluntary male and female blood donors were : B +ve 40.5%, O +ve 26.5 %, A +ve 24.0%, AB +ve 2.8%, B – ve 5.0 %, O –ve 0.2%, AB- ve 0.5% and A – ve 0.5%. Total female donors were 58.8 % and total males were 41.2%.

Conclusion: Blood groups in voluntary blood donors follow the same frequency pattern as the general population in Pakistan. Voluntary blood donors play a very significant role in blood banking in Pakistan.

Keywords: Blood groups, ABO, Rh ,Male, Female, Voluntary, Donors, Lahore, Pakistan, Blood Donation, Blood banking

INTRODUCTION

The ABO system remains the most important of all blood groups in transfusion and transplant practices¹. The ABO blood grouping system is divided into A, B, AB and O. The nomenclature of different blood groups is based on the presence or absence of particular antigen on the surface of Red blood cells. The Rhesus "Rh" blood group system is a complex system and next most significant blood group system after ABO system. If incompatibility occurs in ABO system, it causes breakdown of RBCs².

Though ABO and Rh blood grouping system has clinical significance in transfusion cases, it has forensic applications in certain medico-legal issues. Furthermore, the knowledge of blood group system in a population is helpful in maintain the supply of rare blood groups in blood banks.

Though blood banks can process large number of compatible blood for transfusion based on antigen-antibody reactions but still there are more than 33 blood group system which can result in incompatibility³. This requires extensive work up and resources. We need to organize more resource

conserving activities and target those groups which can contribute through minimum expenditure of expenses and resources. In an under resourced health system as ours to meet our blood banking needs we need voluntary blood donors as the backbone of our blood banking system. World Health Organization (WHO) Global database for blood safety shows that countries with low and medium human development index (HDI) are in definite need of blood transfusion services. Pakistan ranks 136 of the 177 on the HDI⁴. A study conducted⁵ regarding blood donation in developing countries show that certain problems like misinformation about blood donation due to less education, fear of blood donation which could be due to religious reasons or beliefs, and willingness to donate for family and friends contributed significantly towards the blood donation attitude. Bernard Fantus in 1937 at the Cook County Hospital in Chicago, set up the first hospital blood bank in the United States. Fantus coined the term "blood bank". Blood banking is the core of a good health system and in essence a chance for every medical and nonmedical person to be a part of this health system. : Since 1997, law regarding safe blood transfusion (SBT) has evolved considerably in Pakistan. Blood transfusion authorities in every province of Pakistan are regulatory bodies to ensure good quality blood transfusion services all over the country.

According to a study in USA a huge no of blood donors are lost due to extensive screening⁶ and

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standards regarding blood donations in the blood bank, which gives rise to a need of steady source of blood donors. Determination of frequencies of ABO blood groups for blood banking, organ transplant and genetic studies is important⁷ and has already been established. It is also essential to the blood bank inventory and the transfusion facilities associated with it. The use of extensive history from donors and ultrasensitive detection technologies for blood screening has negligibly decreased transfusion transmitted infections to almost zero⁸. New research^{9,10} is now being more directed towards healthy voluntary blood donors to make the blood banking and transfusion facilities up to standards by providing relevant data about voluntary blood donors who should be targeted. Study⁹ shows us the fruit of hard and ethical work that lead to Iran being number four in the entire region for transfusion services merely decades after starting them. However these steps do not bring donors out of their homes and educate them regarding the importance of blood donation.

Strategies for blood donor recruitment and retention requires good public relation skills, effective communication methods, role of media, educating potential donors, youth and school programs along with use of information technology¹¹. Living in a society with religious dominance and the continuous overwhelming strive for liberal mindset, we have to adapt and respond accordingly. We need to start major campaigns to recruit voluntary blood donors. We need to educate using religious and modern literature to encourage more people to donate blood. By doing this we can provide life saving service via our blood banks and cause minimum burden on our already under resourced health system.

METHODS

A total number of 400 self motivated blood donors were chosen from blood donation drive organized in Sheikh Zayed Medical Institute Lahore, Pakistan. The blood donation drive was organized from 2nd February 2016 to 7th February 2016. Awareness and publicity campaigns were organized in the month of January in district of Lahore via letters to various medical and non medical institutes, social media, banners and educational pamphlets. The participants voluntarily donated blood through a blood donation drive organized by the Hematology department and Blood bank of Sheikh Zayed Post graduate Medical Institute in February. The subjects included both male and females. There was no age limit included. Only residents of District Lahore and voluntary donors of blood were included in this study. Participants were given a donor questionnaire and

also agreement form for future donations after at least eight weeks.

A 2.0ml of venous blood was drawn from the antecubital vein of each donor in a disposable syringe, and transferred immediately to a purple vacutainer containing ethylene diamine tetra acetic acid (EDTA) as an anticoagulant. ABO blood grouping was determined by slide method using commercially prepared anti sera, anti A, anti B, anti AB (Plasmatec Kent, UK). Presence of Rh "D" antigen was determined by anti-D (Biotec Laboratories Ltd UK). For Rh-negative donors, Du test was done. Blood was collected under WHO guidelines and screened accordingly for HBV, HCV, HIV and Syphilis only subjects whose blood samples completely satisfied the screening criteria for HBV, HCV, HIV and Syphilis, according to WHO were included. Data was analyzed using SPSS version 20.0.

RESULTS

Out of the 400 healthy subjects, 165(41.25%) were males and 235(58.75%) were females as shown in Table 1. The distribution of ABO and Rhesus blood groups in both genders are shown in Table 2. As shown in table 2 in males B +ve 61(37.0%) and females also B +ve 101(43.0%) was the predominant blood group with a combined percentage of 40.5%. A –ve was the least common blood group with a total percentage of 0.5% comprising of only 2 subjects in the total sample and only present in male donors. In males the rarest blood group was AB –ve with a count of 1 (0.4%) and in females the least common blood group was A – ve with a count of 0 (0.0%). In a descending order the ABO and Rhesus blood groups in the total sample are : B +ve 40.5%, O +ve 26.5 %, A +ve 24.0%, AB +ve 2.8%, B – ve 5.0 %, O –ve 0.2%, AB- ve 0.5% and A – ve 0.5%. Total cumulative percentage of Rhesus – ve and Rhesus + ve blood groups was 6.2% and 93.8% respectively. Pearson Chi square test was applied to find any clinical association. P value of < .05 was taken to be significant. There was no significant association found between gender and the blood groups with p value of 0.319, Pearson Chi square value of 8.160 and Likelihood ratio of 0.239.

Table 1 showing total male and female blood donors.

| | Frequency | % | Valid % | Cumulative % |
|--------|-----------|-------|---------|--------------|
| Male | 165 | 41.25 | 41.25 | 41.25 |
| Female | 235 | 58.75 | 58.75 | 58.75 |
| Total | 400 | 100.0 | 100.0 | 100.0 |

Table 2 showing blood groups in both genders.

| Blood group | Male | Female | Total |
|-----------------|--------|--------|--------|
| A+ve | | | |
| Count | 35 | 61 | 96 |
| % within Gender | 21.2% | 26.0% | 24.0% |
| Count | 2 | 0 | 2 |
| A -ve | | | |
| % within Gender | 1.2% | 0.0% | 0.5% |
| Count | 61 | 101 | 162 |
| B +ve | | | |
| % within Gender | 37.0% | 43.0% | 40.5% |
| Count | 10 | 10 | 20 |
| B-ve | | | |
| % within Gender | 6.1% | 4.3% | 5.0% |
| Count | 5 | 6 | 11 |
| AB+ve | | | |
| % within Gender | 3.0% | 2.6% | 2.8% |
| Count | 1 | 1 | 2 |
| AB -ve | | | |
| % within Gender | 0.6% | 0.4% | 0.5% |
| Count | 51 | 55 | 106 |
| O+ve | | | |
| % within Gender | 30.9% | 23.4% | 26.5% |
| Count | 0 | 1 | 1 |
| O-ve | | | |
| % within Gender | 0.0% | 0.4% | 0.2% |
| Count | 165 | 235 | 400 |
| Total | | | |
| % within Gender | 100.0% | 100.0% | 100.0% |

DISCUSSION

According to a study¹² the most prevalent blood group in Pakistan according to studies conducted in major districts and provinces is B +ve with a mean frequency of 32.31%. The least common blood group according to the same study is AB – ve. Our study showed that compared to the general population this was also true in voluntary donors, in which B+ ve blood group was present in 40.50% of the subjects. Also compared to the general population AB – ve was also the rarest blood group present in only 0.5% of the subjects. A study carried out to find out the frequency of different ABO and Rh (D) blood groups among the voluntary blood donors in Rawalpindi / Islamabad area of Pakistan ¹³ showed the same results regarding the AB + ve being the most prevalent blood group in voluntary blood donors. One of the many studies conducted, one study conducted in District Dir Lower Khyber Pakhtunkhwa Pakistan ¹⁴, A + ve was the commonest blood group. However a study conducted regarding distribution of ABO and RH blood group alleles in different populations of southern Punjab, Pakistan¹⁵ showed no significant difference between ABO or Rh allele variation.

Another study conducted at Punjab Institute of Cardiology, Lahore, Pakistan¹⁶ showed the same dominance of B +ve in our population. A study conducted in Poonch District, Azad Jammu and Kashmir of Pakistan¹⁷ showed ABO blood group system in the total sample showing the same trend of prevalence as for the general Indian subcontinent (B > or = O > A > AB). The ABO blood group system in the total sample showed the same tendency of occurrence as for the Indian subcontinent (B > or = O >A> AB). The same course was found among males, but amongst females the order of pervasiveness was different (O> B> A> AB). However, the allelic frequencies in both sexes were in the order of O > B >A. The Rh positive and negative blood group distribution was similar in both genders. Another study conducted in Pakistan¹⁸ showed the percentage of blood groups A, B, AB, and O in patients was found to be 19%, 41%, 10%, and 30% and in the control group, the values were 26%, 31%, 12%, and 31%, respectively. Our study shows that the prevalence of blood groups in voluntary subjects follow the same trend as in other districts of Punjab and different regions of Pakistan. It also shows remarkable similarity to the trends in the sub continent.

A study published in the Lancet¹⁹ suggests that in next decade, blood need for transfusion would increase due to ageing population. All of these examples only prove that more and more studies need to be done on both general population and voluntary blood donors in various regions of Pakistan. More blood donation drives need to be organized to recruit more volunteers so as to replete the blood banks. Also more data and more researchers are required to fill in the gaps still present in the blood grouping and the advancements regarding them in Pakistan.

CONCLUSION

Our study showed that B +ve is the most prevalent blood group in both and female voluntary blood donors in District Lahore. A – ve is the least prevalent , especially in the female donors. These results comply with other studies conducted in different regions of Pakistan and also its neighboring countries. Blood donation drives should be organized at a massive scale to ensure that enough data collection and also to make blood banks sufficient. These voluntary donors are more reliable, target exactly the same requirement as of the blood banks, more consistent and cost free source of blood.

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