Original Article

Trend of Blood Groups and Rh Factor in the District Swabi

Blood Groups and Rh Factor

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ABSTRACT

Objective: To determine frequency of ABO and Rh (D) blood groups among blood donors in district Swabi.
Study Design: Observational / descriptive study.
Place and Duration of Study: The study was conducted at BGKMC Hospital in collaboration with physiology Department, GKMC from 1st January 2015 to 31st December 2015.
Materials and Methods: A total of 2120 healthy adult, blood donors (both volunteer and directed) from district Swabi were included. The data was collected from the record of Bacha Khan Group of Teaching hospitals in collaboration with department of Physiology.
Results: Among ABO blood groups "B" (31.42%) was the most prevalent, followed by "A" (30.47%), "O" (29.53%) and "AB" (8.58%). Group Rh positive (93.11%) was more prevalent than Rh negative (6.88%). Similarly B^{+ive} (28.76%) was most frequent followed by A^{+ive} (28.41%), O^{+ive} (27.64%), AB^{+ive} (8.3%), B^{-ive} (2.64%), A^{-ive}(2.08%), O^{-ive}(1.89%) and AB^{-ive} (0.28%).
Conclusion: Blood group 'B' was most frequent among the ABO blood groups and Rh (D) positive among Rh blood groups while B^{+ive} was the most frequent blood group in the study population.
Key Words: ABO blood group, Rh (D) blood group, Swabi

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INTRODUCTION

The typical sources of blood transfusion are either autologous transfusion or homologous transfusion. The latter is much more common than the former. Using another's blood must first start with donation of blood. However this becomes only possible after the discovery of ABO blood group system which was discovered by Karl Landsteiner by year 1900. Landsteiner was awarded the Nobel Prize in Physiology or Medicine in 1930 for his work.[1] Later he also discovered the Rhesus factor in 1937. Uptil now more than 30 blood group systems with more than 600 antigens have been discovered but ABO and Rh remains clinically important antigens in human transfusion. The central principle of the ABO system is the presence or absence of antigen A and B on the cell surface membrane. Due to immunological tolerance only toward what occurs in their own bodies humans express isoanti bodies – antibodies against isoantigens, natural components present in the bodies of other members of the same species but not themselves. So the person having A antigen will be have blood group A and anti B antibodies.

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Person having B antigen will have blood group B and anti A antibodies. Person with both A and B antigen on red cell membrane will be labeled as blood group AB and will possess no antibodies against its antigen however person with neither A nor B antigen will have blood group O and will have both anti A antibodies and anti B antibodies[2]. In addition there are more than 40 different kinds of Rh antigens. The most significant Rh antigen is RhD. When RhD is present on the red cell surface, the red cells are called RhD positive. These antigens are under control of three allelic genes, A, B and O, situated on the long arm of chromosome 9. Rh antigens are determined by three pairs of closely linked allelic genes located on chromosome 1[3]

Before a recipient receives a transfusion, compatibility testing between donor and recipient blood must be done. Before a blood transfusion, two blood tests known as a "type and cross match" are done. More specifically, the donated RBCs must lack the same ABO and Rh D antigens that the patient's RBCs lack. However, in practice, donor blood may still be incompatible because it contains other antigens that are not routinely typed but may still cause a problem if the recipient's serum contains antibodies that will target them. Therefore, a "cross match" is done to ensure that the donor RBCs actually do match against the recipient's serum[4].

To perform a cross match, a small amount of the recipient's serum is mixed with a small amount of the donor RBCs. The mixture is then examined under a microscope. If the proposed transfusion is incompatible, the donor RBCs is agglutinated by antibodies in the recipient's serum.

No comparative study is reported in literature regarding the population of Swabi with reference to distribution of ABO antigens in the region.

The aim of the present study was to record the various blood groups among the population of Swabi, Pakistan, and also to compare the data with the population of other areas of Pakistan, as well as some other countries of the world, with a view to generate data with multipurpose future utilities for the health planners and also see the common trend of the prevalence of various blood group

MATERIALS AND METHODS

This study was conducted at Bacha Khan group of Teaching Hospitals in collaboration with Physiology Department from 1st January 2015 to 31st December 2015. A total number of 2120 individual were taken from record book of blood bank. All of the selected individual belong to District Swabi, and were between the ages 18-50 years. A usual method of blood collection was used in all individuals. Two ml blood was drawn from the ante-cubital vein of each donor in a disposable syringe, and transferred immediately to a tube containing ethylene diamine tetra acetic acid (EDTA).

ABO and Rh (D) blood grouping was done by the classical slide method (direct) using ABO Antisera and Rhesus monoclonal Antisera of Bio laboratories. The data was compiled and then analyzed for frequency of ABO and Rh (D) blood grouping by using MS Office 2007.

RESULTS

Table 1 shows the frequency of blood ABO group, indicating that among ABO blood groups "B" was most prevalent with a frequency of 31.42 % followed by "A' with a frequency of 30.47 % , "O" with a frequency of 29.53 % and "AB" with a frequency of 8.58 %

Table No.1: Frequency of ABO Blood Groups among Blood Donors in Swabi

	A	B	O	AB	Total
Frequency	646	666	626	182	2120
Percentage	30.47 %	31.42 %	29.53 %	8.58 %	100%

Table 2 shows the frequency of blood ABO group in male and female, indicating that the percentage of male blood donors were 76.63%, 72.37%, 87.70% and 87.36 in blood group A, B, O and AB respectively while the %ages of female blood donors were 23.37%, 27.62%, 16.29%, 12.63% in blood group A, B, O and AB respectively.

Table No.3: Frequency of RH blood groups among blood donors in Swabi

	A	B	O	AB	Total
Rh Positive	602	610	586	176	1974 (93.11 %)
Rh negative	44	56	40	6	146 (6.88 %)

Table 3 shows the frequency of blood Rh group, indicating that between Rh (D) blood groups the frequency of Rh positive was 93.11 % (1974) and Rh negative was 6.88 % (146).

Table 4 shows the frequency ABO and Rh grouping pattern, indicating that B+ve was most frequent (28.76%) followed by A+ve (28.41%), O+ve (27.64%), AB+ve (8.3%), B-ve (2.64%), A-ve (2.08%), O-ve (1.89%), and AB-ve (0.28%).

This study shows a mixed distribution of ABO blood groups with a high prevalence of Rh positive phenotype.

Table No.2: Frequency of ABO blood groups on gender basis among blood donors in Swabi

	A		**B**		**O**		**AB**		**Total**
Gender	M	F	M	F	M	F	M	F	
Frequency	495	151	482	184	524	102	159	23	2120
Percentage	77%	23%	72%	28%	84%	16%	87.%	13%	

Table No.4: Frequency of blood (ABO and Rh) Groups among blood donors in Swabi

Blood Group	A+ve	B+ive	O+ive	AB+ve	A-ive	B-ive	O-ive	AB-ve	Total
Frequency	602	610	586	176	44	56	40	6	2010
% age	28%	29%	28%	8%	2.%	3%	2%	0.28%	

Table No.5: Distribution of ABO and Rhesus blood groups in Pakistan

Blood group	Nowshera (KPK)	Bannu (KPK)	Mardan (KPK)	Rawalpindi/ Islamabad	Lahore	Mirpur (AJK)	This Study
A	27.12%	31.03%	24.75%	25.53%	24.14%	25.93%	30.47 %
B	32.40%	36.23%	27.97%	33.33%	33.80%	32.59%	31.42 %
O	29.80%	25.07%	27.93%	31.10%	33.10%	24.20%	29.53%
AB	11.04%	7.67%	19.36%	10.04%	8.96%	17.26%	8.58%
Rh +ve	92.88%	89.23%	94.30%	92.45%	93.21%	83.60%	93.11%
Rh -ve	7.12%	10.77%	5.70%	7.55%		16.40%	6.88%
References	(5)	(6)	(7)	(8)	(9)	(10)	

Table No.6; Global distributions of ABO and Rhesus blood groups.

Country	A	B	O	AB	Rh +ve	Rh -ve	Reference
India	22.2	36.4	31.7	9.4	91.75	8.25	(12)
Britain	42	8	47	3	83	17	(13)
Nepal	34	29	32.5	4	96.7	3.3	(14)
Saudi Arabia	33.4	6.0	56.8	3.8	92.8	7.2	(15)
USA	42.0	10	44.0	4.0	85.0	15.0	(16)
Bangladesh	26.6	23.2	40.6	9.6	96.8	3.2	(17)

DISCUSSION

The success of human blood transfusion requires compatibility for the two major blood groups. For this blood of donor and recipient is type and screen. This was only possible after the discovery of ABO and Rh blood group by Karl Landsteiner; Number of studies `was carried out to find the distribution of ABO blood groups antigen in different population group. Similarly in Pakistan researchers have done similar studies on different geographical and ethnic populations.

From these studies a mixed pattern of relative frequency of ABO and Rhesus blood groups is evident. This study follows the pattern of B>A>O>AB such pattern is also supported by studies in Bannu by Khan et al[5] and Mirpur (AJK) by Chishti and associates[6] . Reasons may be cultural, genetic or high percentage of marriages within the families. The differences in the frequencies of blood group in different races could be explained as part of evolution with random genetic drift and natural selection genetic drift in different races can be because of evolution and natural drift. However it is evident from studies in Pakistan that phenotype B is most prevalent and phenotype AB least prevalent. Rh (D) positive was the predominant Rh phenotype throughout Pakistan with a prevalence ranging between 89.58 % to 94.30 %

As shown in table 2 gender wise distribution of ABO phenotype shows a dominance of male donors. The result clearly indicates the higher % of male donors than female. The result of our study are different from study conducted in Gujranwala showing almost equal distribution of blood group on basis of gender among blood donors [7]. This difference may be due regional variation in cultural norms. AsPakhtoon are more conservative about their females and could also be related to less awareness among female community of the region. Also the developmental prospects of the two regions may also be a contributing factor towards this difference.

There is a wide variation of ABO blood group in different population around the globe as evident from table: 5. The Indian study[8] support the pattern of B>O>A>AB in some Asian studies.[9,10,11] However another study from Bagalkot, India has shown phenotype O to be more prevalent as compared to B[12]. Similarly result of Bangladesh, Nepal, Saudi Arabia studies[13,14,15,] shows result like European pattern O>A >B >AB. While another study from Bangladesh has shown that phenotype B is more prevalent than Phenotype A[16]. These results show that there are regional differences in the countries due to ethnic geographical and genetic differences. The differences in the study may also be because of differences in sample size and study design. 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 like association of diseases to blood groups, genetic information, genetic counseling, association of blood groups to various diseases like A and O blood group associated with carcinoma of stomach and duodenal ulcer and also for the general safety of individuals. Therefore further studies are required to be done on general population with large sample size.

CONCLUSION

In the current study 'B' was the most frequent among the ABO blood groups and Rh (D) positive among Rh blood groups.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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