

ORIGINAL ARTICLE

ABO AND RHESUS BLOOD GROUP DISTRIBUTION IN RESIDENTS OF KARACHI.

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ABSTRACT

BACKGROUND: Blood transfusion till recently was a life threatening procedure until the discovery of ABO blood groups. Today committee of League of Nations has recommended A, B, AB & O classification for general use. This study was aimed to determine the frequency of ABO and Rh blood groups in residents of Karachi, so that necessary measures should be taken to maintain the blood product inventory.

METHODS: A study was conducted at Dr. Ziauddin Hospital Clifton laboratory Karachi, Pakistan over a period of 07 months from 1st June- 31st Dec 2016. Healthy blood donors and patients requiring blood products of different age groups were included. After an informed consent, blood grouping was performed by taking blood samples under aseptic measures in EDTA and Gel separating serum tubes for ABO & Rh blood grouping by tube method.

RESULTS: A total of 1583 individuals presented during the study period with 868 (54.8%) males and 715(45.2%) females. Blood group O+ve was found to be more common (31.9%) followed by B+ve (31.2%). In Rh system, Rh+ve (97.2%) were more common than Rh negative (2.8%) blood groups.

CONCLUSION: This study was carried out to maintain the blood product inventory concerning the management of blood bank and transfusion services for the patient.

KEYWORDS: Blood groups, ABO, Rhesus (Rh)

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INTRODUCTION

Humans share the same blood group systems even though they differ in the frequencies of specific types. ¹ Blood is indispensable, deliver nutrients to tissues and remove their metabolic waste products. It accounts for about 7% of total body weight. ² Basic element of blood is plasma and cells, in which the red blood cells are the major constituent. The structural membrane of the RBC consists of various antigens of which the most prevalent are the ABO and Rhesus antigens. ³ A, B, AB, & O are the four major blood groups. RBC's that possess the D antigen on their membrane are known as rhesus positive.⁴ Such blood groups are widely considered to be genetically determined.⁵ The ABO blood grouping system was devised in 1900 by an Austro-

lian scientist, Karl Landsteiner, who was a Nobel prize winner. Blood grouping is a crucial component of blood transfusion, anthropology, and organ transplant.⁶ Blood groups are also known to be associated with various diseases such as diabetes mellitus, stomach and duodenal ulcers, as well as carcinomas.⁷ Rh compatibility screening has established its role in the field of obstetrics by preventing hemolytic disease of the new born. The incidence of Rh and ABO groups varies according to race as well as geographic location. Within Pakistan, variations exist even in its different areas. This study has been conducted on 1583 non-numerated participants and aim to determine the frequency of various ABO and Rh blood groups in a population of Pakistan's largest and most ethnically diverse city, Karachi.

METHODS

A sample of 1583 subjects (Donors & Patients) of both sexes (Male & Female) were included in this study conducted over a period of 07 months from 1st June 2016 to 31st Dec 2016. Samples were drawn in Dr. Ziauddin Hospital Clifton laboratory Karachi, Pakistan. Blood was collected by vein puncture into Ethylene Diamine Tetracetic Acid (EDTA) Purple Top anti-coagulated tube for red cell antigen detection and red top (gel tube) for serum antibody testing. Red cell phenotyping for ABO & Rh was carried out using standard tube technique as described by Judd Ray & Dreclu for forward blood grouping i.e. red cell antigen testing single drop of commercially prepared antisera Anti-A, Anti-B, & Anti-D was placed in clean test tube labeled as Anti-A tube, Anti-B tube & Anti-D tube. In each tube a drop of 5% suspension of red cells mixed with saline was added. However, in reverse grouping i.e. for antibody testing 2 drops of serum were added in clean tubes labeled as A Cell, B Cell, O Cell tube and single drop of commercially prepared cells of A, B & O were added to these tubes. The contents were mixed gently and centrifuged for 20 seconds at 2500rpm. The cell buttons were re-suspended & observed for agglutination / clumping of RBC. If

agglutination was observed in a tube, it implied presence of antigen and/or antibody in that tube, and if agglutination was not found, it meant absence of antigen and/or antibody in that tube.

RESULTS

A total of 1583 subjects including 868 males and 715 females were tested for ABO & Rh blood groups in Karachi. O+ve blood group was found to be more common (31.9%) followed by group B+ve (31.2%), Group A+ve (23.06%), AB+ve (10.9%), A-ve (0.95%), O-ve (0.82%), B-ve (0.76%), and AB-ve (0.25%) respectively. In Rh system, Rh+ve (97.2%) were more common than Rh negative (2.7%) blood groups (Table 1). Amongst 54.83% males, there were 13.39% blood group A, 17.75% blood group B, 17.75% blood group O and 5.94% blood group AB respectively. In 45.17% females, there were 10.61% blood group A, 14.28% blood group B, 14.97% blood group O and 5.31% blood group AB, respectively. Rh Positive blood group was seen in 53.2% males and 43.97% females. The Rh negative blood group was least prevalent with 1.58% in males and 1.2% in females (Table 2).

Table 1: Commonest ABO & Rh Blood Group

Blood Group	Gender	Total with %	
A +ve	Male	201 - (12.70%)	365 - (23.06%)
	Female	164 - (10.36%)	
B +ve	Male	275 - (17.37%)	495 - (31.27%)
	Female	220 - (13.90%)	
O +ve	Male	275 - (17.37%)	505 - (31.90%)
	Female	230 - (14.53%)	
AB +ve	Male	92 - (5.81%)	174 - (10.99%)
	Female	82 - (5.18%)	
A -ve	Male	11 - (0.69%)	15 - (0.95%)
	Female	4 - (0.25%)	
B -ve	Male	6 - (0.38%)	12 - (0.76%)
	Female	6 - (0.38%)	
O -ve	Male	6 - (0.38%)	13 - (0.82%)
	Female	7 - (0.44%)	
AB -ve	Male	2 - (0.13%)	4 - (0.25%)
	Female	2 - (0.13%)	
Rh Pos	Male	843 - (53.25%)	1539 - (97.22%)
	Female	696 - (43.97%)	
Rh Neg	Male	25 - (1.58%)	44 - (2.78%)
	Female	19 - (1.20%)	

Table 2: Percentage of ABO & Rh Blood Groups with gender distribution

Blood Group	Male	Female	Total
A	212 - (13.39%)	168 - (10.61%)	380 - (24.01%)
B	281 - (17.75%)	226 - (14.28%)	507 - (32.03%)
O	281 - (17.75%)	237 - (14.97%)	518 - (32.72%)
AB	94 - (5.94%)	84 - (5.31%)	178 - (11.24%)
Rh Pos	Male	843 - (53.25%)	1539 - (97.22%)
	Female	696 - (43.97%)	
Rh Neg	Male	25 - (1.58%)	44 - (2.78%)
	Female	19 - (1.20%)	

DISCUSSION

The ABO blood group tube testing method since its discovery has proven to be the most reliable and accurate method for detecting ABO blood group antigens. It has an established role in clinical settings, like blood transfusion, organ transplant as well as disputed paternity medico legal cases and association with various diseases⁸ like squamous cell carcinoma, basal cell carcinoma and pancreatic carcinoma.^{9,10,11}

Information about the frequency of ABO blood groups is also an important tool to find out the direction of recruitment to voluntary donors across the country.¹² Our study was carried out in Karachi which is a Metropolitan and largest city of Pakistan, located in the province of (moving) Sindh. Blood group O was found to be the most prevalent (32.7%) group in our study. The frequency of blood group O in males was 17.7% where as in females it was 14.9%. The ABO blood group system in our study showed a prevalence trend of O > B > A > AB. Our findings were consistent with the study conducted in Rawalpindi, located in Punjab province of Pakistan, which also reported blood group 'O' as more prevalent group in that region.¹³ Studies conducted in other region like Turkey, Germany, Hungary, Ukraine and Nigeria also revealed that blood group 'O' was more prevalent.¹⁴⁻¹⁷

In other cities of Pakistan, the frequency of blood groups A,B,AB & O were 28%, 34%, 7% & 31% in Peshawar, 28%, 30%, 9% 33% in Swabi, 18%, 24%, 5% & 53% in Wah Cantt, 24%, 32%, 11%,33% in Hazara and 21%, 36%, 6% & 37% in Bahawalpur respectively. The frequency of A,B, AB & O blood groups were 34, 29, 4 & 33% in Nepal,¹⁸ 38%,10%, 3%, 49% in Australia,¹⁹ 41.7%, 8.6%, 3%,46.7% in Britain,²⁰ and 41%, 9%, 4%, 46% in USA respectively.²¹

Our study showed 97.2% of Rhesus positive and 2.78% negative phenotypes, where as in other regions of Pakistan the frequency of Rh + and

Rh-blood group were 67.2% & 32.8% in Bannu, 72.9% & 26.1% in Islamabad, 71.7% & 26.3% in Lahore, 79.5% & 20.5% in Gujrat, 76.8% & 23.2% in Peshawar and 73.9% & 26.1% in Wah Cantt respectively. 22-27 Rh + & Rh -ve frequency in various parts of world were 96.7% & 3.3% in Nepal,¹⁸ 83% & 17% in Britain,²⁰ 85% & 15% in USA²¹ and 94.45% & 5.55% in India.²⁸

The difference in frequencies in regional studies of Pakistan needs to be explained further. However, our figures are closer to many international studies. Apart from blood transfusion services to prevent dangerous transfusion reactions, the knowledge of blood groups in the region helps in taking preventive measures against a wide variety of diseases e.g. carcinomas and cardiac vascular disease. Various studies show strong association of blood group A to ischemic heart disease while those with blood group 'O' have a preventive effect against it.²⁵

So it is advisable to perform blood grouping studies in every region as it will not only provide a data for future studies to prevent blood transfusion reactions but it will also decrease the incidence of serious disease.

CONCLUSION

This study was carried out to maintain the blood product inventory concerning the management of blood bank and transfusion services for the patient.

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