Frequencies of ABO blood alleles in human population of Pakistan: Southern Sindh in Focus.

R BHATTI D M SHAIKH

Department of Physiology, University of Sindh, Jamshoro.

Correspondence To: Rashida Bhatti

The distribution of ABO blood group was studied in a sample of 2910 individual donors and recipients, at random of both sex who have visited the Liaquat Medical College Hospital Hyderabad. The analysis shows that blood group A,B,O and AB individuals are 15.60%, 21.79%, 60.15%, 2.99%, respectively. The allelic frequencies of A,B and O is computed out to be 0.0948,0.1294,0.7756, respectively.

Key Words : ABO, Alleles, frequency.

Red blood cells are the major component of the cellular part of the blood which play an important roll in transport the oxygen for survival of the life. The surface of red blood cells contains larger number of antigenic determinants that are direct or indirect products of genes. These antigenic determinants are classified into blood groups. The most important which is the ABO blood groups system discovered by Karl-Landsteiner (1901). In each blood group system, antigens appears to be inherited as products of a single gene or group of closely linked genes. In ABO blood group system the antigenic determinants are determine by three genes designated as A,B and O genes, which gives rise to four blood groups that is A,B.O and AB. There are a number of blood groups system beside ABO blood group system as MNS (1927), Rh(1940), Lutheran(1945), Kell(1946), Lewis(1946), Duffy(1950), Kidd(1951), Diego(1955), I(1956), Anoberger(1961), Xg(1962) and Dombrock(1965) but many of these are not clinically important as these do not produced severe incompatibility complication, thus no immediate threat to life and they are very rare. The clinical significance of a blood group system depends on two factors: the frequency of antibodies in the population and their relative potency . It has already determined that the A,B,O are potent antigens. The present study is an attempt to determine the ABO gene frequency in the population of Hyderabad city. Where various athenical groups from different areas have settled down since 1947.

Results

Out of total 23910 tested for blood groups 3731, 5202, 596 and 14381 persons were found having blood group A, B, AB and O respectively with the respective percentages of 15.60, 21.76, 2.99 and 60.15, (column 1st, 2nd, 3rd). Frequency distribution of alleles A,B and O individually in the population under study are computed out by using Hardy weinberg law. It indicates that alleles A,B and O, has the frequency distribution of .0948,.1294 and .7756 respectively (column 4th, 5th). On the basis of hardy-weinberg law. The expected

Table. Phenotypic frequencies and the calculated Alleles and expected Genotypic frequencies

Phenotype			Alleles				Genotype	
Class	No. Observed	Percentage Observed	Class	Allelic Frequencies	Class	Expected Frequencies	Expected Phenotypic Frequencies	Chi-Squire Contribution
A	3731	15.60	A	.0948	AA	.0089	3729.95	.0002956
			-	-	AO	.1471	-	-
B	5202	1.74	B	.1294	BB	.0167	5198.03	.0030321
			-	-	O	.2007	-	
AB	596	2.49	-	-	AB	.0245	585.79	.17749547
O	4381	60.15		.7756	OO	6016	14384.26	.000681
Total	23910	-	-	.9998		.9995	23898.03	.1813505

frequencies for all the genotypes have been obtained by using frequencies for blood alleles A,B and O. It has observed for AA=0.0089, for AO=0.1471, for BB=.0167, for BO=0.2007,for AB=0.0245 and OO=0.6016(column 6th,7th). Expected phenotypic frequencies for the blood group classes A,B,AB & O, obtained 3729,5198.03,58.79 & 14384.26 respectively on the basis of expected frequencies of the possible genotypes(column 8th).The chi-square contribution calculated for blood group A,B, AB and O is obtained .295,.003O29, .174906 and .333739 respectively (x^2 component = 0.178123). Our results are quite different for the distribution ABO alleles, as are not similarity to any of the city of Pakistan or India even to its adjacent Dist: pade (Jamshoro). However a slight similarity was found for the frequencies of ABO allele in Vietnam (A =.142 B =.1894 & O =6708) Altaf, et, al, (1993)[1]. Similarly no Significant difference is also found in the observed & expected frequencies with a chi-square value of 0.178123, which is mainly contributed by the AB blood group where `are difference of 10.21 in present. This indicates that the population under study is quite at an equilibrium state according to Hardy-weinberg law. Though the population under study was quite heterogeneous including Sindhi, Balouchi, Saraiki, Urdu Speeking, Pathan and Punjabis like wise dist: Jamshoro.

Discussion

Allelic frequencies computed for all of three blood alleles A,B and O from data obtained by random sampling of 23.910% of both sex walked in L.M.C (Liaquat Medical College Hyderabad),during 1996-1997. Suggest that O allele has highest frequency (.7756) than A and B allele. This is also the highest frequency for O allele in various cities of Pakistan as in Peshawar (.5568)P.M.R.C , 1984, Hazara (.5745) Khaliq et, al (1984)[3], Quetta, (.5736) Afsar Mian Altaf et, al.(1985) and in Jamshoro(.7089).It is also higher then the O allele frequency in various of India, Gujrat(.61) papiha et, al.(1981), Punjab(.61) chahal and papiha,(1981)[4,5], Himachal pardesh(.59) chahalet, al. (1982), Rajasthan(.576), Bihar(.671) Bhattacharjee et, al.(1969)[2];and then various countries of world (Vietnam =.6708, Australia =.6325, USA =.6708, UK =.6856 and Germany = .6557),with the exception of south America where it comprises 100% with frequency of(1.00), Altaf et,al.(1993)[1] The frequency of O allele is followed by the frequency of allele B (.1294) which is significantly higher than the frequency of A(.0948). As the frequency of O blood allele is found highest among the cities of Pakistan and India. The frequencies of A and B alleles are-less in the population. A significant difference is present in the frequency of A and B alleles which is a different pattern from the cities of Pakistan and India just contrary to their pattern in UK, USA, Germany and also from Iraq (Basrah), Shaukat Islam et,al.(1978). Where the frequency of alleles of higher than the frequency of B. Our results are quite unique for the distribution ABO alleles, not similar to any of the city of Pakistan or India even to its adjacent Distt: pade (Jamshoro).A slight similarity was found for the frequencies of ABO allele in Vietnam (A =.142 B =.1894 & O =6708) Altaf et, al.(1993).No Significant difference is found in the observed & expected frequencies with a chi-square value of 0.178123, which is mainly contributed by the AB blood group where are difference of 10.21 is present. This indicates that the population under study is quite at an equilibrium state according to Hardy-weinberg law. Though the population under study was quite heterogeneous including Sindhi, Baloachi, Saraiki, Urdu speaking Pathan and Punjabis likewise District Jamshoro.

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