Original Article

FREQUENCY OF ABO & RHESUS BLOOD GROUPS IN BLOOD DONORS IN PUNJAB

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ABSTRACT:

Objective: To document the frequency of ABO & Rhesus blood groups in the blood donors in Punjab.

Design: ABO & Rh grouping was done on all prospective voluntary / replacement blood donors donating blood at major teaching hospital blood banks throughout Punjab over a period of four months from June 2003 to September 2003. The frequency of ABO & Rhesus blood groups in both sexes has been analysed.

Settings: Data from all teaching hospital blood banks located at Bahawalpur, Multan, Faisalabad, Lahore and Rawalpindi have been analysed.

Subjects: All voluntary or replacement first time blood donors aged 18-60 years of both sexes have been included in this study.

Main outcome measures: Documentation of frequency of ABO & Rhesus blood groups in blood donors in both sexes in Punjab.

Results: Out of a total of 78768 blood donors, 73322(93.1%) were males and 5446 (6.9%) were females. 94.1% amongst males, while 91.9% amongst females were found to be Rhesus positive. The frequency of Rhesus negative groups in males and females is 5.9% and 8.1% respectively. The frequency of A, B, 0 & AB groups in rhesus positive male donors is 22.6%, 32.4%, 30.5% and 8.6%, while amongst female donors it is 21.5%, 31.6%, 31.0% and 7.8% respectively. Amongst rhesus negative male donors the frequency of A,B, O & AB is 1.46%, 1.85%, 2.22% & 0.39%, while amongst female donors it is 1.76%, 2.74%, 3.13%, & 0.51% respectively.

Conclusions: The donor population is predominantly rhesus positive. The blood groups in the order of frequency in rhesus positive donors are B,O,A,& AB; while in rhesus negative donors it is O,A,B,& AB respectively.

KEY WORDS: Frequency ABO & rhesus groups Punjab, Pakistan

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INTRODUCTION

The ABO blood group system was the first human blood group system to be discovered by Landsteiner. Later, Wiener defined the Rh-Hr system. Together these two systems have proved to be of vast importance for blood transfusion. The regular presence of anti-A and anti-B is utilised in the determination of ABO blood groups. In addition, known red cells are used to detect A or B antigens in the serum, by a process called 'reverse' grouping. Similarly, as D antigen is by far the most immunogenic of the Rh antigens, reaction with anti-D is utilised in clinical practice to classify blood into Rh positive or Rh negative groups. Sub-groups of A and B and the completeness with which the Rh phenotype can be determined depend on the antisera available. In routine practice such sub-classifications are seldom needed.

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Apart from differences amongst species, differences between the individuals of the same species have also been demonstrated. During the World wars, it was discovered for the first time that the frequency of ABO and Rhesus blood groups was different in persons native to different parts of the world. Attempts have been made to classify the racial groups of mankind according to incidence of known blood groups[1].

The frequency of ABO and Rh phenotypes in different populations have been extensively studied. The racial and ethnic variations in the frequency of the different phenotypes provide important epidemiological data regarding population migration and inter-marriages. Different blood groups have been shown to be particularly associated with different diseases as well[2,3]. With increasing technological developments in the field of transplantation, search for organ donors has gained impetus. It was therefore worthwhile to document the frequency of ABO & Rh phenotypes in the different regions of Pakistan. Since most of our blood donors are first-time voluntary or replacement donors, the data, in a way, reflects on the phenotypes in the general population aged between 18-60 years in both the sexes.

SUBJECTS AND METHODS

During a span of four months from June 2003 to September 2003, 78768 blood donors of both sexes were tested for ABO & Rhesus group using Anti-A, Anti-B, Anti-AB and Anti-D antisera. Rhesus negative groups were confirmed by two potent monoclonal IgM Anti-D antisera. Groupings were carried out at all teaching hospital blood banks affiliated with the Institute of Haematology & Blood Transfusion Service, Punjab, located at Lahore, Faisalabad, Multan, Bahawalpur and Rawalpindi. Appropriate records were maintained. This data has been reviewed & analysed for sex distribution and frequency of ABO and rhesus groups.

RESULTS

During a period of four months, a total of 78768 donors donated blood at different blood units throughout Punjab. All donors were aged between 18-60 years. 73322 (93.1%) were males, while 5446(6.9%) were females. (Table-I)

Table-I: Distribution of blood donors

Blood donors	*No. of blood donors*	*Percentage of donors*
Male	73322	93.1
Female	5446	6.9
TOTAL	78768	100.0

Table–II shows the distribution of rhesus group in the donor population. It can be seen that females show a relatively higher frequency of rhesus negative group(8.1%) as compared to males(5.9%). Of the total donors 6.1% were found to be rhesus negative.

Table-II: Distribution of blood donors & percentage

Frequency of rhesus groups in the donor population

Blood donors	*No. of rhesus positive donors*	*% freq.*	*No. of rhesus negative donors*	*% freq.*
Male	68978	94.1	4344	5.9
Female	5005	91.9	441	8.1
TOTAL	73983	93.9	4785	6.1

The distribution of ABO blood groups in males(both rhesus positive and rhesus negative donors) is shown in Table-III. Amongst rhesus positive male donors, Blood group B was found to be the most prevalent group(32.4%), followed by group O(30.55%), group A(22.6%) and group AB(8.6%). Amongst rhesus negative male donors blood group O is the commonest(2.22%), followed by group B(1.85%), group A(1.46%) and group AB(0.39%).

Similarly, Table-IV shows the frequency distribution of ABO groups in females, (both rhesus positive and rhesus negative) blood donors. Amongst rhesus positive female donors, Blood group B was found to be the most prevalent group(31.6%), followed by group O(31.0%), group A(21.5%) and group AB(7.8%). Amongst rhesus negative female donors blood group O is the commonest(3.13%), followed by group B(2.74%), group A(1.76%) and group AB(0.51%).

Table-III: Frequency distribution of ABO blood groups in rhesus positive & rhesus negative male donors

Blood groups	*No. of rhesus positive blood donors*	*% freq.*	*No. of rhesus negative blood donors*	*% freq.*
B	23734	32.4	1354	1.85
O	22390	30.5	1628	2.22
A	16581	22.6	1070	1.46
AB	6273	8.6	292	0.39
TOTAL	68978	94.1	4344	5.9

Table-IV: Frequency distribution of ABO blood groups in rhesus positive& rhesus negative female donors

Blood groups	*No. of rhesus positive blood donors*	*% freq.*	*No. of rhesus negative blood donors*	*% freq.*
B	1720	31.6	149	2.74
O	1688	31.0	168	3.13
A	1172	21.5	96	1.76
AB	425	7.8	28	0.51
TOTAL	5005	91.9	441	8.1

DISCUSSION

The ABO and Rhesus blood group systems are the most commonly utilized grouping systems in blood transfusion. These systems also play an important role in transplantation, hereditary diseases, genetics and in determining migration of races. The association of different blood groups with diseases is important as some of the blood groups are particularly prone to developing certain diseases[2,3].

The particular type of blood group a person inherits depends on the genes that encode for that blood grouping system. Within this system, the frequency of distribution of these genes varies and their phenotypes can reveal important information, including forensic evidence.

The frequency of ABO & Rhesus phenotypes varies in different populations throughout the world. South American Indians all belong to group O. The commonest groups in Australian aborigines are O and A; in Lapps, and in Europeans there is a higher frequency of A_2, while in Africans B group is much commoner[4]. In the United States of America, 46% constitute group O, 41% A1, 9% B and 4% AB[5]. In Saudi Arabia, 52% of the individuals are group O,24% group A, 17% group B & 4% group AB[6]. In Ahwaz (Iran), according to one study, 41.16% are group O[7].

In so far as the distribution of the rhesus group is concerned, the frequency in the English population of rhesus positive individuals is 95%[8]. In the US, 85% belong to the rhesus positive group[5], while in Saudi Arabia, 93 % of male blood donors were found to be rhesus positive[6]. In Ahwaz region of Iran, 90% were found to Rh-positive[7]. The frequency of D negative varies from 20-40% in Basques to 0-1% in Japanese, Chinese, Burmese, Melanasians, Maoris, American Indians and Eskimos[8].

In Pakistan, racial variation is seen in the different provinces; Group O is the commonest in Sindh (37.78%) and in Baluchistan(35%)[9,10]. The predominant group in Punjab and NWFP is group B. We have identified a frequency of B group in Punjab as 32.4%. A study in Bannu (NWFP) region of Pakistan reports a frequency

of Group B as 36.23%[11]. Our results are consonant with previous studies[12,13].

In the population that we studied, the frequency of rhesus positive donors was 93%, while 7% were rhesus negative. These figures are also in conformity to other studies carried out in Punjab[12,14]. In all the other provinces as well, Rhesus positive group is the predominant group and the frequency is more or less the same[10-14].

This study provides useful and reliable geno-geographical information. With advancements in the field of transplant & forensic medicine such population mapping can be of immense help.

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