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Epidemiological information on leprosy in the Singu area of Upper Burma*

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In the course of a WHO trial designed to evaluate the possible protective action of BCG vaccine against leprosy, a longitudinal epidemiological study of the whole population was carried out in an area of very high endemicity in Burma from 1964 to 1976. Two mass surveys of the whole population with an interval of 4 years and annual re-examination of the 28 000 children (0–14 years) in the BCG trial were carried out. The data collected yielded important information about general prevalence and yearly incidence of the disease as well as on sex, age, and classification of cases. The general prevalence rate declined from 32.6 per 1000 in the first survey to 25.2 per 1000 in the second. The number of cases among males was significantly higher than among females. Incidence rate among contacts of already known cases was 9.8 per 1000 person-years. The estimated yearly incidence among non-contacts was 5.9 per 1000. Prevalence rates reached a peak in the 20–39-year age group. The prevalence rate of multibacillary patients also reached a peak in the same age bracket. It is stressed that a further period of epidemiological surveillance will be essential in order to have a correct estimate of the expected number of new infections, especially multibacillary cases, in the 20–39-year group. The value of this information is considered unique for planning and programming of future control activities.

A controlled trial of the value of BCG vaccination for preventing leprosy started in Burma at the end of 1964. Continued epidemiological surveillance of the population in the project area was carried out until 1976 as an essential part of the assessment activities. From March 1976 until the time of writing, these activities have been continued with a reduced staff.

This paper is an attempt to analyse, independently of the BCG study, the epidemiological characteristics of leprosy in a population with a high prevalence monitored at frequent intervals for a period of 15 years. Comparable observations are rarely found in the leprosy literature and some of them are of limited value (*1*). The annual re-examination of an initially child population of more than 28 000 for a period of 12 or more years is of paramount value, especially for the accurate determination of the incidence of leprosy. The difficulty or near impossibility of calculating with reasonable accuracy the number of new infections over a given period of time is a well known problem in leprosy and one that affects control programmes. In view of the exceptionally favourable conditions under which the BCG programme was carried out in Burma, it is believed that the incidence figures given in this paper will be of great value in helping to establish estimates of leprosy incidence in comparable epidemiological situations.

METHODS

The area selected for the BCG trial in Upper Burma comprises 163 villages involving Singu township in Mandalay district and part of the Shwebo district. At the time of selection in 1964 its population was estimated at about 69 000 people (*2, 3*). The BCG leprosy

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trial was carried out as follows:

1. From August 1964 to July 1968, mass survey of the child and adult population of the area and allocation of children to the BCG and control groups.

2. From September 1969 to June 1972, resurvey of the whole population of the area, including immigrants and absentees not covered by the first mass survey.

3. From September 1965 to February 1976, annual follow-up of children included in the BCG trial and annual examination of leprosy cases in the area and their household contacts. From the above-mentioned operations important epidemiological data relating to the following population groups are available:

(*a*) Some 28 600 children included in the leprosy BCG vaccination trial, followed up yearly for periods of 8–11 years depending on the date of their allocation.

(*b*) The population group examined in the period 1964–68 and re-examined in the period 1969–72, i.e., the population examined at both surveys.

(*c*) The population groups examined only in the first mass survey or in the second one.

(*d*) A group of leprosy cases detected during the period 1964–76 and their household contacts, followed-up yearly from the date of diagnosis.

From the available information it was possible to make estimates of:

1. *Period prevalence.* (*a*) Prevalence in the area at the time of the first mass survey (1964–68) related to the mean population during that period; (*b*) prevalence at the time of the second mass survey related to the mean population during the period 1969–72; (*c*) comparison of these two prevalence rates.

2. *Incidence.* (*a*) Annual incidence among contacts of leprosy cases, followed up from the date of diagnosis of the index case to July 1975; (*b*) retrospective incidence data among individuals who were healthy when surveyed in the period 1964–68 and resurveyed in the period 1969–72.

PREVALENCE

Prior to the start of field operations by the WHO BCG leprosy team, many leprosy cases in the trial area had been detected by the national leprosy service, which began its work in about 1955. In the second mass survey (Table 2) (1969–72), the villages were surveyed following the same order as in the first one (1964–68) (Table 1). Thus, the interval between the two examinations is more or less the same for the whole population. This interval is estimated to be 4 years.

Overall prevalence

Prevalence rates by age, sex and clinical forms in the first and second surveys are given in Tables 1 and 2. The population examined and its age structure are taken as estimates of the mid-1966 and mid-1971 demographic situation for the first and second surveys.

The overall reduction in prevalence rate from 32.6

Table 1. Overall prevalence of leprosy cases (rates per 1000) found during the first total population survey, 1964–68

Age group (years)	Population examined	L cases		B cases		I cases		T cases		Total	
		No.	Prevalence	No.	Prevalence	No.	Prevalence	No.	Prevalence	No.	Prevalence
0– 4	10 059	0	0	0	0	2	0.2	10	1.0	12	1.2
5– 9	10 156	2	0.2	1	0.1	23	2.3	112	11.0	138	13.6
10–14	7 798	11	1.4	3	0.4	48	6.2	250	32.1	312	40.0
15–19	5 317	37	7.0	8	1.5	22	4.1	186	35.0	253	47.6
20–39	15 602	189	12.1	26	1.7	27	1.7	520	33.3	762	48.8
40–59	9 135	96	10.5	20	2.2	5	0.5	289	31.6	410	44.9
⩾ 60	3 046	21	6.9	3	1.0	1	0.3	79	25.9	104	34.1
Totals:											
Both sexes	61 113	356	5.8	61	1.0	128	2.1	1 446	23.7	1 991	32.6
Males	28 384	233	8.2	43	1.5	59	2.1	863	30.4	1 198	42.2
Females	32 729	123	3.8	18	0.5	69	2.1	583	17.8	793	24.2

Table 2. Overall prevalence of leprosy cases (rates per 1000) found during the second total population survey, 1969–72

Age group (years)	Population examined	L cases		B cases		I cases		T cases		Total	
		No.	Prevalence	No.	Prevalence	No.	Prevalence	No.	Prevalence	No.	Prevalence
0– 4	10 931	0	0	0	0	0	0	2	0.2	2	0.2
5– 9	11 526	0	0	2	0.2	33	2.3	83	7.2	118	10.2
10–14	11 403	3	0.3	6	0.5	83	7.3	243	21.3	335	29.4
15–19	8 651	21	2.4	14	1.6	58	6.7	206	23.8	299	34.6
20–39	19 833	198	10.0	46	2.3	39	2.0	420	21.2	703	35.4
40–59	11 791	124	10.5	22	1.9	7	0.6	244	20.7	397	33.7
⩾ 60	4 119	32	7.8	6	1.5	1	0.2	69	16.8	108	26.2
Totals:											
Both sexes	78 254	378	4.8	96	1.2	221	2.8	1 267	16.2	1 962	25.2
Males	37 238	226	6.1	62	1.7	113	3.0	714	19.2	1 115	29.9
Females	41 016	152	3.7	34	0.8	108	2.6	553	13.4	847	20.6

per 1000 in the first survey to 25.2 per 1000 in the second survey (a reduction of 7.4 per 1000 or 22.7%) appears to be related to the population growth (28%) and to the fact that clinically inactive indeterminate (I) and tuberculoid (T) cases (1679 out of a total of 3641 cases) were not taken into account for the calculation of prevalence rates in the second survey. It should be pointed out that all the lepromatous (L) and borderline (B) cases registered in the first survey have been included in the second survey and the total number of L + B cases (417) in the first survey is comparable to the 474 L + B cases in the second survey, indicating a decrease in the L + B prevalence rate of 0.77 per 1000 population in the 1969–72 period.

Prevalence and sex

The difference in prevalence between males and females is highly significant in both surveys.

Prevalence and age

In the first survey (Table 1), the prevalence is 1.2 per 1000 below 4 years of age and increases quickly to 13.6 per 1000 in the 5–9-year age group; after that, it increases progressively to reach a peak of 48.8 per 1000 in the groups 20–39 years old. Beyond 40 years, the prevalence rate declines to 34 per 1000 after 60 years of age.

In the second survey, prevalence rates are significantly lower in all age groups but follow the same pattern as in the first one.

Distribution of leprosy in the area

It is of interest to make an appraisal of the distribution of leprosy cases in the area during the second mass survey in order to identify and evaluate the groups of population at different degrees of exposure to infection.

Distribution of leprosy cases in the villages.

(*a*) There were initially 163 villages in the area and the distribution of leprosy cases among them was as follows:

Villages apparently free of leprosy	16
Villages with fewer than 20 leprosy cases	85
Villages with 20–49 leprosy cases	36
Villages with 50 or more leprosy cases	26

(*b*) The following is the distribution of the different clinical forms of leprosy in the villages:

Villages where no cases were found	16
Villages with only I and T leprosy cases	39
Villages whose leprosy population included L and B cases	108

(*c*) If prevalence is considered in relation to the size of the villages, the mean and median values, both for cases and for rates, show an upward trend, i.e., the larger the village the greater the leprosy prevalence.

In general, the variation in prevalence for villages of the same size is so great that no meaningful conclusion can be drawn as to the relationship between village size and incidence or prevalence.

Prevalence rates by village population, as found in the second mass survey, are shown in Table 3. This

Table 3. Prevalence of leprosy cases (rates per 10 000) at second mass survey by village population

Population	No. of villages	Total population	Population examined	L		B		I		T		Total		Range		
				No.	Prevalence	No.	Prevalence	No.	Prevalence	No.	Prevalence	No.	Prevalence	Lowest rate	Highest rate	Median rate
⩽ 250	53	8 587	8 053	20	24.8	11	13.7	19	23.6	86	106.8	136	168.9	0	639	131
251- 500	43	17 357	16 363	44	26.9	35	21.4	37	22.6	253	154.6	369	225.5	29	622	194
501-1000	40	29 587	27 937	138	49.4	62	22.2	69	24.7	491	175.8	760	272.0	94	586	252
1001-2000	17	24 529	23 122	110	47.6	44	19.0	93	40.2	386	166.9	633	273.8	106	462	279
> 2000	1	2 999	2 778	8	28.8	2	7.2	3	10.8	51	183.6	64	230.4	230		—
Total	154	83 059	78 253	320	40.9	154	19.7	221	28.2	1 267	161.9	1 962	250.7	0	639	197

includes only 154 villages since administrative changes occurred after the start of field operations, with the combination in several instances of two neighbouring villages into a single adminstrative unit. The 16 apparently leprosy-free villages were usually very small, 4 of them having fewer than 100 people and the rest fewer than 230.

Familial distribution of leprosy cases. During the second mass survey (Table 2) 78 254 persons belonging to 14 885 families were examined, giving an average of about 5.3 members per family. There were:

13 182 families (89%) having no leprosy case
1 432 families (9.6%) having 1 leprosy case
205 families (1.4%) having 2 leprosy cases
36 families (0.2%) having 3 or more leprosy cases.

It seems, therefore, that the aggregation of leprosy cases in the family is a rather infrequent feature in this area. Of the 347 families with lepromatous or borderline cases, 35.2% had 2 or more leprosy cases in their households. Of the 1326 families where only T or B leprosy cases were detected, the great majority (90.8%) were single-case households, a finding supporting the view of the low infectivity, or non-infectivity, of T and I cases. The concentration of cases in families is about 4 times higher in the presence of lepromatous or borderline leprosy.

Population at risk. There were in the area 76 292 unaffected people at risk of infection; these may be broken down into the following categories by decreasing degree of exposure:

1 846 household contacts of L and B cases
11 448 household contacts of I and T cases
62 998 people not exposed to leprosy at home.

It may be concluded that about 2.4% of the population are exposed at home to L and/or B cases, i.e., they are at a higher risk. About 15% are exposed at home to I and/or T cases, and about 83% are not exposed to leprosy at home but they have probably more or less frequent extrafamilial contacts with leprosy cases.

INCIDENCE

Incidence among contacts

This study is based on the follow-up of 5490 household contacts of persons suffering from different forms of leprosy, detected during the first mass survey and followed up yearly until June 1975 (Table 4).

The examination of the population took approximately 3 years and as a consequence the number of follow-ups of the 28 000 children in the trial is not the same for all children, i.e., those allocated to the trial in the first year of the survey have 1 more examination than those in the second year and 2 more than those in the third year. The results are reflected in Table 4, which has been constructed to indicate the average incidence per 1000 person-years. It will be noted that the overall average annual leprosy incidence rate among all contacts is around 9.8 per 1000 population.

Incidence by clinical forms of the index cases. Where more than 1 case of leprosy was found in the household, the different forms were arranged in order of infectiousness, i.e., L>B>I+T, in order to determine the index case.

In Table 5, information is given on average annual incidence rates, by person-year observations, among household contacts of L, B, and I+T cases. The number of B cases is so small that the results cannot be regarded as significant. On the other hand, it was considered convenient to put together I and T cases because of the small number of I cases and, moreover,

Table 4. Overall average yearly incidence (rates per 1000) among 5490 household contacts detected in the 1964–68 survey and examined yearly until 1975

Age group (years)	No. of examinations (person-years)	L		B		I		T		Total	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
0– 4	8 260	0	0	1	0.1	13	1.6	41	5.0	55	6.7
5– 9	8 238	0	0	4	0.5	30	3.6	76	9.2	110	13.4
10–14	5 988	0	0	2	0.3	16	2.7	43	7.2	61	10.2
15–29	8 351	3	0.4	6	0.7	6	0.7	70	8.4	85	10.2
30–44	6 625	4	0.6	0	0.0	2	0.3	53	8.0	59	8.9
45–59	4 211	3	0.7	1	0.2	0	0.0	41	9.7	45	10.7
⩾60	1 505	1	0.7	0	0.0	0	0.0	7	4.7	8	5.3
Totals:											
Both sexes	43 178	11	0.3	14	0.3	67	1.6	331	7.7	423	9.8
Males	18 744	6	0.3	8	0.4	28	1.5	154	8.2	196	10.5
Females	24 434	5	0.2	6	0.2	39	1.6	177	7.2	227	9.3

because the incidence among contacts of the 2 clinical forms must be similar. It is noted that the average annual incidence rate for contacts of L cases is nearly 22 per 1000, for contacts of B cases about 10 per 1000, and for contacts of I+T cases about 7.6 per 1000 person-years, i.e., the incidence for contacts of L cases is nearly 3 times as high as that for contacts of I+T cases.

Incidence among household contacts by age. According to Table 4, the yearly incidence is already high in children below 4 years (6.7 per 1000) increasing quickly to a peak of 13.4 per 1000 at 5–9 years and declining to 10.2 per 1000 at 10–14 years. It is maintained at the same level up to the age of 60; the variations between 14 and 60 years may be ascribed to chance.

Table 5. Average yearly incidence among 5490 household contacts by clinical forms of the index cases

Index cases	No. of examinations (contact-years)	No. of cases	Incidence per 1000
L	6 477	142	21.9
B	1 284	13	10.1
I+T	35 417	268	7.6
All cases	43 178	423	9.8

As for clinical forms, the L incidence rate is very low in ages below 15 years, while the incidence rate for the I form is high in this age group. It may be concluded that leprosy may appear at any age. In highly endemic areas, like Singu, infection frequently occurs at an early age, especially among contacts of leprosy cases, and this is the likely explanation of the peak incidence occurring in the 5–9-year age group. On the other hand, between 15 and 60 years, the rates of incidence are similar.

Incidence among household contacts by sex. As can be seen from Table 4, the overall incidence is 10.5 per 1000 persons per year for males and 9.3 per 1000 per year for females. The lepromatous incidence rate is 0.3 per 1000 for males and 0.2 per 1000 for females. The differences are not significant.

Incidence among non-household contacts. This was studied in 46 536 persons, apparently not exposed to leprosy at home, examined and found free from leprosy in the first mass survey and re-examined after 4 years in the second one.

Overall incidence among non-household contacts. This is shown in Table 6, which also gives data on mean annual incidence rates by age groups, sex, and clinical forms. The total number of cases detected amounts to 1090, the mean yearly incidence rate for the 4-year period being 5.9 per 1000. Specific mean yearly incidence rates per 1000 by clinical forms are 0.1 for L, 0.2 for B, 0.9 for I, and 4.6 for T cases. Referring to the data obtained in the second mass

Table 6. Overall yearly incidence (rates per 1000) among non-household contacts of leprosy cases for the period 1969–72

Age group (years)	Population[a] examined	L		B		I		T		Total	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
0– 4	8 006	0	0.0	1	0.03	26	0.8	79	2.5	106	3.3
5– 9	8 521	1	0.03	4	0.1	70	2.1	203	6.0	278	8.2
10–14	6 254	0	0.0	8	0.3	56	2.2	187	7.5	251	10.0
15–29	9 518	12	0.3	9	0.2	15	0.4	152	4.0	188	4.9
30–44	8 031	4	0.1	12	0.4	6	0.2	132	4.1	154	4.8
45–59	4 374	3	0.2	8	0.5	1	0.06	66	3.8	78	4.5
⩾ 60	1 832	3	0.4	3	0.4	1	0.1	28	3.8	35	4.8
Totals:											
Both sexes	46 536	23	0.1	45	0.2	175	0.9	847	4.6	1090	5.9
Males	20 995	10	0.1	29	0.3	85	1.0	463	5.5	587	7.0
Females	25 541	13	0.1	16	0.2	90	0.9	384	3.8	503	4.9

[a] Population in this table refers to the total number of persons examined and not to person-years.

survey (Table 2), it should be noted that the prevalence rate for T cases is about 3.4 times as high as the prevalence rate for L cases (16.2 as compared with 4.8 per 1000). The ratio increases to 46 times (4.6 as compared with 0.1 per 1000) when the yearly incidence rates for T and L cases are considered (Table 6). A possible partial explanation of this apparent discrepancy between prevalence and incidence rates could be the number of cases that heal spontaneously or are cured by treatment. However, when new leprosy cases are diagnosed, it is impossible to forecast the evolution of the disease and consequently all I and T cases must be treated.

Incidence by age groups in non-household contacts. As shown in Table 5, the incidence rate increases quickly from 3.3 per 1000 in the 0–4-year age group to reach a peak of 10 per 1000 in the 10–14-year age group, declining progressively to 4.8 per 1000 in the 30–44-year age group. It is maintained at a similar level, about 4.5 per 1000, in the older age groups. Taking into account that the incubation period of leprosy is about 3–5 years, the transmission of the disease in Singu must occur very frequently in the first years of life, especially among household contacts, and the highest rate of infection is probably in the 0–4-year age group for household contacts and in the 5–9-year age group in children not exposed to leprosy at home. The incidence in children below 10 years is 10 per 1000 among household contacts and 5.8 per 1000 among non-household contacts, i.e., it is likely that the transmission of leprosy among household contacts occurs earlier in life and is nearly twice as frequent in the first decade of life as it is in children not exposed to leprosy at home.

Incidence by sex in non-household contacts. There is no significant difference in the incidence rates between the sexes below 15 years of age (7.6 per 1000 for males and 6.3 per 1000 for females), but the difference in incidence rates between the sexes above 15 years of age points to a higher resistance of females against leprosy, the overall incidence rates being 7.0 per 1000 for males against 4.9 per 1000 for females.

Incidence rates and number of leprosy cases among household contacts and non-household contacts. It is useful to compare the annual incidence rates of the non-household contacts over the period of the 2 surveys with the rates in known household contacts in order to assess the relative risk of contracting the disease. This has important implications for the strategy of leprosy control.

Hence, the mean yearly incidence for household contacts of L + B cases was 26.5 per 1000, for household contacts of I + T cases it was 9.6 per 1000, and for non-household contacts it was 5.9 per 1000 (Table 7). On the other hand, the total number of leprosy cases detected during the 4-year period among the different categories of the population was:

	No. of cases	*Prevalence per 1000*
Among 1000 contacts of L + B cases	105	105.0
Among 4490 contacts of I + T cases	172	38.3
Among 46 536 non-household contacts	1090	23.4
Among 52 027 (whole population)	1367	26.2

Consequently it may be stated that the risk of contracting leprosy is about 2.8 times as high for contacts of multibacillary forms (L + B) as for contacts of non-lepromatous cases and nearly 4.5 times as high as for individuals not exposed to leprosy at home. However, it should be noted that the group of population at the highest risk (contacts of L + B cases) is small, only 1.9% of the total population, and in spite of having the highest incidence, it produces only 7.7% of the total number of leprosy cases. The group at medium risk (contacts of I + T cases) produces about 12.6% of the total number of leprosy cases, while the group of population at the lowest risk (non-household contacts) represents 89.4% of the population and produces nearly 80% of the total number of leprosy cases in spite of having the lowest incidence.

Table 7. Incidence rates of leprosy at the second mass survey among persons found free from leprosy at the first mass survey (mean period four years)

Groups of population	Number	Percentage population	Leprosy cases			Mean yearly incidence per 1000	Percentage of cases[a]
			L and B	I and T	Total cases		
Contacts of L cases	841	1.6	10	89	99	26.5	7.2
Contacts of B cases	159	0.3	0	6	6	9.4	0.4
Contacts of I cases	297	0.6	2	14	16	13.5	1.2
Contacts of T cases	4 193	8.1	6	150	156	9.3	11.4
All household contacts	5 490	10.6	18	259	277	12.6	20.3
Non-household contacts	46 536	89.4	68	1 022	1 090	5.9	79.7
Total population	52 026	100	86	1 281	1 367	6.6	100

[a] Related to the total number of leprosy cases detected during the survey.

DISCUSSION AND CONCLUSIONS

From data collected in a leprosy BCG trial in Singu township, important information has been obtained concerning the epidemiology of leprosy in the area during the period 1964–72. It must be pointed out that 28 000 healthy children, about half the total population of Singu, were allocated to a WHO trial designed to assess the possible protection of the BCG vaccine against the leprosy infection in an area with an estimated prevalence rate of at least 30 per 1000. The selected children were allocated, taking into account comparability of sex, age, and exposure to leprosy at home, to 2 groups of 14 000 children each, one to be vaccinated with BCG and the other as control. All children in both groups were clinically examined annually for leprosy lesions (*2–5*). The results of the follow-up, which covers the period 1965–77, have shown that the number of leprosy cases diagnosed in the control group was about 20% higher than in the inoculated children. It can be assumed, therefore, that the BCG vaccination is not likely to have been a significant factor influencing the epidemiological pattern of leprosy in the area during the period under study.

In this paper, an analysis of total population surveys has been attempted, with particular attention to incidence and prevalence rates because of their obvious importance in the evaluation of past activities as well as in planning and programming of future actions. The main conclusions can be summarized as follows.

1. A comparison between the results of 2 mass surveys carried out, with an interval of 4 years, in all the villages in the programme area shows an overall leprosy prevalence rate of 32.6 per 1000 in the first survey and of 25.2 per 1000 in the second, or a reduction between surveys of 7.4 per 1000.

2. The prevalence rate by sex indicates a highly significant predominance of males over females: 42.4 per 1000 for males against 24.2 per 1000 for females in the first survey and 29.9 per 1000 for males against 20.6 per 1000 for females in the second survey.

3. Age distribution of cases was similar in both surveys, with very few cases in the 0–4-year age group and a moderate rate in children of 5–9 years. The rate increases threefold in the 10–14-year age group reaching a higher rate than that for the whole population. An absolute peak rate is reached in the 20–39-year age group and about the same figure is maintained until the age of 60 years, above which there is an appreciable prevalence reduction. From the above figures it seems reasonable to assume that in hyperendemic areas of South-East Asia the 20–39-year age group is the critical one, requiring special attention during case-finding operations. Its practical epidemiological importance is seen to be still greater if we take into account that the prevalence of multibacillary forms (L + B) in this age group is 3 times as high as in the preceding 15–19-year age group, i.e., 12.3 per 1000 against 4 per 1000 (1969–72 survey).

It is important to bear in mind that from 1955 until 1961 antileprosy work was carried out in Singu by a skeleton staff and since 1962, as part of the national leprosy control programme, by a full team comprising 1 leprosy inspector (supervisor) and 4 or 5 junior leprosy workers, with a laboratory and transport facilities at their disposal. A full-time medical officer (team leader) with headquarters in Mandalay visited the Singu township regularly and supervised school and house-to-house surveys, etc.

All leprosy patients detected by the national workers as well as those detected after 1964 by the WHO leprosy BCG team were registered and received the necessary drugs (dapsone) and instructions to start

treatment immediately. The junior workers visited the villages in the area periodically and examined patients and contacts, distributed the drugs, etc. The same facilities exist in Shwebo, which has been a programme area since 1958.

Owing to the ambulatory nature of oral dapsone treatment in the Burma Leprosy Control Programme, it is not possible to make a reliable assessment of the regular intake of the prescribed doses of the drug for all the leprosy cases in the trial area. According to the most reliable information given by the patients themselves, their relatives, and the staff directly involved in the treatment of cases, and to judge from the evolution of the clinical symptoms, a reasonable estimate seems to be that 30–40% of the patients took regular treatment. In future epidemiological assessments, it will be important to take into account that probably a significant proportion of the registered cases in the area took regular dapsone treatment during the period under study.

4. There was a 28% increase in the population between 1964 and 1972. This increase could partially explain the overall reduction in the prevalence rate in the second survey, together with the fact that a significant number of I and T cases found to be inactive at the time of the second survey were not counted as leprosy cases.

5. The average yearly leprosy incidence rate among 5490 contacts of already known leprosy cases is 9.8 per 1000 person-years. If we consider the clinical forms of the index cases individually, the rate per 1000 person-years is 21.9 for contacts of L cases, 10.1 for contacts of B cases, and 7.6 for contacts of I and T cases combined.

6. The estimated average yearly incidence rate among 46 536 non-contact persons in the population is 5.9 per 1000. The total number of new infections among household contacts of leprosy (9.8 per 1000) is therefore 1.66 times as high as among non-contacts (5.9 per 1000). If we take into account the clinical form of the index cases, we observe that among contacts of L, B and I + T cases, the rates are, respectively, 3.4, 1.7, and 1.28 times as high as among non-household contacts of leprosy patients. These figures, as well as those shown in paragraph 5, are comparable with published figures from areas in Asia with a similar endemicity.

7. The proportion of children (0–14 years) among all cases was the same in both surveys, namely, 23%. The prevalence rate per 1000 was 7.55 in the first survey and 5.81 in the second. These figures are unusually high and point to widespread exposure of individuals to infectious cases of leprosy from a very early age.

We can conclude that the data gathered from the linear epidemiological observation of a hyperendemic leprosy area in Burma during a 15-year period support the view that no spectacular changes have taken place in the trend of the disease. It would be quite wrong, however, in our opinion, to take the figures given in this document as final. If we take into account that the persons (originally children) in the two trial groups are now in the crucial 15–39-year age group, where the majority of the all-important multibacillary cases appear, it is clear that the information already collected constitutes precious base-line data for any assessment made in the foreseeable future of the following:

1. The development of multibacillary forms of leprosy under controlled conditions.

2. The effectiveness of leprosy control measures in the area.

3. The incidence of different forms of leprosy arising inside the former BCG trial groups (mainly with regard to multibacillary forms in relation to different age groups).

4. The efficacy of single and combined drug therapy regimens in the prevention and treatment of all forms of leprosy.

RÉSUMÉ

RENSEIGNEMENTS RECUEILLIS DANS LA RÉGION DE SINGU (HAUTE-BIRMANIE) SUR L'ÉPIDÉMIOLOGIE DE LA LÈPRE

Les données rassemblées à la faveur de l'essai de prévention de la lèpre par le BCG, effectué par l'Organisation mondiale de la Santé au sein de la population de Singu (district de Mandalay, Birmanie), ont permis de dresser un tableau beaucoup plus précis de l'épidémiologie de la lèpre dans cette région au cours de la période 1964–72, couverte par deux enquêtes de masse, et de la période de surveillance qui a suivi.

Chez les 28 000 enfants (0–14 ans) indemnes lors de leur inclusion dans l'essai de vaccination par le BCG et suivis jusqu'en 1976 au moins, le nombre des cas nouveaux de lèpre se traduit par un taux d'incidence plus élevé d'environ 20% dans le groupe témoin que dans le groupe vacciné. Il est donc raisonnable de penser que la vaccination n'a pas modifié de manière appréciable le tableau épidémiologique de la lèpre au cours de la période d'étude. Les deux enquêtes de masse, qui englobaient l'ensemble de la population, ont été menées à 4 ans d'intervalle et quelque 95% de tous les habitants de la région ont été examinés au cours de chacune. La comparaison entre les résultats des deux enquêtes, ainsi que les données recueillies grâce à l'observation suivie des cas ainsi que des membres de la population en contact ou

non avec des lépreux au domicile familial, permettent d'énoncer les conclusions suivantes:

1) Le taux de prévalence dans la région a diminué de 7,4 pour 1000, passant du taux de 32,6 pour 1000 fondé sur les données de la première enquête à celui de 25,2 pour 1000 calculé à l'issue de la seconde. Mais cette réduction est très probablement due pour une part à un accroissement de 28% de la population entre les deux enquêtes et, d'autre part, au fait qu'il n'a pas été tenu compte lors de la deuxième enquête des cas inactifs indéterminés (I) ou tuberculoïdes (T).

2) Dans les deux enquêtes, le taux de prévalence s'est révélé plus élevé chez les individus du sexe masculin que chez ceux du sexe féminin (1,6 à 1).

3) En ce qui concerne la distribution par âge, on a constaté que le nombre relativement modeste des cas dans le groupe 5–9 ans (10,2 pour 1000) s'accroissait rapidement pour atteindre un très haut niveau dans le groupe 10–14 ans (29,4 pour 1000) et un niveau record d'environ 35 pour 1000 chez les jeunes adultes de 15 à 19 ans. Ce taux élevé demeure pratiquement inchangé jusqu'à l'âge de 60 ans, après quoi il diminue jusqu'à 26,2 pour 1000.

Sur le plan de la contagiosité, on assiste à une rapide augmentation des cas multibacillaires avec l'âge, ceux-ci passant de 4 pour 1000 dans le groupe 15–19 ans à 12,3 pour 1000 dans le groupe 20–39 ans. La forte prévalence des cas contagieux dans ce dernier groupe d'âge revêt une grande importance épidémiologique.

4) Les cas nouveaux parmi 5490 contacts se sont traduits par un taux d'incidence de 9,8 pour 1000 années-sujets. Si la forme de lèpre enregistrée pour les cas initialement répertoriés est prise en considération, le taux des cas nouveaux pour 1000 années-sujets est de 21,9 pour 1000 chez les contacts de cas lépromateux, 10,1 pour 1000 chez les contacts de lépreux B et 7,6 pour 1000 chez ceux des cas I et T pris ensemble.

5) Chez les 46 536 membres de la population qui n'étaient pas régulièrement en contact avec des lépreux, l'incidence moyenne annuelle de la lèpre a été estimée à 5,9 pour 1000. La comparaison entre le taux d'incidence chez les contacts et chez les autres membres de la population étudiée, ou entre le taux d'incidence chez les contacts de malades paucibacillaires et multibacillaires, fournit des résultats analogues à ceux qu'on obtient sur la base de données provenant de zones d'endémicité plus ou moins similaire en Asie.

6) La proportion d'enfants par rapport à l'ensemble des cas a été très élevée dans les deux enquêtes (23%).

7) Les données fournies par cette étude épidémiologique longitudinale incitent à penser qu'aucun changement spectaculaire ne s'est produit au cours de la période d'observation. Elles revêtent en tout cas une extrême importance pour la planification de tout programme ultérieur de lutte.

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