

# A Study of Antispermatozoal Antibodies in Leprosy<sup>1</sup>

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The presence of autoantibodies in lepromatous leprosy has been widely investigated. Autoantibodies have been found against thyroglobulins (<sup>3</sup>), nuclear material, and cardiolipin (<sup>11</sup>), as well as rheumatoid factors and cryoglobulins (<sup>9</sup>). Wall and Wright (<sup>17</sup>) have demonstrated autoantibodies reacting with the testicular germinal cells and spermatozoa. Recently, Saha and Gupta (<sup>12</sup>) detected sperm antibodies in both lepromatous and tuberculoid forms of leprosy. This study has been undertaken primarily to detect serum antispermatozoal antibodies (ASA) in patients with polar leprosy. An attempt has also been made to find the correlations, if any, between the incidence of serum ASA and the duration of the disease and/or with the number of erythema nodosum leprosum (ENL) reactions.

## MATERIALS AND METHODS

Sixty male patients with polar leprosy were studied. Thirty-three had polar lepromatous disease and 27 polar tuberculoid leprosy. These patients were from the Leprosy Mission Hospital Naini and the SRN Hospital, Allahabad (U.P.), India. As controls, serum ASA were also studied in 20 age-matched healthy male individuals from the same socioeconomic strata as the leprosy patients. The diagnosis in all cases was confirmed by clinical examination and histopathological evaluation of skin biopsies. In the subjects whose sera were evaluated for the presence of ASA, cases with evidence of either genito-urinary infection or any testicular or epididymal pathology were excluded.

Blood samples were taken in the morning

on an empty stomach. The ABO blood groups of the individuals were determined. The serum samples were stored at 4°C. The serum ASA were detected by the following immunological techniques:

- a) Modified sperm agglutination test (<sup>8</sup>)
- b) Sperm immobilization test (<sup>6</sup>)
- c) Modified tanned red cell hemagglutination test (<sup>14</sup>).

In all the techniques, for detection of ASA in the test serum, the antigen was obtained from individuals of the same blood group.

## RESULTS

The incidence of serum ASA varied from 18.5 to 39.4 percent, depending on the technique employed to detect them. A perfect correlation between the different tests was observed in 30.3 and 18.5 percent of the cases of lepromatous and tuberculoid leprosy, respectively. The incidence was higher in lepromatous patients (Table 1).

The incidence of ASA in both groups was found to be proportional to the duration of the disease. The incidence of sperm immobilizing antibodies was higher than the sperm agglutinins in the first 36 months. Thereafter, with further increase in disease duration, the incidence of the various types of antibodies was similar (Table 2).

There was no correlation between the incidence of ASA and the number of ENL attacks in lepromatous leprosy cases (data not shown). None of the control group of individuals showed the presence of serum ASA by the three techniques used.

## DISCUSSION

Human spermatozoa have been found to possess multiple antigenic groups. The different antigenic determinants might produce different types of antibodies which could be detected by these three tests—sperm agglutination, sperm immobilization, and hemagglutination tests. The sperm immobilization test has been found to be the most sensitive of the three. Similar obser-

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TABLE 1. Incidence of antispermatozoal antibodies in polar leprosy cases by the three immunological tests.

Immunological test	Lepromatous leprosy			Tuberculoid leprosy		
	Sera tested	Sera positive	% positive	Sera tested	Sera positive	% positive
Sperm agglutination test	33	12	36.4	27	6	22.2
Sperm immobilization test	33	13	39.4	27	9	33.3
Hemagglutination test	33	10	30.3	27	5	18.5

vations have been made by Isojima and Tsuzuku (6).

In the present study, all three types of ASA were not present in every test serum. This may indicate that spermatozoal antigens induced different types of antibodies in different individuals. The incidences of antispermatozoal antibodies in both the polar types of leprosy were found to be proportional to the duration of disease, although their incidence was lower in tuberculoid leprosy. Job and Macaden (7) and Tilak (16) postulated that there may be antigenic similarity between testicular tissues and leprosy bacilli. This may prevent the early formation of these antibodies. With progression of the disease, as damage to the testicular tissue occurs, spermatozoa may be exposed to the host's immune apparatus resulting in the production of antispermatozoal antibodies. Stewart, Tull and Davis (15) suggested that the synthesis of such antibodies might be further accentuated by the adjuvant-like action of *M. leprae*.

Erythema nodosum leprosum (ENL), which is a form of cutaneous vasculitis, occurs in lepromatous leprosy and is thought

to be an Arthus type of reaction. In lepromatous leprosy, there is already testicular damage. ENL reactions in such cases can further damage testicular tissues. One could speculate that this, in turn, could increase the titer of antispermatozoal antibodies due to more antigen being available to the immune apparatus until a stage of immunological paralysis is reached. In any case, in the present study no correlation between the ENL attacks and the incidence of ASA was observed.

The exact mechanism of production of ASA in leprosy is not known. They may be produced by either an autoimmune mechanism or due to direct testicular damage produced by the bacilli. Mathews and Trautman (9) have observed antibody mediated responses in leprosy similar to those typical of collagen diseases, suggesting an autoimmune mechanism for the production of ASA. Allison, *et al.* (1) opined that in autoimmune organ specific disorders, perhaps a sub-population of T-lymphocytes has an important suppressor effect on the tendency of B-lymphocytes to form autoantibodies. Irvine (3) postulated that in leprosy, es-

TABLE 2. Relationship between duration of disease and incidence of antispermatozoal antibodies in cases of leprosy.

Duration of disease (months)	Lepromatous leprosy						Tuberculoid leprosy							
	Sera tested	Agg. <sup>a</sup> test		Immob. <sup>b</sup> test		Hemagg. <sup>c</sup> test		Sera tested	Agg. <sup>a</sup> test		Immob. <sup>b</sup> test		Hemagg. <sup>c</sup> test	
		n <sup>d</sup>	%	n	%	n	%		n <sup>d</sup>	%	n	%	n	%
1-36	13	3	(23.1)	4	(30.8)	1	(8.3)	17	2	(11.8)	5	(29.4)	1	(5.9)
37-120	10	4	(40.0)	4	(40.0)	4	(40.0)	6	2	(33.3)	2	(33.3)	2	(33.3)
>120	10	5	(50.0)	5	(50.0)	5	(50.0)	4	2	(50.0)	2	(50.0)	2	(50.0)

<sup>a</sup> Agg. test = Sperm agglutination test.

<sup>b</sup> Immob. test = Sperm immobilization test.

<sup>c</sup> Hemagg. test = Hemagglutination test.

<sup>d</sup> n = Number of positive sera.

pecially the lepromatous form, these suppressing or controlling T cells may be lacking, which can lead to the emergence of autoimmunity according to the precise nature of the T cell deficiency. Saha, *et al.* (13) reported high incidences of both non-organ-specific and organ-specific antibodies in lepromatous leprosy. These authors further noticed the disappearance of rheumatoid factor from the sera of four of five patients with lepromatous leprosy after they had received immunological reconstitution therapy by intravenous transfusion of normal lymphocytes.

The evidence for testicular involvement due to the direct action of the bacilli is supported by the fact that a large number of bacilli have been demonstrated in testicular tissues of patients with leprosy (7, 13). The inflammatory changes may lead to an obstruction of the efferent ducts of the testis. This would result in extravasation of spermatozoa into the interstitium, thereby exposing them to the immune apparatus of the host, resulting in the production of antibodies. Rao and Rangnekar (10) and Ansbacher (2) have demonstrated these antibodies in patients with surgically induced obstruction of the vas deferens. Gupta, *et al.* (4) observed that circulating sperm antibody titers among vasectomized subjects increased with time after the occlusion.

### SUMMARY

Sixty male patients with polar leprosy (33 lepromatous and 27 tuberculoid) were studied for the presence of antispermatozoal antibodies. Antibodies were detected by three different immunological tests. The sperm immobilization test was found to be the most sensitive. In lepromatous leprosy the incidence of these antibodies was higher than in tuberculoid cases. An increasing incidence of antispermatozoal antibodies was observed with the duration of the disease irrespective of the test employed for their detection. No correlation between the number of erythema nodosum leprosum (ENL) reactions and the incidence of antibodies could be demonstrated.

### RESUMEN

Se buscaron anticuerpos antiespermatozoides en 60 pacientes del sexo masculino con lepra polar (33 lepromatosos y 27 tuberculoides). Los anticuerpos se

buscaron por 3 métodos inmunológicos diferentes. La prueba de la inmovilización de los espermatozoides resultó ser la más sensible. En la lepra lepromatosa la incidencia de estos anticuerpos fue mayor que en los casos tuberculoides. Un aumento en la incidencia de anticuerpos antiespermatozoide estuvo directamente relacionado con la duración de la enfermedad. No se pudo demostrar correlación alguna entre el número de reacciones tipo eritema nodoso leproso (ENL) y la incidencia de anticuerpos.

### RÉSUMÉ

Chez soixante sujets masculins atteints de lèpre polaire (33 lepromateux et 27 tuberculoides), on a recherché la présence d'anticorps anti-spermatozoïdes. Les anticorps ont été décelés par 3 épreuves immunologiques différentes. L'épreuve d'immobilisation du sperme s'est révélée la plus sensible. Dans la lèpre lépromateuse, la prévalence de ces anticorps était plus élevée que chez les cas de lèpre tuberculoïde. On a constaté que la prévalence d'anticorps anti-spermatozoïdes augmentait avec la durée de la maladie, quelle que soit l'épreuve utilisée pour leur détection. Aucune corrélation n'a pu être démontrée entre le nombre de réactions d'érythème noueux lépreux (ENL) et la prévalence d'anticorps.

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