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Discharge of *Mycobacterium leprae* from the Mouth in Lepromatous Leprosy Patients

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A bacteriological study of the mouths of 40 lepromatous patients, 35 of them untreated, has been undertaken. In each case a mouth wash was done and acid-fast bacilli were counted in the washing. Surface smears taken from 3 sites (tongue, palate and gums) were examined for acid-fast bacilli. Inoculation of surface scrapings into Lowenstein-Jensen media was also performed. The results show that non-cultiviable acid-fast bacilli were present in the mouths of 85% patients with a mean count of 1.59×10^6 per mouth wash. The possible significance and the epidemiological implications of these findings in communities where spitting is a common habit, are discussed.

Introduction

The nose in leprosy has been a subject of thorough study in the recent years. It has been shown that nasal washings (Shepard, 1960, 1962), nasal smears (Davey and Barton, 1973) and nose-blows (Davey and Rees, 1974) are all positive for *Mycobacterium leprae* in a large proportion of lepromatous patients. Further Desikan (1977) has shown that *M. leprae* shed from nose, in the nose-blows, remain viable for 9 days — indicating an obvious epidemiological significance and potential hazard of the nasal discharge in leprosy.

In some Asian countries, indiscriminate spitting is common. The present study has therefore been undertaken to see whether there is a discharge of bacilli from the mouth of lepromatous patients as happens from their nose. Hitherto, no such study has been undertaken.

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Material and Methods

Forty bacteriologically positive cases of leprosy formed the subjects of study. Except for 5, all were practically untreated. Of the treated cases 4 had received DDS 50 to 100 mg for 3 days to 4 weeks and the fifth patient had received DDS for 7 weeks. Thirty-seven cases belonged to lepromatous type and 3 to borderline (BL) type. There was no evidence (clinical and in some cases radiological) of pulmonary tuberculosis in any of the cases. A detailed history of disease with particular regard to duration, treatment received, if any, was noted in all cases. All the patients were assessed for their leprosy status by clinical examination, skin smears from 4 sites and skin biopsies. In each patient the mouth was subjected to a thorough clinical examination.

(a) BACTERIAL COUNTS FROM MOUTH WASH

Patients were given 40 ml tap water and were asked to take it into the mouth and swill it around for 30 s before spitting it out into a wide-mouth container. To this mouth wash, 1 to 2 ml of N/10 NaOH was added for breaking excess of mucus. The specimen was then centrifuged for 15 min at 3000 rev/min. The supernatant was discarded and the deposit resuspended in about 1 ml of 0.1% B.S.A. The exact volume of the suspension was recorded. In the suspension thus prepared, counting of acid-fast bacilli (AFB) was done by standard procedure.

(b) SURFACE SMEARS

Surface smears were obtained from 3 sites in the mouth, from the lesions, if they were present, or from the apparently normal mucosa if lesions were not found. The 3 sites chosen were the tongue, palate and gums. Only surface material was obtained without traumatizing the mucous-membrane. This was done by gently scraping the surface with a blunt, smooth-edged instrument. After air-drying, the smears were fixed by passing the slides over a flame. The slides were then stained by Ziehl-Neelsen technique and examined for AFB.

(c) INOCULATION OF LOWENSTEIN-JENSEN (L.J.) MEDIUM

In all the first 24 patients, scrapings from the sites mentioned above were also inoculated into L.J. medium. Scrapings were first introduced in 1 ml of 0.1% B.S.A. to which a few drops of N/10 NaOH was added. The resulting suspension, after neutralization, was inoculated into 2 tubes of L.J. medium. One tube was incubated at 37°C and the other at 25°C.

(d) NOSE-BLOW EXAMINATION

In 16 consecutive cases nose-blow specimens were taken directly on the glass slides. Smears were prepared, stained and examined for AFB.

Results

Twenty-three patients showed lesions in the mouth seen as papules or nodules, some with ulcerated surface. Seventeen patients did not show any

TABLE 1
Summary of results

Groups	No. of patients	By smear		By mouth wash		Positive by either method	Negative by both methods
		Positive	Negative	Positive	Negative		
Patients with oral mucosal lesions	23 (57.5%)	19 (82.6%)	4	17 (73.9%)	6	21 (91%)	2 (6.1%)
Patients with no oral lesions	17 (42.5%)	7 (41.2%)	10	10 (58.8%)	7	13 (76.4%)	4 (23.5%)
Total	40	26 (65%)	14	27 (67.5%)	13	34 (85%)	6 (15%)

TABLE 2
Quantum of bacillary discharge per mouth wash

No. of bacilli recovered per mouth wash	No. of patients
More than 10^6	4 (10%)
10^5–10^6	15 (37.5%)
Less than 10^5	8 (20%)
Nil	13 (32.5%)

Mean 1.6×10^6.

lesions (Table 1). From among the cases showing lesions in the mouth, bacilli could be detected by either of the methods in 21 patients. In 19 cases surface smears of the mucosa were positive for AFB. In 17 cases bacilli were found by mouth wash.

From among the patients not having any lesions in the mouth, 7 patients showed AFB in the smears and 10 in the mouthwash specimens, 13 being positive by either of the methods.

As mentioned earlier, only surface material was obtained from the mucous membrane without traumatizing the mucosa. However, in one case, the mucosa was accidentally abraded. Smears thus examined showed inflammatory cells, mainly macrophages, some of which contained intracellular bacilli in the classical "cigar bundle" arrangement. Very few epithelial cells showed intracellular bacilli.

The number of bacilli recovered in the mouthwash varied considerably (Table 2) — the range being 2.6×10^4 to 2.9×10^7 with a mean of 1.6×10^6 per mouth wash. The data related to duration of disease is presented in Table 3. It is apparent that the longer the duration of the disease, the higher the bacteriological positivity in smears as well as mouth washings.

Of the 24 inoculations into L.J. medium, none showed any cultiviable AFB. In this group of 24 patients, 21 showed AFB on smear/mouth wash.

In 16 consecutive cases, nose-blows were also taken at the time of examination. Eight of them showed bacilli in the nose-blows. Of these 8 patients, 7 had bacilli in the mouth too. In other words, one patient who had bacilli in the nose-blow, did not show organisms in the mouth. Further, in 4

TABLE 3
Duration of illness and bacteriological positivity

Duration of illness	No. of cases	Mouth smear positivity	Mouth wash positivity
0 to 3 years	12	6 (50%)	6 (50%)
4 to 10 years	23	16 (69.6%)	17 (73.9%)
More than 10 years	5	4 (80%)	4 (80%)

patients whose nose-blows were negative for bacilli, the organisms could be seen in the mouth. Five patients were negative for AFB in both nose-blows and mouth smears washings.

Discussion

The present study shows that AFB, which did not grow on Lowenstein-Jensen medium, were present in the mouth of 34 of the 40 lepromatous patients studied (85%). As could be expected, mouth positivity was higher in patients with clinical lesions in the mouth than in those with no lesions. Further, where clinical lesions were present, mouth smears were positive more often than mouth washes. This could be due to the selection of an affected site for obtaining smears. In patients without any clinical lesions, mouth wash appeared to be more sensitive as it could sample a larger area of mucosa.

The bacillary discharge per mouthwash ranged from 2.6×10^4 to 2.9×10^7 (mean 1.6×10^6). This indicates that a large number of bacilli may be discharged into the environment by lepromatous patients in spitting as also while speaking, coughing, sneezing etc., causing a potential hazard to the community. It has been shown by Davey and Rees (1974) that bacilli discharged in the nose-blows remain viable up to 7 days. Desikan (1977) has shown that bacilli shed into the environment, could be viable for 9 days or even longer. This further highlights the epidemiological significance of the discharged bacilli from the nose in the earlier studies and possibly also from the mouth in the present study.

In addition to its public health importance, the other important findings are that unlike the nose (Davey and Rees, 1974) mouth positivity appears to increase with the duration of the disease.

In 16 cases, simultaneous study of mouth smears, mouth washes and nose-blows was conducted. Percentage of mouth positivity was a little higher than nose blows, but almost all patients who were positive for nose-blows were also positive for AFB in the mouth. Though the possibility of nasal secretions trickling into the posterior part of the mouth cannot be ruled out, higher positivity of the mouth may well indicate discharge of bacilli from oral mucosa itself. This has been confirmed in a subsequent study (see accompanying publication) where biopsy specimens from the tongue were found to be loaded with AFB. Similar findings have been observed in the histopathological study of the soft palate (Reichart, 1974).

The results of the study thus show that discharge from the mouth, like that of nose, contains a large number of acid-fast bacilli in significant proportion of lepromatous leprosy patients. Further, the unhygienic habit of indiscriminate spitting, especially while chewing tobacco, betal leaves or betal nuts (which possibly also cause minor trauma to the oral mucosa), enhances the possibility of bacillary dissemination. Bacilli are probably sprayed from the mouth of the lepromatous patient into the environment during sneezing, coughing and speaking.

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