PRINT: ISSN 0970-9274 ONLINE: 2456-6608 DOI: 10.31901/24566608.1992/03.04.02

JOURNAL OF HUMAN ECOLOGY
J. Hum. Ecol., 3(4): 257-261 (1992)

Studies on the Dd-Antigen-Antibody System: Antigen Dd-Reactivity in North India

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KEY WORDS Antigen Dd. Reactor. Non-reactor. North India.

ABSTRACT Antigen Dd-reactivity was studied in 5 caste groups of Northern India i.e. the Jat Sikh, Khatri, Bania and Brahmin sampled from Punjab, and in the Sunni Muslims of Kashmir. The incidence of Dd-reactors varied widely in these groups. No correlation was observed with either sex or marital status or with ABO and Rh blood groups. However, there is some suggestion of association with age, evident from high incidence of Dd-reactors in older age groups.

INTRODUCTION

Antigen Dd, a component of certain human dandruff specimens was first detected by Shrivastava (1972). The antigen has an ability to precipitate human sera selectively.

The antibodies reacting with antigen-Dd had not been detected in human cord serum, but they appeared to be a permanent feature in the sera of adult antigen Dd-reactors (Kaur and Shrivastava, 1981). Individuals with detectable antibodies to antigen Dd were called Dd-reactors and those in whom the antibodies could not be detected, were called Dd-nonreactors.

The frequency of antigen Dd-reactors varies widely in different populations. A number of populations have been screened for the presence of antibodies to antigen Dd. These include several caste groups from North India (Asia), Nigerians from Africa and Polish, Hungarian and Greek from Europe.

The present study was conducted to check the incidence of Dd-reactivity in Bania and Brahmin castes of Punjab and Sunni Muslims of Jammu and Kashmir, which were not studied earlier. Also studied were Jat Sikh and Khatri groups of Punjab to compare these with the earlier studies.

MATERIAL AND METHODS

The data were collected randomly from four major caste groups of Punjab, district Patiala i.e. Jat Sikh, Khatri, Bania and Brahmin and a group of Sunni Muslims from Pulwama district of Kashmir.

The material comprises of a total of 765 blood samples of normal healthy individuals of both the sexes. The details of the samples collected are given in table 1.

Table 1: Groups studied and their sample sizes

Population	*n*
Punjab	
Patiala District	
Jat Sikh	219
Khatri	209
Bania	160
Brahmin	75
Jammu and Kashmir	
Pulwama District	
Sunni Muslim (Ahmediya Community)	102
Total	765

Antigen Dd used was prepared earlier as

described by Shrivastava (1972) and the antigen Dd-reactivity was studied using the technique of immuno-electroosmophoresis (IEOP), as described by Rose and Bigazzi (1973).

RESULTS AND DISCUSSION

Results of the distribution of Dd-reactivity in our present study and in other populations studied to date are presented in table 2. A low frequency of Dd-reactors (7.84%) has been recorded in Sunni Muslims, whereas the populations from Punjab show quite high frequencies ranging from 29.37% in Bania to 41.15% in Khatri, highest recorded so far.

The frequencies of Dd-reactors were found to be almost identical in Jat Sikh (40.18%) and Khatri (41.15%) on one hand and Bania (29.37%) and Brahmin (30.67%) on the other. The results of homogeneity tests for antigen Dd-reactivity in different sets of populations (Table 3) show that the Jat Sikh and Khatri when compared with Bania reveal significant phenotypic differences. Furthermore, all the four caste groups from Punjab differ significantly from Sunni Muslim of Kashmir.

A close look at table 2 shows that the lowest frequency of Dd-reactors (3.97%) was recorded in Poland by Shrivastava (1972). The subsequent studies conducted by Kaur and Shrivastava (1983)

Table 2: Distribution of antigen Dd-reactivity in the groups studied and other populations

Population	*n*	*Dd-reactor*		*Dd-nonreactor*		*Authors*
		No. Obs.	*%*	*No. Obs.*	*%*	
Europe						
Greek	100	35	35.00	65	65.00	Kaur et al., Unpublished
Hungarian	100	23	23.00	77	77.00	Kaur et al., Unpublished
Polish	126	5	3.97	121	96.03	Shrivastava, 1972
Africa						
Nigerian	51	16	31.37	35	68.63	Kaur et al., Unpublished
Asia						
India						
Jammu and Kashmir						
Muslim	82	4	4.88	78	95.12	Kaur & Shrivastava, 1983
Buddhist	59	7	11.86	52	88.14	Kaur & Shrivastava, 1983
Sunni Muslim	102	8	7.84	94	92.16	Present study
Himachal Pradesh						
Gaddi	80	-	0.00	80	100.00	Kaur et al., 1980
Uttar Pradesh						
Rana Tharu	120	-	0.00	120	100.00	Kaur & Shrivastava, 1983
Punjab						
Punjab-I	120	29	24.17	91	75.83	Kaur & Shrivastava, 1974
Punjab-III	318	63	19.81	255	80.19	Kaur & Shrivastava, 1983
Punjabi blood donors	300	75	25.00	225	75.00	Kaur & Shrivastava, 1983
Jat Sikh	156	27	17.3	129	82.69	Kaur et al., 1981
Khatri	105	23	21.90	82	78.10	Kaur et al., 1981
Balmilk	108	21	19.44	87	80.56	Kaur et al., 1981
Jat Sikh	219	88	40.18	131	59.82	Present Study
Khatri	209	86	41.15	123	58.85	Present Study
Bania	160	47	29.37	113	70.63	Present Study
Brahmin	75	23	30.67	52	69.33	Present Study

Table 3: Antigen Dd-reactivity: homogeneity (chi-square) test between groups

Groups compared	χ^2	*Probability*
Jat Sikh *vs* Khatri	0.036	$0.90 < p < 0.80$
Jat Sikh *vs* Bania	4.71	$0.05 < p < 0.025$
Jat Sikh *vs* Brahmin	1.24	$0.30 < p < 0.20$
Jat Sikh *vs* Sunni Muslim	34.71	$0.0005 < p$
Khatri *vs* Bania	5.44	$0.025 < p < 0.01$
Khatri *vs* Brahmin	2.56	$0.20 < p < 0.10$
Khatri *vs* Sunni Muslim	36.04	$0.0005 < p$
Bania *vs* Brahmin	0.0398	$0.90 < p < 0.80$
Bania *vs* Sunni Muslim	17.4	$0.0005 < p$
Brahmin *vs* Sunni Muslim	15.56	$0.0005 < p$

in Ladakhi Muslim and Buddhist showed comparatively higher values 4.88 and 11.86%, respectively. However, populations from Punjab showed still higher frequencies of Dd-reactors in both caste undifferentiated as well as in different caste samples (Kaur and Shrivastava, 1974; Kaur et al., 1981; Kaur and Shrivastava, 1983).

In the earlier stages of our work (Shrivastava, 1972; Kaur and Shrivastava, 1974), the technique of immunodiffusion (ID) was used to study the Dd-reactivity, which required greater quantities and greater concentrations of the reactants for the precipitation bands to appear. Also, it took longer (24-48 hours) for the results to appear. Keeping this in mind, later on, we switched over to the technique of immunoelectroosmophoresis (IEOP) which required comparatively lower quantities and concentrations of the reactants. The solution of the precipitation bands was sharper and clearer and took only 30-45 minutes for the results to appear. Besides the two studies mentioned above, the rest of the populations in table 2 were all studied using the technique of IEOP.

We are aware of the quantitative differences in Dd-reactors (Kaur and Shrivastava, 1982) and assume that quite a few reactors might have gone unnoticed in the first study conducted by Shrivastava (1972) using the technique of ID, leading to a low frequency. However, we have observed a wide variation in frequencies, ranging from 4.88% in Ladakhi Muslim to 25% in Punjabi blood donors (Kaur and Shrivastava, 1983), and a total absence of Dd-reactivity in Gaddi of Himachal pradesh (Kaur et al., 1980) and Rana Tharu of Uttar Pradesh (Kaur and Shrivastava, 1983), using the technique of IEOP. Hence it is clear that the trait has variable frequencies in different populations.

On the basis of Dd-reactivity, Sunni Muslim appear to be a distinctly different group from Punjabis, but when compared with Ladakhi Muslim (Kaur and Shrivastava, 1983), did not show any significant differences. Although the two Muslim groups live under almost similar climatic conditions and are followers of the same religion, they apparently belong to two different racial stocks; while the Ladakhi Muslim are of Mongoloid stock, the Sunni Muslim of Pulwama district belong to the Caucasoid stock. Both are highly inbred communities, and there is no intermarrying between them.

Among the Punjabi populations, when the Jat Sikh and Khatri of the present study were compared with a sample of Jat Sikh and Khatri groups of an earlier study (Kaur et al., 1981), statistically significant differences were observed. It is difficult to explain the high frequency of Dd-reactors in Jat Sikh and Khatri in the present study, except that in this study we have used a different agarose (Pharmacia type B, Sweden) especially meant for counter-immunoelectrophoresis and other gel diffusion techniques, whereas in our earlier studies the agarose used was from Koch-Light, England. As already mentioned we are aware of the fact that there are quantitative differences among the reactor sera and it has been speculated that the antibodies against antigen Dd are universally present in man (Kaur and Shrivastava, 1982), and since we are able to detect only their raised amounts, it is possible that using pharmacia agarose, we can detect even comparatively low quantities of antibodies. This therefore, may be the reason for higher Dd-reactor frequencies observed in the present study.

CORRELATION OF SEX WITH ANTIGEN Dd-REACTIVITY

Out of 663 individuals investigated from Punjab for antigen Dd-reactivity, 354 were males and 309 females. Among the males, 37.74% were found to be Dd-reactors, whereas for females the frequency was found to be slightly higher (39.16%). However, when the two sexes were compared, no significant differences were observed in the distribution of Dd reactors between them (Table 4). Apparently therefore, the trait is not sex linked.

Table 4: Antigen Dd-reactivity : sex-wise distribution in pooled sample from Punjab

Sex		*Dd-reactor*	*Dd-nonreactor*
Male	Obs.	123	231
(n = 354)	Exp.	103.28	223.72
	%	34.74	65.26
Female	Obs.	121	188
(n = 309)	Exp.	113.72	195.28
	%	39.16	60.84
	$\chi^2_1 = 1.38$	$0.30 < p < 0.20$	NS

CORRELATION OF AGE WITH ANTIGEN Dd-REACTIVITY

To study age-wise distribution of antigen Dd-reactivity, the data were broken into four age-groups 10-20, 21-30, 31-40, and above 40 years (Table 5). The maximum frequency of reactors (56.63%) was observed in the age-group 31-40, and the minimum (27.13%) in the age-group 10-20. The results of homogeneity test between different age-groups are given in table 6. Since younger age groups show statistically significant differences with older age groups, our earlier observations of late manifestation of the trait are further confirmed.

ANTIGEN Dd-REACTIVITY AND MARITAL STATUS

A comparative distribution of antigen Dd-reactivity was studied between married and unmarried females (Table 7). Though the married women are known to have more immune antibodies in them due to immunization by foetus during pregnancy, no significant differences were observed when the two groups were compared. This confirms our previous observation that antigen Dd is absent in the serum/blood of human beings and hence does not cause the production of antibodies. So apparently marital status has no effect on the distribution of anti-Dd antibodies.

Table 5: Antigen Dd-reactivity : age-wise distribution in pooled sample from Punjab

Age-group (years)	*n*	*Dd-reactor*	*Dd-nonreactor*
10-20	258	70 (27.13%)	188 (72.87%)
21-30	393	157 (39.95%)	236 (60.05%)
31-40	83	47 (56.63%)	36 (43.37%)
> 40	64	27 (42.19%)	37 (57.81%)

Table 6: Antigen Dd-reactivity: homogeneity chi-square test between age-groups

Age-groups compared (years)	χ^2_1	*Probability*
10-20 *vs* 21-30	11.27	$0.001 < p < 0.0005$
10-20 *vs* 31-40	24.22	$0.001 < p < 0.0005$
10-20 *vs* >40	5.52	$0.025 < p < 0.01$
21-30 *vs* 31-40	7.9	$0.005 < p < 0.001$
21-30 *vs* >40	0.112	$0.80 < p < 0.70$
31-40 *vs* >40	3.01	$0.10 < p < 0.05$

Table 7: Antigen Dd-reactivity: comparison between married and unmarried females

Marital status		*Dd-reactor*	*Dd-nonreactor*
Married	Obs.	39	42
(n=81)	Exp.	31.41	49.59
Unmarried	Obs.	113	198
(n=311)	Exp.	120.59	190.41
	$\chi^2_1 = 3.77$,	$0.10 < p < 0.05$,	NS

Table 8: Distribution of ABO blood groups in Dd-reactors and non-reactors

Sample		*O*	*A*	*B*	*AB*
Dd-reactor	Obs.	98	48	87	12
(n=245)	Exp.	91.27	46.85	88.14	18.74
	%	40.00	19.59	35.51	4.90
Dd-nonre-	Obs.	165	87	167	42
actor	Exp.	171.73	88.15	165.86	35.26
(n=461)	%	35.79	18.87	36.22	9.1
	$\chi^2_1 = 4.53$,	$0.30 < p < 0.20$,			NS

Table 9: Distribution of Rh (D) blood group in Dd-reactors and non-reactors

Sample		*(D) +*	*(D) -*
Dd-reactor	Obs.	228	11
(n=239)	Exp.	226.88	12.12
	%	95.40	4.6
Dd-nonreactor	Obs.	427	24
(n=451)	Exp.	428.12	22.88
	%	94.68	5.32
	$\chi^2_1 = 0.16$,	$0.70 < p < 0.60$,	NS

ABO, Rh BLOOD GROUPS AND ANTIGEN Dd-REACTIVITY

ABO blood group antigens were typed in both Dd-reactors and Dd-nonreactors (Table 8). No correlation was observed $\chi^2_3 = 1.53$, $0.30 < p < 0.20$), and the distribution of ABO types was found to follow almost identical pattern in the two groups. Similarly, no correlation was observed when Rh(D) types were studied with regard to Dd-reactivity ($\chi^2_1 = 0.16$, $0.70 < p < 0.60$, Table 9).

ACKNOWLEDGEMENT

V.B. is grateful to the I.C.M.R, New Delhi for the award of a research fellowship which made her participation in this study possible.

REFERENCES

Kaur, N. and Shrivastava P.K.: Antigen Dd reactors in an Indian population. *Dermatologica, 149*: 559-562 (1974).

Kaur, H., Sehajpal P.K., Khanna, A.K. and Shrivastava, P.K.: Some biochemical polymorphism in members of the Gaddi tribe of Himachal Pradesh. *Hum. Hered., 30*: 204-206 (1980).

Kaur, H., Sehajpal, P.K. and Shrivastava, P.K.: Distribution of some genetic traits in three populations from Punjab, North India. *Anthrop. Anz., 30*: 66-69 (1981).

Kaur, H. and Shrivastava, P.K.: Studies on the Dd-antigen-antibody system. I. The nature of antigen Dd and its antibodies. *Experientia, 38:* 1481-1483 (1982).

Kaur, H. and Shrivastava, P.K.: Studies on the Dd-antigenantibody system. II. Antigen Dd-reactivity in some North Indian populations. *Experientia, 39:* 91-92 (1983).

Rose, N.R. and Bigazzi, P.E.: *Methods in Immunodiagnosis*. Wiley, New York (1973).

Shrivastava, P.K.: Antigen Dd. A serum precipitating factor in human dandruff. *Dermatologica, 144:* 310-313 (1972).