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Leprosy in children aged 0–14 years: report of an 11-year control programme

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Summary A Leprosy Control Programme has been in operation in the entire twin island country of Trinidad and Tobago for 11 years. During the 11 years of the Programme, the number of new cases of leprosy diagnosed in children aged from 0 to 14 years decreased from 65 patients in the third year of the Programme to 3 in both the 10th and 11th years of operation. The epidemiology of leprosy in Trinidad and Tobago during these 11 years is described.

The success of this Programme is credited to: 1, the decisions by the Government of Trinidad and Tobago in 1968 to close the leprosarium and to set up a Leprosy Control Programme; 2, the recruitment and training of qualified personnel; 3, active patient identification and aggressive treatment and follow-up of infectious patients; and 4, the assistance of a vibrant voluntary organization in providing socio-economic assistance for patients and in educating the public.

Introduction

An aggressive outpatient approach to the control of leprosy was implemented in Trinidad and Tobago in early 1971. After a sharp rise in the new case rate for the first 3 years of the programme, the new case rate steadily fell in the following 8 years both in children, aged 0–14 years, and in adults (15 plus). In this paper we will look at the former group and at various related parameters.

Method

PATIENT IDENTIFICATION

Patients were diagnosed by clinical examination, an AFB positive skin smear, and/or a biopsy, except in patients who had only facial lesions.

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The patients were classified according to the criteria of Ridley & Jopling.[1]

Tuberculoid (TT) patients were treated with 4,4-diaminodiphenylsulphone (dapsone) 1–2 mg/kg/day. Medication was continued for 18–24 months after the skin lesions disappeared and the resolution of neuritis. They were considered cured after receiving this medication.

Indeterminate (II) patients were treated the same as above but were given dapsone for 3 additional years after their disease became inactive instead of for 18–24 months.

Borderline tuberculoid (BT) and bacteriologically negative borderline (BB) patients were treated the same as above but were given dapsone for 5 and 10 additional years respectively, after their disease became inactive.

In the first 2 years of the programme, skin smear positive patients were initially treated with 2 drugs: dapsone 1–2 mg/kg/day and clofazimine (lamprene) 1–2 mg/kg/day. Beginning in 1973 rifampicin (rimactane) 10–20 mg/kg/day was added to the other drugs. The maximum daily dose of rifampicin was 600 mg. All 3 drugs were given for the initial 3 months. Clofazimine and dapsone were continued until the patients' skin smears were negative. Beyond this point dapsone alone was given, in borderline (BB) patients for 10 years, in borderline lepromatous (BL) patients indefinitely, and in lepromatous (LL) patients indefinitely.

Results

PATIENTS IDENTIFIED

A total of 275 patients with leprosy were identified in children aged 0–14 years in the first 11 years of the programme (Figure 1). Whereas 144 (52%) of the patients were identified in the first 3 years of the programme (1971–1973) only 17 (6%) were identified in the last 3 years of the programme (1979–1981). During each of the 10th and 11th years of the programme only 3 new patients were identified, representing an 88% reduction in the number of new patients when compared with the first year when 26 patients were identified.

TYPE OF DISEASE

Of the 275 patients, 199 (72%) were classified as tuberculoid, and an additional 51 (19%) were classified as borderline tuberculoid. The 9 (3%) classified as indeterminate were also skin smear negative, thus 94% fit in the paucibacillary group. Only 16 (6%) were in the multibacillary group (BB, BL, and LL). See Table 1.

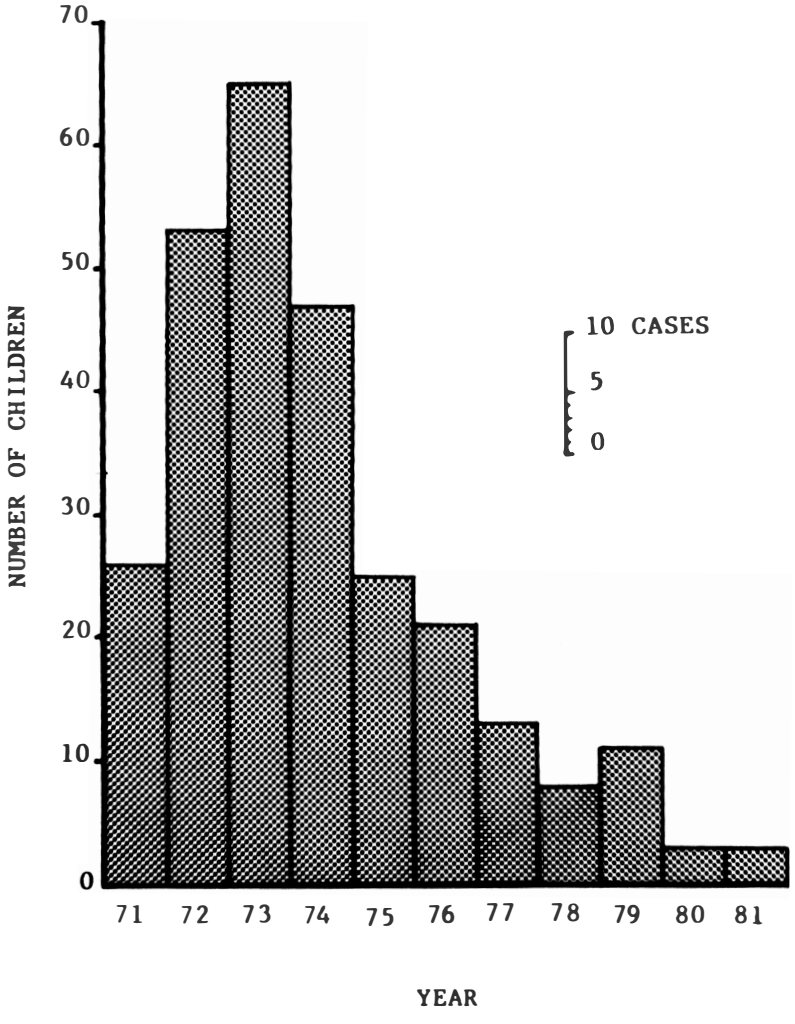

Figure 1. Newly-diagnosed leprosy in 0–14 year olds, 1971–1981, in Trinidad and Tobago.

AGE, SEX, AND ETHNIC ORIGIN

The age and sex of the patients at the time of diagnosis is shown in Table 2. There was no significant difference in the number of boys or girls per 10,000 population affected (Chi-square = 1·46). Thirty-one (11%) of the patients were children less than 5 years of age, whereas 141 (51%) were aged 10–14 years. The case detection rate was approximately four times higher in those aged 10–14 years than in those children less than 5 years. The youngest patient was 16 months old.

The ethnic origin of the patients (Table 3) shows that 49% of the patients were East Indian, 40% Negro, 11% mixed and less than 1% other. This varies from what would have been expected if cases had occurred in proportion to the percentage of the population in each ethnic group (Chi-square = 12.99, with 2 d.f.,

Table 1. Classification of leprosy in children 0–14 years of age 1971–1981 in Trinidad and Tobago

Type	Number of patients Male	Female	Total	% of total patients
II	7	2	9	3
TT	101	98	199	72
BT	30	21	51	19
BB	0	4	4	1
BL	4	3	7	3
LL	5	0	5	2
Total	147	128	275	100

Table 2. Leprosy in children 0–14 years, by age and sex at diagnosis 1971–1981 in Trinidad and Tobago

Age (years)	Number of patients Male	Female	Total	% of total patients	Case detection rate/10,000* population
0–4	12	19	31	11	3
5–9	50	53	103	37	8
10–14	85	56	141	51	11
Total	147	128	275	100	8

* Based on estimated 1975 mid-year population aged 0–14 years.

$P < 0{\cdot}01$). The expected number of cases by ethnic group would be Negro 118, East Indian 110, mixed 39, and other 8.

GEOGRAPHICAL LOCATION

The overall rate of leprosy for the 11 years of the Programme was 8/10,000 population aged 0–14 years. Figure 2 shows the case detection rate per 10,000 population aged 0–14 years for areas of Trinidad and Tobago. The overall rates varied from zero to 27/10,000 during the 11-year period. In County St George East 2, the area with the highest rate, the case detection rate was more than four times the average for the rest of the country (6/10,000).

CHARACTERISTICS OF PATIENTS WITH POSITIVE SKIN SMEARS

Overall 7% of the patients aged 0–14 had positive smears. Whereas 100% of the BB, BL and LL patients had positive smears, only 8% of BT and 0% of TT and II

Table 3. Leprosy in children 0–14 years of age by ethnic origin 1971–1981 in Trinidad and Tobago

Ethnic origin	Number of patients*	Percentage of total patients	Percentage in total population
East Indian	136	49	40
Negro	109	40	43
Mixed	29	11	14
Other	1	0	3
Total	275	100	100

* Chi-square = 12·99 with 2 d.f., $P < 0{\cdot}01$.

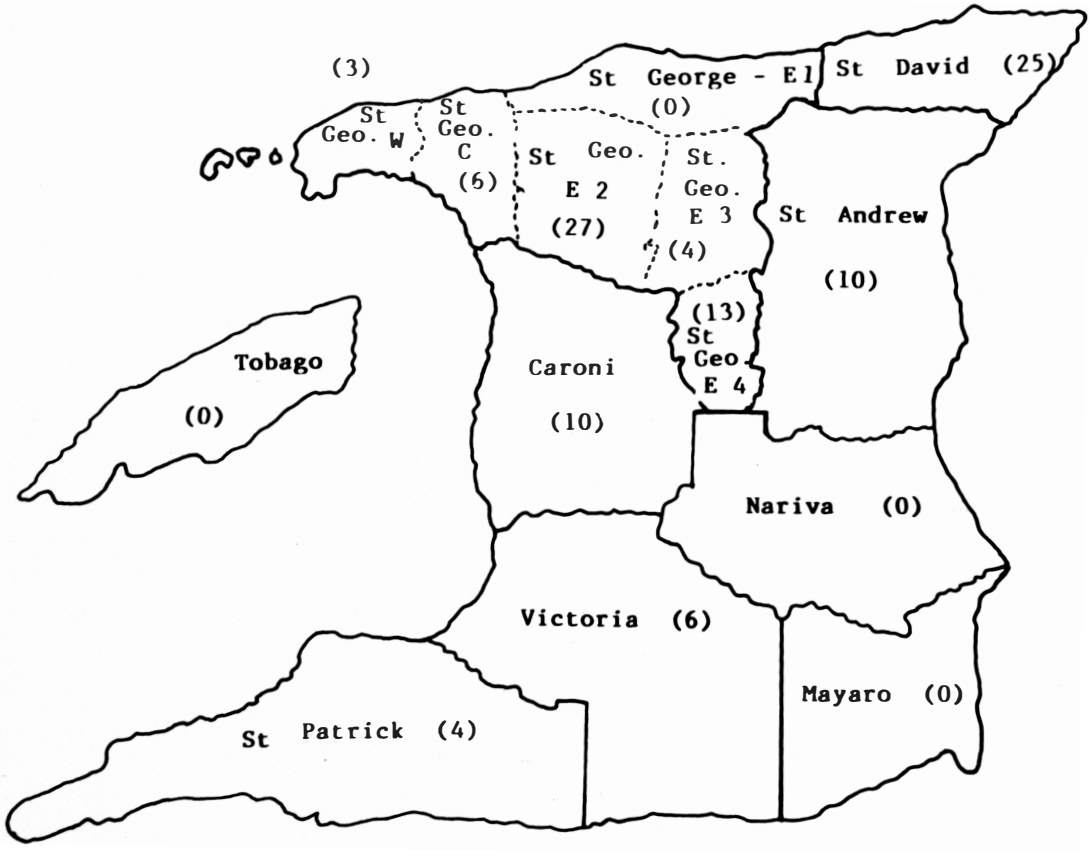

Figure 2. Map of Trinidad and Tobago showing case detection rates for leprosy per 10,000 children aged 0–14 years for the 11-year period, 1971–1981.

patients had positive smears. All BT patients with positive smears were aged 5 years or above. Only 1 child under age 5 had a positive skin smear, and only 3 children under age 10 had positive smears (Table 4). Of the 20 children with positive skin smears at diagnosis, 10 (50%) were smear negative in 2 years, 14 (70%) were negative in 4 years, 17 (85%) were negative in 6 years and 18 (90%) were negative 8 years after diagnosis. The 2 still positive at the end of the study had been diagnosed in 1979.

DISABILITIES

At the time of diagnosis 4 children (aged 8, 12, 13, and 14 years) had disabilities. Their types were TT, BT, BB, and BT respectively. None of the children who regularly took their medication developed any disabilities while they were on the register. One child, age 6, who did not take her medication regularly developed disabilities 5 years after diagnosis.

STATUS OF PATIENTS AT END OF ELEVEN YEAR PERIOD

The status of patients as of 31 December 1981, is shown in Table 5. One hundred and twenty patients had completed their therapy and were considered cured. Nine migrated. Only 3 patients were lost to follow-up. Of those patients still on the register on 31 December 1981, 74 were considered to have inactive disease and were continuing their therapy as described previously. Sixty-seven patients were considered to have active disease and were continuing therapy. Up to December 1981, LL and BL patients remained on the register, and on medication, until death (unless they emigrated), as up to that time our policy was that they must take medication for life. As of 1 January 1982, we began following the World Health Organization's recommendations regarding short-term, partially-supervised multidrug therapy, which rapidly altered our register. Only 2 children still needed treatment and remained on the register as of 31 December 1983.

Table 4. Age and type of leprosy in children age 0–14 years who had AFB positive skin smears 1971–1981 in Trinidad and Tobago

Age	Number with (+) smears	Type of leprosy					
		II	TT	BT	BB	BL	LL
0–4	1	0	0	0	0	1	0
5–9	2	0	0	1	0	1	0
10–14	17	0	0	3	4	5	5
Total	20	0	0	4	4	7	5

Table 5. Status as of 31 December 1981 of 275 children diagnosed as having leprosy during the 11-year period 1971–1981 in Trinidad and Tobago

Status	Number
On register:	141
Active leprosy	67
Inactive leprosy	74
Off register:	132
Cured	120
Migrated	9
Lost	3
Refused treatment after becoming inactive	2
Total	275

Discussion

In 1965 and again in 1970, the World Health Organization Expert Committee on Leprosy estimated that the number of leprosy cases worldwide was approximately 10·8 million.[2] By 1977, this same Committee estimated that the number of cases had increased to 12 million.[3]

Despite the increase in worldwide cases, control programmes have reduced the prevalence and incidence of leprosy in some countries. In Thailand, where a programme has been in existence more than 20 years, a 70% reduction in leprosy prevalence from 13·4/1,000 was shown in a random sample survey taken 10 years after the programme was begun. Similar reductions have occurred in Burma,[4] and Upper Volta.[5]

Although random sampling surveys have not been carried out in Trinidad and Tobago, other statistics suggest that major reductions in disease prevalence and incidence have occurred. In 1971 there were 1632 known leprosy patients on the register for a rate of 16/10,000 population. At the end of 1981 there were 763 known leprosy patients on the register for a rate of 7/10,000 or a reduction of 53%.[6] The number of identified cases of leprosy patients in the entire Programme paralleled the number of cases identified in children aged 0–14 years. In 1971, 70 patients were detected, in 1973, 130 were detected, and in 1981 only 30 patients were detected. The number of cases detected in 1981 represents a 59% reduction as compared with 1971 and a 78% reduction when compared with 1973.

A census survey of primary and secondary school children in County St George East 2, the area with the highest rate and number of leprosy cases in children, was undertaken in 1974 and again in 1982. In 1974, 13 cases were identified. In 1982 only 3 children were identified as new cases.

Based on information which the WHOECL had from various control programmes around the world, they recommended that 75% or more of lepromatous and borderline cases (multibacillary) should be on treatment for a control programme to be successful.[7] Of the 382 multibacillary patients on the Leprosy Register in Trinidad and Tobago at the end of 1981, 359 (94%) were under treatment. At the end of December, 1981, 341 (89%) were bacteriologically negative. Of the 20 children who were originally bacteriologically positive, 18 were bacteriologically negative by the end of 1981. The 2 remaining bacteriologically positive children were diagnosed in 1979.

The decrease in leprosy cases in Trinidad and Tobago is thought to be due to the institution of a comprehensive, integrated Hansen's Disease Control Programme that emphasized case detection and vigorous follow-up and treatment of cases. It could be argued that the decrease in leprosy might have occurred without the control programme, due to other factors such as the improving socio-economic conditions in the country during the past decade. Although this is possible it is unlikely, based on experience with leprosy in other parts of the world.[8]

The ability to decrease leprosy prevalence from 1632 (16/10,000) to 763 (7/10,000) over an 11-year period suggests that a reduction in the prevalence of leprosy is possible even when the initial prevalence rate is relatively low. It suggests also that having 90% of known lepromatous and borderline patients on chemotherapy is effective in reducing the spread of disease and suggests that the WHOECL criteria are valid.[9]

The epidemiology of leprosy in children during the 11 years of the Programme suggests that the case-detection rate of disease in children may drop more quickly than the case-detection rate in adults as the disease is being brought under control. The reasons for this are not known. As the group of individuals making up the 0–14 year age group changes about 7% per year (newborns replacing the 14-year olds who become 15 years old), a major decrease in transmission would very quickly result in a decreased case-detection rate in children as an indicator of the leprosy situation in an area.

EPIDEMIOLOGY OF LEPROSY IN TRINIDAD AND TOBAGO

The finding that 94% of the patients had paucibacillary disease is consistent with the reports of others who have shown a low rate of lepromatous disease in children.[10, 11] The similar number of cases for boys and girls is consistent with what would be expected.[12, 13]

Epidemiological studies have not reliably shown a predilection for African or

Indian races to have a difference in their incidence rates for disease. Among our children, however, there is a relative over-representation of the East Indians.

In comparing the rates of leprosy in children in different areas of Trinidad and Tobago, it is useful to note that although the rate in the country may be only 8/10,000 for the 11 years (or 0·7 patients/ 10,000/year), the rates in a local area may be three times higher.

The finding of only 7% of children with positive smears, especially in the 0–10 year age group is consistent with the finding that most of these children had TT or BT disease. A corollary to this is that it is rarely useful to perform a skin smear on children younger than age ten.[14]

The experience of the HDCU of having no deformities occur in children while on Hansen's Disease Register if they were taking their medication regularly is in agreement with the WHO Expert Committee on Leprosy which notes that deformity is not an inevitable or necessary part of leprosy. Its occurrence indicates some defect in the strategy of leprosy diagnosis and treatment. In a well-conducted leprosy control programme, almost no leprosy patients on first diagnosis will be suffering from some deformity attributable to neglected disease.[15] Evaluation of the Programme shows that only 3 (1%) patients were lost to follow-up. Similar control programmes should be possible in other countries where leprosy transmission is continuing.

Conclusion

What made this Programme successful? The role of the individuals who initiated interest in the problem of leprosy was extremely important. Without their help, surveys probably would not have been done, and official recognition of the problem might not have occurred.

The strong support given by the government in providing personnel, financial resources and in accepting a new approach to leprosy control was vital.

Strong support from a voluntary organization helped reduce fear among the public and encouraged early identification and treatment of leprosy.

Teaching medical and nursing students, plus training public health and hospital personnel made a major positive impact over the years.

A strong emphasis on early case finding, adequate treatment and good case holding were crucial in breaking the cycle of transmission of disease.

The decision of the government to go from a programme of isolation to a programme of integration was a key factor to bringing leprosy under control. With the old system, undetected cases were spreading disease so that new cases continued to occur. Patients were isolated causing them to lose financial security, families and community status. With an integrated approach patients can lead a normal life, maintaining their jobs, families and community status. With the former fears related to isolation removed and with an emphasis on early

detection, new multibacillary cases remain a source of infection in their communities for only a few months instead of for years.

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