RENAL INVOLVEMENT IN LEPROSY

N K Chopra and R S Pande

Renal involvement in 20 lepromatous leprosy (LL) and 5 non-lepromatous patients was assessed by (a) biochemical analysis of blood and urine, (b) renal functional tests, and (c) histopathological examination of renal biopsies. Ten age-matched healthy normals formed the control group. LL patients had a varying degree of renal involvement as indicated by the presence of pus cells, granular, hyaline and red cell casts, reversal of albumin/globulin ratio and lowered creatinine clearance rates. Renal biopsies showed significant histopathological lesions in 50% of lepromatous as compared to 20% of the non-lepromatous patients. The pathological changes were predominantly of chronic glomerulonephritis followed by chronic pyelonephritis and interstitial nephritis. Surprisingly, none of the patients studied showed granulomas, acid fast bacilli or amyloid in the kidney.

Key words : Leprosy, Renal, Pathology, Kidney.

Lepromatous leprosy (LL) is a systemic, disseminated form characterised by dermal, neural and systemic granulomatous disease, abundant *Mycobacterium leprae*, lowered cell mediated immune responses, increased specific and non-specific humoral response, autoantibodies and circulating and tissue-localised immune complexes.[1,2] Renalin volvement was first reported by Mitsuda and Ogawa[3] in 1937. Non-specific renal lesions, such as glomerulonephritis, pyelonephritis, interstitial nephritis were variously reported by subsequent Indian workers.[4-6] Whereas a high incidence of 45 to 55% of secondary renal amyloidosis was reported by Western authors,[7,8] reports on Indian patients showed only 8-10% involvement.[4,9] With a view to further evaluate the geographic pattern of renal lesions in lepromatous leprosy, patients from the Baroda district of Gujarat were studied, using biochemical, microbiological and histopathological criteria.

From the Department of Medicine, Medical College and S. S. G. Hospital, Baroda-390 001, India.
Address correspondence to : Dr. N. K. Chopra, Distt. Leprosy Officer, Anasuya Leprosy Hospital, Ajwa Road, Baroda, India.

Materials and Methods

Twenty five patients of leprosy consisting of 20 lepromatous leprosy (LL) and 5 non-lepromatous leprosy attending from June to November 1982 were included in the study. They were classified according to the clinico-pathological criteria of Ridley and Jopling.[10] The clinical details are given in table I. Fifteen of the patients received anti-leprosy treatment with dapsone (DDS). Detailed physical and clinical examination was carried out prior to the study to exclude any associated illnesses such as nephritis, diabetes mellitus, hypertension and pulmonary tuberculosis. Ten normal healthy subjects were also investigated and formed the control group.

Both the patients and the controls were subjected to : (a) estimation of hemoglobin, total and differential leucocyte counts, erythrocyte sedimentation rate and blood smear examination; (b) urinalysis for the presence of albumin, sugar, pus cells, red blood cells and casts if any; (c) serum electrolytes and blood urea, serum and urinary creatinine, creatine clearance, 24 hours albumin, serum proteins with albumin/globulin ratio, serum cholesterol, serum calcium, phosphorus and alkaline phos-

Table I. Clinical details and treatment status of leprosy patients.

Type of leprosy	Number of cases			Duration of illness (years)			Duration of treatment (years)			
	Total	Male	Female	<1	1 to 5	5	Nil	<1	1 to 5	>5
Tuberculoid	2	2	—	2	—	—	1	1	—	—
Borderline tuberculoid	2	1	1	1	1	—	2	—	—	—
Borderline	1	—	1	1	—	—	—	1	—	—
Borderline lepromatous	5	4	1	2	3	—	2	1	1	1
Lepromatous	15	10	5	5	4	6	5	3	1	6
Total	25	17	8	11	8	6	10	6	2	7

phatase, (d) urine culture for pyogenic organisms and the presence of acid fast bacilli (AFB), (e) The dermal bacillary index in the patients was evaluated by slit smears of 6 sites in the body.

Percutaneous renal biopsies were done in all patients using Franklin's modification of Vim-Silvermann's needle. The biopsies were fixed in buffered formalin and the paraffin blocks were sectioned and stained for haematoxylin and eosin, PAS, congo red, and methyl violet. Acid fast bacilli were stained by Wade and Fite method.

Results

Of the 25 leprosy patients, 17 were male. They ranged in age from 15 to 70 years. Sixteen of the patients had received less than one year's antileprosy treatment with dapsone. None of the patients were noted to have other systemic diseases such as hypertension, diabetes or tuberculosis. All non-lepromatous patients except one (BB) in reactional phase were bacteriologically negative. All lepromatous patients showed bacilli in the skin with BI ranging from 3+ to 5+.

Routine urinalysis of LL patients showed significant numbers of pus cells in 4 cases, granular, hyaline and red cell casts in 3, and 10-15 red cells per high power field in 5. Three patients showed 1.5 to 2 gm per day of proteinuria. Two patients having erythema nodosum leprosum showed smoky urine. Bacterial culture of urine samples revealed *E. Coli* and *Klebsiella* in 3 and 2 lepromatous patients respectively.

Table II gives the data on serum proteins, serum cholesterol and blood urea of patients and controls.

Table II. Comparison of serum proteins, cholesterol and blood urea of the leprosy patients with normal controls.

Subjects	Serum proteins			Serum cholesterol	Blood urea
	Total gm%	Albumin gm%	Globulin gm%	mg%	mg%
Non-lepromatous	6.8±1.1	3.9±1.0	2.9±0.6	170±35	29±3.0
Lepromatous	7.5±0.5	4.1±0.4	3.1±0.5	160±30	28±5.0
Normal controls	7.1±0.2	4.6±0.2	2.5±0.1	174±20	30±3.0

In the non-lepromatous group, 1 patient showed reversed albumin and globulin ratio, 4 patients with lepromatous leprosy showed a similar reversal, the remaining showed no remarkable differences from the control group. Four lepromatous patients had higher levels of urinary and serum creatinine values. On the other hand, creatinine clearance was significantly lowered in 13 patients with lepromatous leprosy.

Ten (50%) patients of lepromatous as opposed to one (20%) of the non-lepromatous patients showed significant renal pathology. Of the ten lepromatous individuals with renal lesions, six showed evidence of chronic diffuse glomerulonephritis, and two each had non-specific chronic pyelonephritis and interstitial nephritis. The glomerular involvement ranged from focal mesangial cellularity to periglomerular fibrosis and complete hyalinisation. The tubules showed atrophy, and albumin casts. The interstitium showed infiltration by mononuclear cells and fibrosis. The vessels were essentially normal. There was no correlation between the duration of illness and the presence of renal lesions.

Interestingly, none of the biopsies studied showed granulomas or acid fast bacilli. Amyloidosis was not seen in any of our patients.

Comments

Though lepromatous leprosy is a systemic disorder, leprosy granulomas and acid fast bacilli are less frequently seen in the kidney as compared to the liver and spleen.[3,11] On the other hand, renal disease complicating the reactional states in leprosy is more frequent.[12-14] Most of the studies in India have been undertaken in south India. With a view to understanding whether some of the differences reported in Indian as opposed to Western literature were due to racial differences, studies were undertaken in an ethnically different population taken from the Baroda district of Gujarat.

The present investigation shows histopathologically proven involvement of the kidney in 50% of lepromatous leprosy patients as compared to 20% of the non-lepromatous group of individuals. The type of involvement was predominantly of chronic glomerulonephritis followed by chronic pyelonephritis and interstitial nephritis. These patients showed varied biochemical abnormalities ranging from reversed albumin / globulin ratio to poor creatinine clearance in 13 of 20 LL patients. The significant negative findings were the absence of acid fast bacilli and granulomas in any of our patients. Rare instances of leproma-like lesions with vacuolated cells containing acid fast bacilli have been reported.[7] Secondary amyloidosis of the kidney as seen in south Indian patients was also not observed by us even after special staining of the tissues. These studies confirm even more strongly the earlier reports of our country[4,6,9] indicating low incidence of amyloidosis in LL patients in India. It is of significance that lepromatous individuals were more prone to develop renal complication than their non-lepromatous counterparts. However, there was no relationship between the duration of illness and the presence of renal pathology.

The majority of renal changes seen in our patients are of a non-specific nature and indicative of glomerular and interstitial disease. Future studies using immunochemical staining are required to indicate whether immune complex deposition was responsible for some of the glomerular lesions.

References

1. Turk JL and Bryceson ADM : Immunological phenomenon in leprosy and related disease, Adv Immunol, 1971; 13 : 209-221.
2. Nath I : Immunological aspects of human leprosy— Current Status, Leprosy Rev, 1983; 54S : 31S-45S.
3. Mitsuda K and Ogawa M : Study of 150 autopsies on cases of leprosy, Inern J Leprosy, 1937;5 : 53-60.
4. Desikan KV and Job CK : A review of postmortem findings in 37 cases of leprosy, Intern J Lepros 1968; 36 : 32-44.

5. Sainani GS and Narayan Rao KV : Renal changes in leprosy, J Assoc Phys India, 1974; 22 : 649-664.
6. Johny KV and Karat ABA : Renal biopsy studies in cases of leprosy, J Assoc Phys India, 1971; 19 : 117-118.
7. Powell CS and Swan LL : Leprosy; Pathologic changes observed in 50 consecutive necropsies, Amer J Pathol, 1955; 31 : 1131-1147.
8. Shuttleworth JS and Ross SW : Secondary amyloidosis in leprosy, Ann Int Med, 1956; 45 : 23-28.
9. Krishnamurthi S and Job CK : Secondary amyloidosis in leprosy, Inern J Leprosy, 1966; 34 : 155-158.
10. Ridley DS and Jopling WH : Classification of leprosy according to Immunity : A five group system, Intern J Leprosy 1966; 34 : 255-273.
11. Bernard JC and Vazquez CAJ : Visceral lesions in leprosy, Intern J Leprosy, 1974; 41 : 94-101.
12. Brusco CM and Masanti JC : Cases of death of leprosy patients, influence of lepra reaction and renal disease, Intern J Leprosy, 1963; 31 : 14.
13. Ramanujam K, Ramu G, Balkrishnan S et al : Nephrotic syndrome complicating lepromatous leprosy, Ind J Med Res, 1973; 61 : 548.
14. Wawal PE : Nephrotic syndrome complicating ENL, J Assoc Phys India, 1977; 25 : 423.