FREQUENCIES OF BLOOD GROUP ANTIGENS AND CORRESPONDING ALLELES IN THE POPULATION OF MIRPUR, AZAD JAMMU KASHMIR, PAKISTAN

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ABSTRACT

A sample of 3927 subjects was collected from the Mirpur, Azad Jammu Kashmir, Pakistan. A frequency distribution of 26.38%, 32.50%, 9.47% and 31.65% was observed for blood groups A, B, AB and O, respectively, while 91.04% of the subjects being Rh positive. The allelic frequencies were calculated to be 0.2, 0.238 and 0.562 for A, B and O alleles, respectively, and 0.299 for d allele. The data did not show significant differences between males and females during the study period with respect to allelic frequencies of blood groups and was found to be in Hardy-Weinberg equilibrium. The trend of blood groups and allelic frequencies has been compared with other regions of Pakistan.

Key worlds: Mirpur, Azad Jammu Kashmir, Pakistan, blood groups, allelic frequencies.

INTRODUCTION

ABO and Rh blood group systems are the first recognized human polymorphisms at the molecular level. These polymorphisms have been extensively used as genetic markers to study population characteristics. They are also employed in the anthropological studies to appreciate differences between ethnic groups as well as for forensic purposes. Allelic frequency distributions of ABO and Rh blood groups have been reported from various populations all over the world. However, only few studies have been conducted for Pakistan and especially the record from the northern part of the country is scarce (Mian *et al*., 1984, 1985; Mian and Dasti, 1991; Mian and Bhutta, 1993; Bhatti, 1998; Bhatti and Sheikh, 1999). Pakistan comprises a unique assemblage of population showing indigenous groups mixed with several gradients of population influxes from north-west. In the present study we report ABO and Rh blood group polymorphisms from a northern hilly area Mirpur, Azad Jammu Kashmir and compare it with the adjoining as well as other regions of Pakistan.

MATERIALS AND METHODS

A sample of 3927 subjects was drawn from the District Headquarter Hospital Mirpur, Azad Jammu Kashmir, Pakistan during 2002, including the blood donors and patients. The sample comprises 37.43% males and 62.57% females of various age groups representing general population of Mirpur. The blood of each individual was collected through finger prick as described by Amin-ud-Din *et al*. (2004). Phenotyping was performed using the commercially available antisera (anti-A, anti-B and anti-D) on the basis of the pattern of reaction exhibited with the antibodies. The allelic frequencies and respective standard errors were calculated assumingthat the population is in Hardy-Weinberg equilibrium, as described by Mather (1957). Significance of the difference was calculated by using the method of maximum approximation (Mather, 1964). The distribution of blood groups between males and females was compared by employing χ^2 test.

RESULTS AND DISCUSSION

The distribution of blood groups was found to be 26.38%, 32.50%, 9.47% and 31.65% for blood groups A, B, AB and O, respectively. The frequencies for allele A, B and O allele were calculated to be 0.2, 0.238 and 0.56, respectively (Table 1). At Rh locus, 91.04% of the subjects were Rh positive, while 8.96% were Rh negative and the frequency of d allele was calculated to be .299 (Table 2). The allelic and genotypic frequencies at the ABO and Rh loci did not differ significantly from those expected under the Hardy-Weinberg equilibrium. The frequencies of blood groups did not reveal any significant difference between males and females (χ^2 = 2.358; $P<0.05$).

Various blood group systems have been discovered in humans and are extensively studied throughout the world. The diversity of blood groups in human populations is due to genetic drift, migration, allele selection and random effects. The blood group polymorphisms help appreciate the similarities and differences among populations. In the present study blood group B is most prevalent in the overall sample and AB is the rarest. However, O blood group has the highest frequencyin males, where as in females blood group B remains highest. The ABO blood group system shows a general trend of prevalence as B>O>A>AB, and the allele frequencies are in the order O>B>A.

The phenotypic and allelic frequencies of ABO blood group in the present study are not in complete agreement with that of observed in other populations of central and southern cities of Pakistan (Mian *et al*., 1984; 1985; Bhatti and Shaikh, 1998). However, they run very close to the frequencies reported for north-wester cities, including Peshawar, Quetta and Swabi (Khaliq *et al*. 1984; Mian *et al*. 1985; Khurshid *et al*. 1992). The frequency of d allele is also comparable with that of observed for other northern cities like Rawalpindi and Islamabad and shows significant difference from the rest of the Pakistani populations (Janjua *et al*. 1997; Bhatti and Amin, 1996).

Interestingly, the allele frequencies of ABO locus in the Mirpur sample show concordance with the frequencies reported for Muslim community of Gujrat, India (Papiha *et al*. 1981). It might indicate close affinity of both populations and might reveal the fact that massive gene flow between these regions was witnessed during the partition of subcontinent in 1947.

The allele B depicts a high frequency in the northern part of Pakistan and declines in south-western cline, reaching to a lowest point near the Arabian sea (Bhatti, 1998; Bhatti and Shaikh, 1999). Consistent with this observation, the present sample from northern part of Pakistan shows a higher tendency of B allele and is significantly different from the southern cities. However, the south-western clinical decline of B allele needs to be explored in more details by a country-wide extensive study. We intend to expand our study in order to quantify the prevailing degree of differentiation according to blood polymorphic systems in Pakistan. This information would be useful if the causes of heterogeneity-selective, migratory or random, are to be traced.

Table 1. Distribution of phenotypic and allelic frequencies of ABO blood group system in the poplation of Mirpur, Azad Jammu Kashmir.

Sex	Phenotypes					Allelic frequency		
	A	B	AB	O	Total	p	q	r
Male	386 (26.25%)	467 (31.77%)	132 (8.98%)	485 (32.99%)	1470	0.197± 0.007	0.230 ± 0.008	0.574 ± 0.009
Female	650 (26.45%)	809 (32.93%)	240 (9.77%)	758 (30.85%)	2457	0.202± 0.006	0.243 ± 0.006	0.555 ± 0.007
Total	1036 (26.38%)	1276 (32.50%)	372 (9.47%)	1243 (31.65%)	3927	0.200 ± 0.004	0.238 ± 0.004	0.562 ± 0.005

Table 2: Distribution of phenotypic and allelic frequencies of Rh blood group system in the population of Mirpur, Azad Jammu Kashmir.

Sex	Phenotypes			Allelic frequency	
	Rh+	Rh-	Total	D	d
Male	1346 (91.56%)	124 (8.44%)	1470	0.711± 0.013	0.289 ± 0.013
Female	2229 (90.72%)	228 (9.28%)	2457	0.695 ± 0.010	0.304 ± 0.010
Total	3575 (91.04%)	352 (8.96%)	3927	0.701 ± 0.008	0.299 ± 0.008

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