

Serological Variations Among Two Tribal Groups of Ladakh, Jammu and Kashmir, India

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ABSTRACT The distribution of phenotypes and gene/haplotype frequencies of four blood groups - A, A₂BO, MNSs, Rhesus and Kell has been investigated among two Scheduled Tribes - Bodhs of Changthang and Dard Bodhs of Khaltse in Ladakh, Jammu and Kashmir. The serological constitution of both these groups is similar to various other population groups of North India, particularly those from the Western Himalayan region.

Ladakh, the largest division of the northernmost Indian border State of Jammu and Kashmir is inhabited by several scheduled tribes with variable Mongoloid affinities depending on the degree of admixture. In Ladakh, one find population groups which are still living almost in complete isolation, as well as, others which have been exposed to the forces of exogenic change. Therefore, this area provides an ideal situation for the study of population variation and its causes. Although a few genetic studies have been reported among the population groups of Kashmir, such data from Ladakh region is meagre. Therefore, an attempt has been made here to investigate the distribution of blood genetic markers among two Scheduled Tribes of Ladakh-Bodhs of Changthang and Dard Bodhs of Khaltse.

Bodhs of Changthang are nomadic, but recently a number of them have also settled in and around Changthang (4050 metres above mean sea level). Dard Bodhs claim to be pure Aryans; they were referred to as Mirasos by Michael Pissel in his controversial book of the same title. They are confined to a few villages on the Indus and are distinguishable from the rest of the population groups of Ladakh. The main occupation of both tribal groups is agriculture and they mainly speak Tibeto-Chinese (Bodhs) and Indo-European (Dards) languages with regional variations.

MATERIAL AND METHODS

For the present work, blood samples from two endogamous tribal groups-Bodhs (n=27) from village Nyoma and around of Changthang and Dard Bodhs (n=39) from village Bema and around of Khaltse subdivisions of Leh district of Ladakh, Jammu and Kashmir were collected from unrelated subjects in EDTA.K₂ vials, in 1991. These were analysed for four blood group systems - A, A₂BO (tested with Anti - A, -A₁ and -B); MNSs (tested with Anti-M, -N and -S); Rhesus (tested with Anti -C, -D, -E, -c and -e); and Kell (tested with Anti -K) following standard serological techniques and manufacturer's instructions. The gene and haplotype frequencies have been calculated after Mourant et al. (1976).

RESULTS AND DISCUSSION

The distribution of the phenotype and gene/chromosome frequencies of the four blood group systems investigated - A, A₂BO, MNSs, Rhesus and Kell in two scheduled tribes - Bodhs and Dards of Ladakh are listed in table 1. In both groups, the observed and expected phenotype numbers are in Hardy - Weinberg equilibrium for all the systems tested.

Table 1: Distribution of blood groups among Bodhs and Dards of Ladakh

Systems/ Phenotypes	Bodhs			Dards		
	Phenotype		Gene/Haplotype Frequencies	Phenotype		Gene/Haplotype Frequencies
	Number	Per cent		Number	Per cent	
A₁A₂BO						
O	10	37.04	A ₁ = 0.181	15	38.46	A ₁ = 0.168
A ₁	7	25.93	A ₂ = 0.046	9	23.08	A ₂ = 0.015
A ₂	1	3.70	B = 0.182	1	2.56	B = 0.199
B	6	22.22	O = 0.591	11	28.21	O = 0.618
A ₁ B	2	7.41		3	7.39	
A ₂ B	1	3.70		0	0.00	
Total	27	100.00		39	100.00	
MNSs						
MMS	4	14.82	MS = 0.094	7	19.44	MS = 0.120
MMss	12	44.44	Ms = 0.647	15	41.67	Ms = 0.638
MNS	2	7.41	NS = 0.046	3	8.33	NS = 0.041
MNss	6	22.22	Ns = 0.213	8	22.22	Ns = 0.195
NNS	1	3.70		1	2.78	
NNss	2	7.41		2	5.56	
Total	27	100.00		36	100.00	
Rhesus						
CCDEE	0	0.0	CDE = 0.000	1	2.78	CDE = 0.000
CCDee	4	16.0	CDe = 0.303	11	30.56	CDe = 0.556
CcDEE	2	8.0	CdE = 0.097	3	8.33	CdE = 0.000
CcDEe	6	24.0	cDE = 0.380	8	22.22	cDE = 0.161
CcDee	3	12.0	cDe = 0.064	5	13.89	cDe = 0.076
Ccddee	1	4.0	cdE = 0.000	0	0.00	cdE = 0.131
ccDEE	2	8.0	cde = 0.156	1	2.78	cde = 0.076
ccDEe	5	20.0		2	5.56	
ccDee	1	4.0		3	8.33	
ccddEe	0	0.0		1	2.78	
ccdd ee	1	4.0		1	2.78	
Total	25	100.0		36	100.00	
Kell						
K+	1	3.7	K = 0.019	1	2.78	K = 0.014
K-	26	96.3	k = 0.981	35	97.22	k = 0.986
Total	27	100.0		36	100.00	

Among Bodhs, the frequency of gene A (22.8 per cent) is higher than gene B (18.2 per cent). Whereas, among Dards the frequency of gene B is little higher (19.91 per cent) as compared to that of gene A (18.31 per cent). The frequency of gene A₂ has been observed 4.71 per cent

among Bodhs and 1.55 per cent in Dards. The predominance of gene A over B has previously been reported among various population groups of Western Himalayas.

In the MNSs system, it has been found that the frequency of gene M is over 70 per cent in

the present populations, a trend similar to that observed among various North Indian populations. Furthermore, as for most populations of North India, in these groups also gene *S* has been found to be more associated with gene *M* than with *N*. In Bodhs, the frequency of gene complex *Ms* is 64.7 per cent and that of *Ns* is 21.36 per cent: The incidence of gene complex *MS* (9.37 per cent) is almost double that of *NS* (4.57 per cent). In Dards also similar observations have been made - the incidence of *Ms* gene complex is over 60 per cent (63.83), followed by gene complex *Ns* (19.51 per cent). The complex *MS* is more frequent than *NS*. Thus, the pattern of distribution of *MNSs* gene complexes is *Ms>Ns>MS>NS* in both the populations of the present study. Among Ladakhis, the frequency of *Ms* was reported rather low (Bhattacharjee, 1968), but the present populations show similarities with the Tibetans (Bhattacharjee, 1967) for this gene complex. Thus, Bodhs like other populations with Mongoloid affinities are showing low frequency of *MS* (less than 10 per cent); and Dards with a frequency of 12.55 per cent, are nearer to the North Indian population groups.

The Rhesus system show great variability in its distribution. Among Bodhs of Changthang, the chromosome *cDE* is most frequent (38.0 per cent), followed by *CDe* (30.3 per cent) and a rather high frequency of *cde* (15.56 per cent) and *Cde* (9.7 per cent) has been observed. On the other hand, among Dards, the chromosome *CDe* is the most frequent (55.56 per cent) followed by *cDE* (16.12 per cent), *cdE* (13.05 per cent), *cde* (7.64 per cent) and *cDe* (7.63 per cent). A high frequency of *CDe* was also reported among the Ladakhi population (Bhattacharjee, 1968) and Kanets (Papiha et al., 1984). In Dards, the frequency of chromosome *cdE* was found to be very high, albeit generally it is found either absent or very infrequent in Indian populations. Similarly the incidence of *Cde* observed among Bodhs, though high, is well within the range described for India. The predominance of chromosome *cDE* over *CDe* among Bodhs corresponds well with the situation recorded in Yakut of Eastern Siberia from Asiatic part of U.S.S.R. (Zolotareva and

Bashlay, 1968) and Bhutanese (Glasgow et al., 1968) at high altitude. The high incidence of haplotype *cDE* may be due to some kind of adaptation as suggested by Glasgow et al. (1968) or there might be two groups of mongoloid populations one with high incidence of *cDE* as reported among Tibeto-Mongoloids and another with low as found among South-East Asian Mongoloids and Chinese.

The Kell gene (*K*) has been found in polymorphic proportions among both Bodhs (1.87 per cent) and Dards (1.40 per cent). Since, this gene has been found to be either absent or infrequent among various Mongoloid populations (Mourant et al., 1976), a relatively high incidence recorded among Bodhs, is more compatible with the range observed for the populations of Western Himalayas (Bhasin et al., 1983; Papiha et al., 1989).

Although, the present sample sizes are small, there is some evidence from this study that the distribution of various blood groups among Bodhs of Changthang and the Dard Bodhs of Khaltse of Ladakh is not homogenous. In fact, the present serological results indicate that Bodhs of Changthang have considerable Mongoloid affinities while Dard Bodhs are more closer to North Indian populations.

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