Effect of Levamisole on Bacterial Index in BL and LL Leprosy[1]

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Levamisole, a synthetic anthelmintic, has been shown to stimulate cell-mediated immunity ([8]) and humoral immunity ([13]). It also potentiates macrophage activity ([9, 10]) and increases neutrophil mobility ([1]), adherence and chemotaxis ([14]). Clinically, several workers have observed remarkable improvement in lepromatous leprosy patients complicated with erythema nodosum leprosum (ENL) ([3, 4, 6]). Since we also found significant improvement in ENL reactions and in the clinical status of lepromatous (LL) and borderline lepromatous (BL) leprosy patients (unpublished data), the present study was undertaken to determine the effects of levamisole on the bacterial indices (BI) in BL and LL leprosy patients when administered along with specific antileprosy therapy.

MATERIALS AND METHODS

This study was conducted from January 1982 to November 1983 on 40 patients from the Bholanath Memorial Leprosorium, Sarnath, Varanasi, India. All of the patients were receiving antileprosy treatment for not more than one month at the commencement of the study. The patients were classified according to the Ridley-Jopling scale ([11]), and only those patients who attended follow-up clinics until the end of the study have been included in this report.

A total of 40 patients were studied, divided into two groups of 20 patients each. Each group (study and controls) had 10 BL and 10 LL cases. The average ages of the BL patients in the study and the control groups were 31.6 and 42.4 years, respectively, with a corresponding duration of illness of 5 years 8 months and 3 years 5 months. The male-to-female ratio was 75:25. The average ages for the LL patients were 40.7 years (study group) and 43.7 years (controls), with an average duration of illness of 8 years 6 months and 6 years 9 months, respectively. The male-to-female ratio was 90:10. The controls were treated with dapsone (DDS) 100 mg daily together with vitamin B complex and hematinics. In addition to the above, the study group received levamisole 150 mg once every two weeks under supervision for 1½ years. Thus, the only variable between the controls and the study group was levamisole.

Before initiation of therapy, all patients were bacteriologically graded by Ridley's method, taking smears from 4 sites, 2 from the ear lobes and 2 from the skin lesions. Thereafter, at monthly intervals for a period of 1½ years both study and control groups were examined to monitor bacteriological improvement.

RESULTS

BL cases. Initially, the mean (±S.D.) BIs of the control and study populations were 3.10 (±0.91) and 2.95 (±1.14), respectively, a statistically not significant difference. After 1½ years, the values came down to 2.20 (±0.71) and 1.35 (±0.85) for the control and study groups, respectively. Two patients in the study group became bacteriologically negative. The BIs of individual patients in the control and study groups are shown in Table 1. The differences in the mean BI between these two groups was statistically significant ($p < 0.01$) after 1½ years of treatment.

LL cases. The initial mean BIs were 4.00 (±0.94) and 4.10 (±0.74) for the control and study groups, respectively, which were not statistically different. After 1½ years, the values came down to 2.85 (±0.75) and 1.60 (±1.14), respectively. Three patients in the study group became bacteriologically negative. The differences in BI at the end of 1½ years of treatment were statistically signif-

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TABLE 1. *Bacterial indices of individual BL patients before and after 1½ years of treatment with dapsone with or without levamisole.*

Patient no.	Control group		Study group[a]	
	Before	After	Before	After
1	3	2	4	1.5
2	4	2.5	2.5	1
3	3.5	2	4	2.5
4	3	2.5	3	1
5	2.5	2	2	1.5
6	4	2.5	4	2
7	1	0.5	3.5	2
8	3	3	1.5	0
9	4	3	1	0
10	3	2	4	2
Mean ± S.D.	3.10 ± 0.91	2.20 ± 0.71	2.95 ± 1.14	1.35 ± 0.85[b]

[a] The study group received levamisole in addition to dapsone, vitamin B complex, and hematinics.
[b] Significantly different from the control group after treatment, $p < 0.01$, Student's t test.

icant ($p < 0.01$). The individual BIs in both the control and study groups at the beginning and after 1½ years are shown in Table 2.

No adverse side effects of levamisole were noted during the period of the study.

DISCUSSION

A number of workers have reported defects in lepromatous macrophages in their ability to digest *Mycobacterium leprae* ([2, 12]). Convit, *et al.* ([5]) reported that lepromatous macrophages could lyse *M. leprae* when other mycobacteria were administered concurrently. Renoux and Renoux ([9, 10]) reported the ability of levamisole to augment macrophage activity. At adequate dosage levamisole increased binding of IgM and C3 and increased phagocytosis and digestion of virulent *Listeria* organisms. Ramu and Sengupta ([7]) reported that intervention levamisole therapy in persistently bacteriologically positive lepromatous cases leads to a marked improvement in their BI. Similar results were observed in the present study. Although it is difficult to say how levamisole therapy lowers the bacterial index in LL and BL forms of leprosy, it is possible that either the bacteria are lysed or otherwise cleared off more efficiently by the activated macrophages.

TABLE 2. *Bacterial indices of individual LL patients before and after 1½ years of treatment with dapsone with or without levamisole.*

Patient no.	Control group		Study group[a]	
	Before	After	Before	After
1	3.5	3	4	2
2	5	3.5	4.5	2.5
3	2	1.5	3.5	2
4	3.5	2	5	2
5	4	3	3	0
6	5	4	5	2.5
7	3.5	2.5	3.5	0
8	4.5	2.5	5	3
9	4	3	4	2
10	5	3.5	3.5	0
Mean ± S.D.	4.00 ± 0.94	2.85 ± 0.75	4.10 ± 0.74	1.60 ± 1.14[b]

[a] The study group received levamisole in addition to dapsone, vitamin B complex, and hematinics.
[b] Significantly different from the control group after treatment, $p < 0.01$, Student's t test.

SUMMARY

A 150 mg levamisole tablet once in every fortnight along with specific antileprosy drugs were administered to ten patients each in BL and LL groups of leprosy. A similar number of patients in each group receiving only specific antileprosy treatment served as controls. After 1½ years of study a more significant improvement was noted in the bacteriological status in the levamisole-treated group. Thus, levamisole can be used as an effective adjunct for quicker recovery in lepromatous patients.

RESUMEN

Se administró una tableta (150 mg) de levamisol cada cuatro noches a grupos de 10 pacientes con lepra de los tipos intermedio-lepromatoso y lepromatoso. Los pacientes recibían además, las drogas antileprosas específicas. Como controles se incluyeron pacientes de los mismos tipos de lepra que recibieron solamente las drogas antileprosas. Después de 1.5 años de estudio, se notó una mejoría más marcada en el estado bacteriológico del grupo tratado con levamisol. De acuerdo a ésto, el levamisol puede usarse como un suplemento efectivo en la recuperación más rápida de los pacientes lepromatosos.

RÉSUMÉ

Chez 10 malades atteints de lèpre lépromateuse BL, ainsi qu'à 10 malades atteints de lèpre LL, on a ajouté aux médicaments spécifiques contre la maladie, du levamisole à raison d'une tablette tous les 15 jours. Un nombre identique de malades appartenant à chacun de ces deux groups cliniques a reçu uniquement le traitement spécifique contre la lèpre, servant ainsi de témoin. Après un an et demi, on a noté une amélioration plus marquée de l'état bactériologique chez les malades traités par le lévamisole. Il apparaît dès lors que le lévamisole peut être utilisé comme un complément efficace du traitement, en vue d'accélérer la guérison des malades lépromateux.

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