

ABO AND RHESUS BLOOD GROUP DISTRIBUTION IN URBAN AREA OF SOUTHERN PUNJAB
MULTAN PAKISTAN

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Abstract: This study was conducted to find out the distribution of ABO phenotypes frequencies in urban area of Southern Punjab Multan Pakistan. A total of 1087 subjects (both male & female) were taken and their blood samples were tested for ABO blood group & Rh. by using anti sera of ABO blood grouping i.e. Anti-D, Anti-A and Anti-B, and confirmed by standard technique. Doubtful results were checked by tube method. The data was analyzed by applying Pearson correlation and chi square test. In the present study overall prevalence of blood group & Rh. positive was 997/1087 (91.72%) as compared to 90/1087 (8.28%) blood group & Rh. negative ($P < 0.05$). It is a part of evolution with a natural and random genetic drift selection. ABO blood group types were equally distributed but there was no significant difference in both sexes. However, among ABO blood group & Rh positive; dominance frequency was 'B' positive with 373 (34.32%) followed by 'O' positive 293 (26.95%), 'A' positive 218 (20.06%) and 'AB' positive with frequency of 113 (10.40%) respectively, and among ABO blood group & Rh. negative; 'O' negative was more prevalent with 42 (3.86%) followed by 'B' negative 23 (2.12%), 'A' negative 22 (2.02%), and 'AB' negative with frequency of 03 (0.28%) respectively. In the present study ABO blood group 'B' positive was dominant as compared to other ABO blood groups & Rh positive ($P > 0.05$). Analysis of the data collected in the present study indicated that there was a dominant frequency of ABO blood group & Rh. positive as compared to Rh. negative, and blood group 'B' positive was dominant as compared to other ABO blood group types. The determination of the frequency of ABO blood group types in urban area Southern Punjab Multan would help us in understanding the distribution of ABO phenotypes. Whereas, the differences of ABO blood group's frequencies in different races and regions is a part of evolution with a natural and random genetic drift selection.

Keywords: rhesus, ABO blood group, antigens, dominance, genetic draft, correlation

Introduction

The frequency of ABO blood group types are distributed variably in different regions and races. The differences of ABO blood groups frequencies in different races is a part of evolution. Blood group is genetically determined antigen, detected on the surface of the cell by specific antibodies and classified into four groups i.e. A, B, AB and O (Land-Stainer and Wiener, 1940). Others blood groups exist but known blood groups are 15 types. ABO & Rhesus blood group system has importance in transfusion of blood and organ transplant. It has also importance in ancestral relation, genetic and evolution of humans. ABO blood system has reactive agglutinins in the serum that not have corresponding antigens. In addition, few researches have showed an association between different diseases and ABO blood group system (Pinkston and Cole, 1996). It has been observed by Garratty (2005) that blood group ABO antigens do have a biological role and various sure link with diseases to ABO blood group type was

observed e.g. blood group A is linked with higher risk of cancer, and blood group O is associated with lower risk of cancer (Bai-Lin *et al.*, 2014; Naeem *et al.*, 2020ab). Khan (1988) studied the distribution of ABO blood group types in Britain & USA and reported that incidence of blood group 'A' and 'O' were more common there. Similar results were also observed in Saudi Arabia by Moslem and Shashi (1989). While population of Egyptians has no blood groups 'A' and 'AB' negative and it may be characteristic of Egyptians population. Blood group 'A' was more common in Europe particularly in Central Europe reported by Daeen (2005), similarly blood group 'A' was more common in west Bengal reported by Datta *et al.*, (1997) and, blood group 'B' was more common in Northern India and in Central Asia reported by Encyclopedia (2002). Generally Pakistani population has high prevalence of blood group 'B', while in some part of Pakistan blood group 'B' was reported dominant, while in other part blood group 'O' was dominant as reported by Shah *et al.* (1990) and Mabood *et al.*, (1993). Therefore, it is

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no doubt that occurrence of ABO blood group varies in different regions, races and from community to community and some races has dominance of one blood group than others.

Materials and methods

The current survey was conducted to find out the ABO blood group & Rh. frequencies in urban area of Southern Punjab Multan Pakistan. Blood sample was drawn; using disposable syringes by venous puncture and instantly shifted into EDTA vials and stored at -20^o C until used for biochemical analysis. Total blood samples were collected from 1087 subjects visited at private laboratories for blood donation, and brought these blood samples labeled by subject name, age and sex to the well-equipped lab at Institute of Pure and Applied Biology Bahuddin Zakariya University Multan for the analysis. Blood samples of patients were tested for ABO blood group & Rh. by using ABO blood grouping anti sera i.e. Anti-D, Anti-A and Anti-B and confirmed by standard technique. If red blood cells showed agglutination by mixing with Anti- A, it was called type blood group A, if red blood cells showed agglutination by mixing with Anti- B, it was called type blood group B, if red blood cells showed no agglutination with Anti- A and with Anti- B, it was called blood group O, and if red blood cells showed agglutination by mixing with

Anti- D, it was called Rh. Positive if no agglutination called Rh. Negative. Doubtful results were checked by tube method. The data was analyzed by applying Pearson correlation and chi square test.

Results

A total of 1087 subjects (505 men, 582 women) were included in this study based on a detailed questionnaire for epidemiological studies and overall prevalence of blood group & Rh. positive was 997/1087 (91.72%) as compared to 90/1087 (8.28%) blood group & Rh. negative (P< 0.05). It is a part of evolution with a natural and genetic drift selection. ABO blood group types were equally distributed but there was no significant difference in both sexes. However, among ABO blood group & Rh positive; dominance frequency was ‘B’ positive with 373 (34.32%) followed by ‘O’ positive 293 (26.95%), ‘A’ positive 218 (20.06%) and ‘AB’ positive with frequency of 113 (10.40%) respectively, and among ABO blood group & Rh. negative; ‘O’ negative was more prevalent with 42 (3.86%) followed by ‘B’ negative 23 (2.12%), ‘A’ negative 22 (2.02%), and ‘AB’ negative with frequency of 03 (0.28%) respectively. In the present study blood group ‘B’ positive was dominant as compared to another ABO blood groups & Rh positive (P> 0.05).

Table 1. Distribution of ABO & Rhesus Blood Group Types among 1087 Subjects

ABO and Rhesus Blood Group Types	Control Group		Exp. Group		Total	
	N	%	N	%	N	%
O+ive	90	8.28%	203	18.68%	293	26.95%
A+ive	79	7.27%	139	12.79%	218	20.06%
B+ive	107	9.84%	266	24.47%	373	34.31%
AB+ive	44	4.05%	69	6.35%	113	10.40%
O-ive	10	0.92%	32	2.94%	42	3.86%
A-ive	12	1.10%	10	0.92%	22	2.02%
B-ive	4	0.37%	19	1.75%	23	2.12%
AB-ive	0	0.00%	3	0.28%	3	0.28%
Total	346	31.83%	741	68.17%	1087	100.00%

Discussion

The frequency of ABO blood group types are distributed variably in different regions and races. The differences of ABO blood groups frequencies in different races is a part of evolution. ABO blood groups are one set of (antigens), which are genetically determined carbohydrate molecules carried on the surface of membranes of red blood corpuscles (Umit *et al.*, 2008). The biological role of blood groups relates to the presence of chemical on the other cells that were initially identified as red cell antigens and act as receptors for bacteria, parasites or viruses. In the present study the overall prevalence of ABO blood group & Rh. positive was (91.72%) as

compared to (8.28%) ABO blood group & Rh. negative. Overall ABO blood group & Rh. positive and ABO blood group type ‘B’ positive was dominant as compared to ABO blood groups & Rh. negative as shown in Table- 1. Similar results in the population of Lahore were appraised by Umer *et al.* (2014), according to their results more frequent blood group was ‘B’ (37.8 %) followed by ‘O’ (28.8%), ‘A’(24.2%) and ‘AB’ (9.1%) in blood donor, while in rhesus system 93.0% were Rh. positive and 7.0% were Rh. negative. Similarly results of the present study were also appraised by Wikipedia (2017) reported ABO blood group distribution in Pakistan was as follows i.e. blood group ‘B’ positive with

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(34.40%) followed by 'O' positive (24.63%), 'A' positive (20.6%) and 'AB' positive with overall prevalence of (9.52%) respectively and among ABO blood group & Rh. negative; 'O' negative was more prevalent with (4.17%) followed by 'B' negative (3.57%), 'A' negative (2.66%) and 'AB' negative with overall prevalence of (0.45%) respectively.

In the present study as it was observed that in the rhesus system 91.72% were Rh. positive and 8.28% were Rh. negative. The present study results were appraised by Shah *et al.* (1990), according to their results ABO blood group negative was 5% only as compared to ABO blood group positive, this is in accordance to the present study which had showed low frequency of ABO blood group negative as compared to ABO blood group positive. Similar result were by Ilyas *et al.* (2013) who stated that ABO blood group & Rh. positive was dominant with prevalence of 92.03% and 7.97% were with ABO blood group & Rh. negative. In the present study frequency of blood group 'B' was dominant with prevalence of 34.32% followed by 'O' positive 26.95%, 'A' positive 20.06% and blood group 'AB' positive was least prevalent with 10.40% respectively. Similar results were reported by a study carried out from both urban and rural areas of Gujranwala (Pakistan) by Ilyas *et al.* (2013) that mostly common dominant blood group was 'B' with 35.36% followed by blood group 'O' with 32.41%, blood group 'A' with 22.91% and blood group 'AB' was least prevalent with 9.32%. The results of the present study were supported by Babar *et al.* (1999) who also reported similar results that blood group 'B' had highest frequency with prevalence of (32.4%) followed by group 'A' and 'O' were (27.12%) and (29.80%), and group 'AB' had the lowest (11.04%) frequency respectively, and 92.88% subjects were Rh positive, while 7.12% of the population was Rh. negative in District Noshera Pakistan. Similar results were also appraised by Khan *et al.* (2017) that group 'B' (32.0%) was dominant, followed by "O" (29.8%), "A" (27.4%) and "AB" groups with overall lower frequency of (10.8%), while in Rhesus system 93.0% were Rh. +ive and 7.0% Rh. -ive in the population of District Nowshera, Pakistan. The results of the present study were also supported by Carol and Melvin (1973), according to them blood group 'B' had its higher incidence in India and adjacent Central Asia and its occurrence diminishes both towards East and West, falling to single digit percentages in Spain. The prevalence of ABO blood group is distributed variably in different races and regions and could be explained on the basis that the difference of ABO blood group's frequencies in different races and

regions is a part of evolution with a natural and random genetic drift selection. According to the results of the present study it could be explained on the basis that the distribution of ABO blood group Rh. positive and dominancy of blood group type 'B' in our population of Southern Punjab Multan Pakistan is a part of evolution with a natural and random genetic drift selection. However, the need for ABO blood groups study in our population was multipurpose and provided a baseline data for future research. The determination of the frequency of ABO blood groups in this urban area of Southern Punjab Multan would help us in understanding the distribution of 'ABO' phenotypes and association of various diseases.

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