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Association of ABO and Rh (D) Blood Groups with Leprosy

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ABSTRACT In the present paper, an attempt has been made to see the association, if any, in six different types of leprosy patients with respect to the ABO and Rh (D) blood groups based on a sample of 194 leprosy patients from Maharashtra, West India.

INTRODUCTION

An interesting and instructive example of association is that which exists between blood groups and diseases. The word association in this context means that a given disease occurs in people of a given blood type more often than would be expected by chance. The main reason for particular attention being paid to some infectious diseases is the fact that several micro-organisms are known to possess antigens very similar to human blood substances. Such studies may provide clues for the biological significance of the genetic polymorphisms in man. It was Lowe (1942) who initiated the study of the ABO blood groups and diseases in India.

Following the publication of Vogel and Chakravartti (1966) additional information regarding association of blood groups and leprosy are now available. Beiguelman (1964) and Chakravartti (1970) pointed out that a significant excess of A frequency was found in the lepromatous as compared to the tuberculoid samples, while a significantly different incidence of the ABO blood groups between control series and leprosy patients, and no significant difference was observed between lepromatous and non-lepromatous patients.

The main aim of this paper is to probe whether individuals belonging to different ABO and Rh (D) blood groups do or do not differ in their susceptibility to leprosy. Also, the present study reports data on the ABO and Rh (D) blood types in borderline tuberculoid, borderline lepromatous and polyneuratic leprosy types.

MATERIAL AND METHODS

The sample for the present study consists of 194 (99 male and 95 female) leprosy patients from Aheri tehsil of Gadchiroli district and Mul tehsil of Chandrapur district of Maharashtra State, West India. It represented both the sexes of different ages. The results were compared with 112 normal (control) (65 male and 47 female) individuals sharing the same ecozone. For the present analysis the leprosy patients were classified into six sub types *i.e.* tuberculoid, indeterminate, lepromatous, borderline tuberculoid, borderline lepromatous and polyneuratic type.

RESULTS AND DISCUSSION

The analysis of the present leprosy patients showed the highest frequency of B (37.63%), followed by O (24.74%) and A (21.13%) blood groups. The patient series showed a higher frequency of B and AB and a lower frequency of O and A blood groups as compared to the controls. The Chi-square results showed statistically significant difference between them (χ^2= 12.7455 ; 0.01 > P > 0.001).

When the patients were sub-divided the incidence of AB (13.80%) was observed to be higher in tuberculoid patients as compared to the control series (4.46%). But the Chi-Square showed statistically non-significant difference (χ^2= 7.2268 : 0.10> P > 0.05). The lepromatous leprosy patients showed the highest frequency of blood group B (44.73%) and the frequency of AB (10.52%) was also observed to be higher

in them as compared to controls. The Chi-square test, however, showed non-significant difference ($\chi^2 = 4.4047$; $0.30 > P > 0.20$).

Indeterminate type of leprosy patients showed a much lower frequency of blood group O (23.83%) compared to the control series (34.82%) but the frequency of AB (17.64%) was observed very high. A significant difference ($\chi^2 = 10.2446$; $0.02 > P > 0.01$) was found between the patients and controls.

Strikingly, a very low frequency of blood group B was observed among the borderline lepromatous patients (9.09%) compared to controls (33.03%). The frequency of AB (36.30%) was also observed to be very high. Overall the difference was highly significant ($\chi^2 = 16..1330$; $0.01 > P > 0.001$). In tuberculoid patients the frequencies of blood group O and AB (21.43% each) were observed to be very low and high, respectively. But differences with controls ($\chi^2 = 6.5179$; $0.10 > P > 0.05$) were not appreciable.

The polyneuratic leprosy patients showed a much higher incidence of blood group A (40.00%) compared to the normals (27.68%) whereas, the frequency of O and B (20.00% each) was observed to be lower.

The lowest incidence of the Rh (D) negative was observed among the tuberculoid type of leprosy patients (12.07%) whereas, the highest (21.43%) was recorded among the borderline tuberculoid leprosy patients. The incidence of Rh (D) negative was observed to be much lower (9.82%) in controls as compared to all the sub types of leprosy patients (range 18.18-21.43%) as well as total patient series (17.01%). But the Chi-square showed non-significant difference (χ^2 range 0.2025-3.1697) between controls and each of the sub type series of leprosy patients.

Ghosh and Mukherjee (1970) observed more O than B patients suffering from leprosy. Shah et al. (1972) observed that blood group B was less frequent in patients suffering from lepromatous type of leprosy. Spielman et al. (1970) could not obtain any significant relationship with regard to the ABO and Rh (D) blood groups. Saxena et al. (1973) also came out with the same conclusion, but they observed that O individuals were more prone to tuberculoid type of the disease. Vogel and Chakravartti (1966) however, observed that blood group A is somewhat more frequent in lepromatous cases. Vogel et al. (1971) observed significantly higher frequencies of groups A and AB compared to groups B and O in leprosy patients.

The present study shows a rather higher frequency of B in both tuberculoid and lepromatous leprosy patients whereas the frequency of O was observed to be higher in controls. The present study therefore is in conformity with the results obtained by Saxena et al. (1973) who observed that B patients were more probe to lepromatous type of leprosy. However, this study did not show any conformity either with the studies conducted by Vogel and Chakravartti (1966) or with those of Ghosh and Mukherjee (1970) and Shah et al. (1972).

Like Vogel et al. (1971), the frequency of AB was also observed to be high in the present study but unlike Vogel et al. (1971) not of A. On the whole it can be said that the present findings show a significantly high frequency of

Table 1: Distribution of ABO and Rh (D) blood groups among leprosy patients and controls

Leprosy type	*Number tested*	*ABO type*				*Rh (D) type*	
		O	*A*	*B*	*AB*	*Rh (D)+*	*Rh (D) –*
Tuberculoid	58	14 (24.14)	12 (20.68)	24 (41.38)	8 (13.80)	51 (87.93)	7 (12.07)
Lepromatous	38	10 (26.31)	7 (18.42)	17 (44.73)	4 (10.52)	31 (91.58)	7 (18.42)
Indeterminate	68	16 (23.83)	15 (22.06)	25 (36.76)	12 (17.64)	55 (80.88)	13 (19.12)
Borderline lepromatous	11	4 (36.36)	2 (18.18)	1 (9.09)	4 (36.36)	9 (81.82)	2 (18.18)
Borderline tuberculoid	14	3 (21.43)	3 (21.43)	5 (35.71)	3 (21.43)	11 (78.57)	3 (21.43)
Polyneuratic	5	1 (20.00)	2 (40.00)	1 (20.00)	1 (20.00)	4 (80.00)	1 (20.00)
Total	194	48 (24.74)	41 (21.13)	73 (37.63)	32 (16.49)	161 (82.99)	33 (17.01)
Controls	112	39 (34.82)	31 (27.68)	37 (33.03)	5 (4.46)	101 (90.18)	11 (9.82)

Figures in parantheses are percentages

Table 2: Distribution of ABO blood groups tuberculoid leprosy in Indian populations

State	*Population*	*Blood group*					*Heterogeneity*				*Reference*
		n	*O*	*A*	*B*	*AB*	*A : O*		*B : O*		
							X	X^2	*X*	X^2	
West Bengal	Patients	200	63	53	72	12	1.3	1.81	1.14	0.55	Lowe, 1942
	Controls	1638	571	368	570	129					
Gujarat	Patients	177	67	38	59	13	1.72	2.3	1	0	Verma & Dongre, 1955
	Controls	1000	343	271	302	84					
Tamil Nadu	Patients	431	179	87	145	20	0.85	1.04	0.88	0.84	Povey & Honton, 1966
	Controls	755	282	162	260	51					
Maharashtra	Patients	58	14	12	24	8	1.08	0.03	2.48	2.13	Present study
	Controls	112	39	31	37	5					

groups B and AB as compared to groups A and O in leprosy patients. With regard to Rh(D) blood groups Salzano (1967) presented the results in patients with different immunological types of leprosy but no clear picture was apparent. In the present study also there is no association of Rh (D) blood groups with leprosy.

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