

The Distribution of the ABO and LH Blood Groups in Some Central Indian Populations

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ABSTRACT The distribution of the ABO and LH (a new red blood cell membrane specificity) types have been reported among the Brahmin, Bania, Kshatria, Kayasth, Shudra and Muslim from Central India. No significant differences have been found in the distribution of both these blood markers among the six studied populations.

INTRODUCTION

Shrivastava et al. (1979) discovered a new red blood cell membrane specificity called by them LH in the seed extracts of *Erythrina lithosperma*, a plant belonging to the family leguminosae. The name LH was given to this specificity to cherish the memory of Ludwik Hirszfeld, the celebrated Polish serologist. Further studies relating to the *Erythrina lithosperma* lectin, and genetics and population distribution of the LH specificity have been made by Shrivastava et al. (1979), Sehajpal and Shrivastava (1980, 1981), Reddy et al. (1981), Kaur and Shrivastava (1983) and Koley et al. (1989).

The LH specificity refers to weak (LH negative) or strong (LH positive) agglutination of erythrocytes obtained with the lectin from *Erythrina lithosperma*. In fact, anti-LH lectin reacts with human red blood cells by either clumping them firmly or just weakly agglutinating them. The former types of reaction is called LH-positive and the latter LH-negative. Since population differences are known to exist regarding the distribution of the ABO and LH types, we are presenting here the results of our observations on the distribution of the ABO and LH types among six endogamous populations of Central India namely the Brah-

min, Bania, Kshatria, Kayasth, Shudra and Muslim.

MATERIAL AND METHODS

Blood samples were collected randomly from unrelated normal healthy individuals represented by 137 Brahmin, 115 Bania, 77 Kshatria, 45 Kayasth, 53 Shudra and 48 Muslim, from Sagar, Madhya Pradesh. Since sex differences are not known to exist in the newly discovered LH system, the samples collected from both males and females were pooled for all analyses.

For the ABO typing standard serological procedures were followed. The LH typing was done with anti-LH lectin prepared in our own laboratory as described by Shrivastava et al. (1979). The seeds for lectin were obtained from Botanical Survey of India, Calcutta.

RESULTS

The phenotypic distribution of the LH types and allele frequencies in the six populations are shown in table 1. The Brahmin have the highest frequency (72.26%) of the LH⁺ type and the Kayasth the lowest (55.55%). The allele frequencies range from 0.7453 in the Kayasth to 0.8501 in the Brahmin for the LH⁺ allele.

Table 1: Distribution of the LH types and allele frequencies in the six populations of Central India

Population	n	LH+		LH-		Allele frequencies	
		No. Obs.	% obs.	No. Obs.	% obs.	LH ⁺	LH ⁻
Brahmin	137	99	72.26	38	27.74	0.8501	0.1499
Bania	115	81	70.43	34	29.56	0.8392	0.1608
Kshatria	77	50	64.93	27	35.06	0.8058	0.1942
Kayasth	45	25	55.55	20	44.44	0.7453	0.2547
Shudra	53	37	69.81	16	30.19	0.8355	0.1645
Muslim	48	32	66.67	16	33.33	0.8165	0.1835

Table 2: Distribution of the ABO types and allele frequencies in the six populations of Central India

Population		Phenotypes				Allele frequencies		
		O	A	B	AB	A	B	O
Brahmin (n=137)	No. Obs.	41	34	54	8	0.1694	0.2634	0.5670
	% Obs.	29.93	24.82	39.42	5.84			
Bania (n=115)	No. Obs.	33	24	44	14	0.1805	0.2940	0.5254
	% Obs.	28.70	20.87	38.26	12.17			
Kshatria (n=77)	No. Obs.	20	22	28	7	0.2124	0.2639	0.5236
	% Obs.	25.97	28.57	36.36	9.09			
Kayasth (n=45)	No. Obs.	8	15	17	5	0.2596	0.2906	0.4494
	% Obs.	17.78	33.33	37.78	11.11			
Shudra (n=53)	No. Obs.	13	15	18	7	0.2348	0.2727	0.4925
	% Obs.	24.53	28.30	33.96	13.21			
Muslim (n=48)	No. Obs.	10	17	17	4	0.2554	0.2554	0.4886
	% Obs.	20.83	35.42	35.42	8.33			

Table 3: Distribution of the LH types in individuals with blood group A

Type		Brahmin (n=34)	Bania (n=24)	Kshatria (n=22)	Kayasth (n=15)	Shudra (n=15)	Muslim (n=17)
LH ⁺	No. Obs.	18	13	11	06	08	09
	% Obs.	52.94	54.17	50.00	40.00	53.33	52.94
LH ⁻	No. Obs.	16	11	11	09	07	08
	% Obs.	47.06	45.83	50.00	60.00	46.67	47.06

Table 4: Distribution of the LH types in individuals with blood group B

Type		Brahmin (n=54)	Bania (n=44)	Kshatria (n=28)	Kayasth (n=17)	Shudra (n=18)	Muslim (n=17)
LH ⁺	No. Obs.	36	30	16	09	14	11
	% Obs.	66.67	68.18	57.14	52.94	77.78	64.71
LH ⁻	No. Obs.	18	14	12	08	04	06
	% Obs.	33.33	31.82	42.86	47.06	22.22	35.29

Table 5: Distribution of the LH types in individuals with blood group AB

Type		Brahmin (n=8)	Bania (n=14)	Kashtria (n=7)	Kayasth (n=5)	Shudra (n=7)	Muslim (n=4)
LH ⁺	No. Obs.	4	5	3	2	2	2
	% Obs.	50.00	35.71	42.86	40.00	28.57	50.00
LH ⁻	No. Obs.	4	9	4	3	5	2
	% Obs.	50.00	64.29	57.14	60.00	71.43	50.00

The results of the inter-population comparisons for the distribution of the LH types in the studied samples show no statistically significant difference in any case. Since blood group O individuals were found to be all LH⁺, this group has been excluded during calculation of chi-square values.

The distribution of the ABO blood groups and allele frequencies in the present sample populations are given in table 2. The allele frequencies have the order $O > B > A$ in all of them, and when compared among themselves for the distribution of the ABO types, no statistically significant differences were seen.

Table 3 shows the distribution of the LH types in blood group A individuals. There are more LH⁺ than LH⁻ individuals in all samples except the Kayasth. The highest frequency (54.17%) of the LH⁺ type has been found in the Bania and the lowest (40.00%) in the Kayasth. No appreciable differences have been found in the distribution of LH types in group A individuals in the studied samples when compared with each other.

The distribution of the LH types in group B individuals is presented in table 4. The LH⁺ type is more frequent than LH⁻ type in all populations and it ranges from 52.94% in the Kayasth to 77.78% in the Shudra. Comparisons between the various studied samples for the distribution of LH types in the blood group B individuals show no significant differences.

In table 5 the distribution of the LH types in group AB individuals has been shown. The Brahmin and the Muslim have the highest number of LH⁺ individuals (50.00%) and the Shudra the lowest (28.57%). However, there exist no

statistically significant differences with regard to the distribution of the LH types in individuals belonging to blood group AB in the various studied samples.

DISCUSSION

From the results of our experiments it may be concluded that as for the distribution of the ABO and LH blood markers not much population differentiation has occurred in Central Indian populations, under the influence of a rigid caste system, religious obligations and mating restrictions. However, when we compare our samples with North Indian (studied by Kaur and Shrivastava, 1983) and South Indian (studied by Reddy et al., 1981) populations we get some interesting results. In distribution of the LH types between Central and North Indian populations we observed significant differences in 6 population sets out of 30; in the distribution of the ABO types in 2 sets out of 30; in the distribution of the LH types with blood group A in 5 sets out of 30 and in the distribution of the LH types with blood group B in only 1 out of 30 population sets. By contrast, between Central and South Indian populations, we found significant differences in 2 population sets out of 18 in distribution of the LH types; 3 sets out of 18 in the distribution of the ABO types; and 5 sets out of 18 in the distribution of the LH types with blood group B. Thus the LH system could be used in population variation studies, particularly in association with the ABO system.

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