

Epidemiological study of leprosy in Malwani suburb of Bombay

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Summary The present investigation was undertaken to study epidemiology of leprosy in Malwani, a western suburb of Bombay, which has a population of 63,321. A total of 691 cases were detected in a 4-year follow-up period between April 1979 and April 1983. The prevalence rate in schoolchildren was 13.88% and the peak incidence occurred in the age group 10–19 years. In this study, the females predominated the males with the male to female ratio being 1:1.33. The disease was found to be more prevalent in the low socioeconomic group and in overcrowded families. Extremities were most commonly affected. A large number of cases occurred in contacts of infectious lepromatous patients. The exact reasons for this could not be ascertained from this rather small sample. It could be related to droplet infections or skin contact.

Introduction

Though leprosy was the first human disorder shown to be due to a microbe identified 100 years ago, it still continues to be a major public health problem, mostly in the developing countries of the world. It is estimated that there are 12–13 million leprosy patients in the world. The majority of them residing in Africa and Asia. Among individual nations, the largest number of leprosy patients (about 4 million) reside in India, where the estimated incidence is about 20,000–30,000 per year.¹

In India, the prevalence of disease varies from place to place—the highest being in certain regions of Orissa, Tamil Nadu, Andhra Pradesh and Maharashtra. In Northern India, the prevalence is rather low. About 15–20% of patients are infectious, that is suffering from multibacillary forms of the disease.¹ One of the distressing facts is that it affects pre-schoolchildren. The city of Bombay has a very high prevalence rate (13 per 1000). The large scale migration of people from outside in a way contributes to this high prevalence. In this expanding city, the suburbs and rural areas are getting urbanized at a very fast rate. One such area is Malwani with a population of 63,321 located in the western suburbs of Greater Bombay. Malwani has a well organized community health centre, developed by the KEM Hospital and Seth G.S. Medical College of Bombay. A number of preventive programmes have been undertaken including one for leprosy eradication. The aim of the present study is called the baseline information on the leprosy scene at Malwani, so that subsequent affects of control measures can be properly assessed. The present study was conducted over a 4-year period, April 1979 to April 1983.

Materials and methods

The leprosy cases were registered through: (1) Mass house-to-house survey (a mass survey was done at the beginning of the programme); (2) school survey (a mass survey was done in July 1979 and repeated every year for new admissions. Suspected cases were also referred during regular school health check-ups); (3) household contact survey of the index cases (the contacts were examined once every 3 months); (4) referrals from health centres, dispensaries and general practitioners; and (5) self-reported cases having any sign and symptom of leprosy.

All the suspected cases during the mass survey and school survey were referred to the clinic. At the clinic they were examined clinically and bacteriologically. Once the diagnosis was made, the case history and examination findings of the patients were recorded on special case sheets, and an index number was given to each patient.

Doubtful cases were recorded on observation card and followed up at 3-month intervals. They were registered as regular patients after confirmation of the diagnosis.

Classification of the leprosy was done clinically and grouped according to Indian classification: (i) non-lepromatous; (ii) borderline; and (iii) lepromatous type. In the cases of borderline and lepromatous types, slit smears were obtained from the skin lesions and ear lobule.

Results and discussion

Table 1 shows the number of leprosy cases detected during various surveys.

The prevalence rate in the general population of Malvani is 10.91/1000. A high prevalence rate in the slums of North Bombay is also recorded in another study.²

The prevalence rate in school is 13.81/1000 which is higher than the general prevalence rate of the population. The higher prevalence rate in school is because a majority of cases (53.11%) are below 19 years (Table 2). The lepromatous type of cases are not seen in school as the majority—(89.13%) of total lepromatous cases—are above 19 years (Table 2), or lepromatous cases may not be attending school. In the study area the majority of schools belong to the Municipal Corporation. A higher incidence of leprosy in Municipal Schools has also been reported in other studies.³⁻⁵ In this study 21.56% of cases are detected through school surveys, so school surveys are a major tool in leprosy control programmes.

The peak incidence is observed in the age group 10-19 years. The other workers have reported the peak incidence in the age group 20-29. No explanation can be offered, at the moment, for these differences. The incubation period of leprosy is very long, so an extensive surveillance programme

Table 1

Mode of detection	T		B		L		Total	
	No.	%	No.	%	No.	%	No.	%
Mass survey	229	41.86	38	38.78	26	56.52	293	42.40
School survey	130	23.77	19	19.39	0	0.00	149	21.56
Contact survey	50	9.14	6	6.12	4	8.70	60	8.69
Referrals and self-reported	138	25.23	35	35.71	16	34.78	189	27.35
Total	547	100	98	100	46	100	691	100.00
Percentage		79.16		14.18		6.66		100.00

Total number of schoolchildren examined: 10,789.

The prevalence rate in school: 13.81/1000.

Table 2. Prevalence of leprosy in different age groups among male and female cases and types of leprosy

Age Group	T				B				L				Total					
	Male		Female		Male		Female		Male		Female		Male		Female		Male and Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-9	64	29.77	68	20.48	8	15.09	6	13.33	0	0.00	1	5.56	72	24.33	75	18.99	147	21.27
10-19	93	43.26	96	28.92	19	35.86	8	17.78	3	10.71	1	5.56	115	38.85	105	26.58	220	31.84
20-29	15	6.98	64	19.28	5	9.43	10	22.22	2	7.14	4	22.22	22	7.43	78	19.75	100	14.47
30-39	23	10.70	16	18.07	3	5.66	11	24.45	7	25.10	4	22.22	33	11.15	75	18.99	108	15.63
40-49	7	3.25	24	7.23	7	13.21	6	13.33	6	21.43	4	22.22	20	6.76	34	8.61	54	7.82
50-59	9	4.19	11	3.31	8	15.09	3	6.67	5	17.86	3	16.66	22	7.43	17	4.30	39	5.64
60 or more	4	1.86	9	2.71	3	5.66	1	2.2	5	17.86	1	5.56	12	4.05	11	2.78	23	3.31
Total	215	100	332	100	53	100	45	100	28	100	18	100	296	100	395	100	691	100
Mean (years)	17.9		22.8		27.9		28.0		33.2		36.7		22.1		24.0			
SD	±14.8		±17.9		±19.2		±15.2		±18.2		±15.1		±17.3		±15.5			
Sex ratio	647/1000		1177/1000		1177/1000		1177/1000		1555/1000		1555/1000		749/1000		749/1000			
Z	Z = 3.4789 p < 0.001 (Significant)		Z = 1.1504 p > 0.05 (Not significant)		Z = 1.1504 p > 0.05 (Not significant)		Z = 1.1504 p > 0.05 (Not significant)		Z = 0.7269 p > 0.05 (Not significant)		Z = 0.7269 p > 0.05 (Not significant)		Z = 1.5716 p > 0.05 (Not significant)		Z = 1.5716 p > 0.05 (Not significant)			

may show peak incidence of infection in an earlier age group. The mean age of infection in females is higher than in males in the non-lepromatous type of infection.

The male to female ratio is 1:1.33. Other studies quoted earlier show the predominance of male cases over female cases. The female cases are seen more where lepromatous cases are less (in this study lepromatous cases are only 6.6% of the total cases) (Table 1). This confirms the findings of another study.⁶

The male:female ratio in lepromatous cases is 1.56:1, and in borderline the ratio is 1.18:1. The Marshall's study shows the same pattern.⁸ In non-lepromatous the females predominate over males.

The male:female ratio in the Malvani population is 1.16:1.⁸ So there is no significant predominance of either sex in the general population. There is practically no sex difference up to the age of 19 years as there are fewer infectious cases below 19 years of age.

There are several factors which influence the sex predominance in the endemic area. The main factor causing the sex difference is opportunity for contact and practically no difference is noted when the opportunity for contact remains the same.

The higher female ratio can be explained on the basis that males are at work during the day time, while the mother or older females remain in contact with children at home (53.11% of cases are below the 19 years age group).

Until it can be shown that the lepromatous rate is greater in males in childhood, it can be assumed that this sex difference may be due to the difference in the susceptibility.⁶

Table 3. Religion wise distribution of leprosy cases

Religion	Leprosy cases		Malvani population ⁸	
	No.	%	No.	%
Hindu	331	47.90*	36093	57.00*
Muslim	318	46.02†	23428	37.0†
Christians	39	5.65‡	3102	4.9‡
Others	3	0.44	698	1.1
Total	691	100	63321	100

* Z, 4.8046 $p < 0.001$ significantly less.

† Z, 2.6234 $p < 0.05$ significantly less.

‡ Z, 0.8740 $p > 0.05$ not significant (no difference).

Table 4. Distribution of cases according to the type of dwelling

Type of dwelling	Leprosy cases		Malvani population	
	No.	%	No.	%
Zopadapatti	463	67.01*	40557	64.05*
Chawls	221	31.98†	21852	34.51†
Individual tenements	7	1.01	912	1.34
Total	691	100	63321	100

* Z, 1.4954 $p > 0.05$ not significant.

† Z, 1.2887 $p > 0.05$ not significant.

The prevalence of leprosy is greater among the Muslim population. Both the communities live in the same socioeconomic settings, however, the average size of Muslim families is larger than Hindu families.⁹ (This was also observed in our contact study.) Overcrowding could be a very important factor and may be responsible for a higher prevalence in Muslims (see Table 3).

There is practically no significance in the type of dwelling (see Table 4). This is why all the slums of Bombay have different prevalence rates,¹² though the main structure of residence in the slum is zopadapatti.

The majority of the cases belong to the low income group (Rs. 0-50) (see Table 5). The average per capita income per month is Rs. 62/- whereas the lowest income per capita per month is Rs. 70/- in the general population of India.¹⁰ There is usually an attempt to correlate socioeconomic status to the incidence of leprosy. However, the former can not be a cause, as unemployment due to disease and disability keeps these families in the low income group.

Unemployment is 17.22% (see Table 6). This is because of disability produced by the disease and also because once the patient's diagnosis is known he is removed from his job. The exact number of the patients removed from their jobs due to disease or disability is not known, for that long term follow-up is required.

The majority of patients show a single lesion (see Table 7). Also in school surveys most of the children show a single lesion. Often the single lesion remains in the silent form and the patient

Table 5. Distribution of cases according to per capita income per month

Monthly income (Rupees)	Cases		Malvani population ⁸	
	No.	%	No.	%
0-50	327	47.32†	15704	24.8†
51-100-	283	40.96	27861	44.0
101-250	70	10.13	15323	24.2
More than 250	11	1.59	4433	7.0
Total	691	100	63321	100

* Z, 11.808 $p < 0.001$ (highly significant).

Average income per month: Rs. 62/- per capita (patient).

Average income per month: Rs. 99.05 per capita (Malvani population).

Table 6. Occupation of cases

Occupation	Number	%
Unskilled worker	111	16.06
Skilled worker	33	4.77
Clerical cadre	27	3.91
Trader	42	6.08
Student	169	24.46
Housewife	190	27.50
Unemployed	119	17.22
Total	691	100

Table 7. The distribution of cases according to the number of lesions

No. of lesions	Male		Female		Total	
	No.	%	No.	%	No.	%
Single lesion	157	57.04	240	60.76	397	57.45
More than one lesion	139	46.96	155	39.24	294	42.55
Total	296	100	395	100	691	100

Table 8. The distribution of lesions according to the sites of lesion in the cases having a single lesion

Sites of lesion	Male		Female		Total	
	No.	%	No.	%	No.	%
Arm	47	29.95	71	29.59	118	29.72
Leg	39	24.84	50	20.83	89	22.42
Thigh including hip and buttock	32	20.38	33	13.75	65	16.37
Back	15	9.55	48	20.00	63	15.87
Pectoral region	5	3.18	8	3.33	13	3.27
Epigastric region	5	3.18	9	3.75	14	3.53
Face	14	8.92	21	8.75	35	8.82
Total	157	100	240	100	397	100

ignores it. Many cases are also detected during the general examinations of patients in hospitals who have been admitted for other complaints.¹¹ That is why mass survey school surveys and health education forms an effective tool for identification of cases, which is a pre-requisite for understanding control programmes.¹²

Only the site where the lesion appears first is of significance. In the case of multiple lesions, it would be difficult to find out from the patient the exact site of the first lesion, hence the patients having a single lesion were selected for such analysis (see Table 8). The commonest sites are arm, leg, thigh and buttocks. These are the sites in the body which receive maximum trauma, friction and inflammation, and these sites also have more skin-to-skin contact. However, there is variation among the sites in different age groups and in different regions.¹³ No explanation can be offered, at the moment, for these regional differences.

The epigastric and pectoral regions show very few lesions as these are well-protected areas of the body.

Out of the five deformities of the eyes, three were of the lagophthalmos type and two were of blindness, which was caused by persistent iridocyclitis and exposure keratitis due to paralysis of the Vth cranial nerve (see Table 9). Chronic iridocyclitis is a common phenomenon which can lead to blindness in borderline lepromatous cases.¹⁴

The observation period of this study was 4 years. As the incubation period of leprosy is uncertain, long-term observation is required to find out the impact of transmission of the disease among household contacts. The prevalence rate of 19.30/1000 among contacts was found to be significantly higher than the general prevalence rate of 10.91/1000 for Malvani.

The incidence of infectivity is greater among the contact cases of lepromatous and borderline

Table 9. Type of deformity in male and female cases

Type of deformity	Male		Female		Total	
	No.	%	No.	%	No.	%
Eye	3	4.12	2	3.58	5	3.88
Hand	27	36.98*	28	50.00*	55	42.64
Foot	33	45.21†	20	35.71†	53	41.08
Hand and Foot	10	13.69	6	10.71	16	12.40
Total	73	100	56	100	129	100

* Z, 0.98 $p > 0.05$ not significant.† Z, 1.76 $p > 0.05$ not significant.**Table 10.** Distribution of contact cases in different types of index cases

Type of index cases	No. of contacts examined	T	B	L	Total	Incidence of infectivity (%)
T	2530	43 (86)	0 (0)	0 (0)	43 (71.67)	1.70
B	450	7 (14)	5 (83.33)	1 (25)	13 (21.67)	2.87
L	129	0 (0)	1 (16.67)	3 (75)	4 (6.66)	3.10
Total	3109	50 (100)	6 (100)	4 (100)	60 (100)	1.93

* Figures in brackets indicate percentages.

cases than the non-lepromatous type, indicating that contacts of lepromatous cases are at higher risk (see Table 10). The contacts of lepromatous cases are fewer as the majority of lepromatous cases stay alone and away from their families. The contact case findings are similar to the findings of Doull (1961).¹⁵

Lepromatous cases are not seen among contacts of non-lepromatous cases. Three lepromatous cases are recorded among the contacts of lepromatous 'Index case'. This indicates that the disease is infectious and proves the concept of contact transmission.

Conclusions

The epidemiological study of leprosy in Malvani has shown a few minor differences in the pattern of leprosy in comparison with studies elsewhere.

These are: (a) reversal in sex ratio, the male and female ratio is 1:1.33; (b) peak incidence of disease is in a younger age group of 10-19 years; (c) the proportion of lepromatous cases is (6.6%) less than figures for all India; and (d) the deformity rate (18.67%) was found to be lower than elsewhere.

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TEACHING MATERIALS AND SERVICES

'Hansenologia'; *Dermatologia Tropical*; textbook in Portuguese

This excellent book in Portuguese, written by Dr Sinesio Talhari and Dr Rene Garrido Neves, both from Brazil, deserves further publicity. The edition we have is dated 1984, but it may have been revised. It is a strongly bound paperback of about 100 pages, covering all basic aspects of leprosy (but note that the use of 'Hansenology' and similar derivatives is important in their country) in a most competent and up-to-date manner. It is profusely illustrated in black and white, and colour pictures. In view of the scarcity of good material in Portuguese, this book deserves serious attention and wider distribution, including Angola, Mozambique, Cape Verde and Guinea Bissau. Enquiries to Dr Sinesio Talhari, Servicio de Dermatologia, Faculdade de Medicina, 69 000, Manaus, Amazonas, Brasil.

WHO Training in leprosy

This document; WHO/CDS/LEP/86.2 (English language) was produced by WHO in 1986 and is available on application to the Department of Publications, WHO, 1211 Geneva 27, Switzerland. It was written as a collaborative effort between Miss P J Neville, Education and Training Secretary, the Leprosy Mission International, London; Dr W Felton Ross, Medical Adviser, American Leprosy Missions Inc., USA; the Leprosy Unit, Division of Communicable Diseases, WHO, Geneva. The four main sections cover: introduction, training health personnel in leprosy, teaching and training considerations, teaching/learning materials on leprosy.

Self-instructional packages in medical education

The September 1986 issue of the Newsletter from the School of Medical Education, the University of New South Wales, P.O. Box 1, Kensington, NSW, 2033, Australia carries an interesting article on the above subject by May Wong. Such packages are defined in the opening paragraph as 'collections of learning items that have been designed to guide the learner in a structured manner through one or more learning tasks. The learning materials are organized in such a way that they provide stimuli, learning activities [responses and practice] feedback and assessment and allow the learners to function with little or no intervention from the instructors.'

(This publication merits further study. In the absence of experienced and credible teachers for the subject of leprosy in most endemic areas, this approach may have much to commend it.—*Editor*.)