

Childhood leprosy in the post-elimination phase: data from a tertiary health care Hospital in the Karnataka state of south India.

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Summary

Objective: Children with leprosy attending a tertiary care hospital during the post-elimination period, in the Karnataka state of south India, have been studied. Data on childhood leprosy collected by the field health workers from district leprosy office during the same period through community survey was also analysed.

Results: In the hospital, 61 new childhood cases were diagnosed, 19.7% of the total leprosy cases ($n = 309$) examined during that period. Borderline tuberculoid leprosy was the commonest presentation in children. Twenty four (39.34%) were pauci-bacillary and 37 (60.65%) were multi-bacillary. Positive slit skin smear was obtained in 8.19%. Household contacts were identified in 18.2%. Reactions were seen in 16.4% (type 1 and 2) and 8.19% children had visible deformity. Analysis of the data collected by the field health workers showed 223 (21.25%) childhood cases (pauci-bacillary 69.50% and multi-bacillary 30.49%). Type 1 reaction was recorded in 4.93%. Deformities were seen in 5.82%, and 1.79% had WHO Grade 2 deformities.

Conclusion: More multi-bacillary cases were recorded in the hospital as compared to higher number of pauci-bacillary cases by the community survey. Cases with reactions and deformities were also higher in hospital. Type 2 reaction was not recorded in community survey and WHO Grade 2 deformities were low. Patients with more severe disease might have attended the hospital by choice, resulting in the difference in data. The results indicate that transmission of leprosy is continuing in India even in this state with low endemicity. Presence of household contacts, children with multi-bacillary disease and smear positivity in childhood cases are the aspects requiring special attention.

Introduction

India is one of the 16 high-burden countries which contribute to the 95% of the global load of new leprosy cases at present.¹ The country entered the elimination phase in late 2005. Data from National Leprosy Eradication Programme (NLEP, India) reveal that there are 92,000 cases of leprosy on record with a prevalence rate of 0.73/10,000 population (1st April, 2013).² A total of 13,387 childhood leprosy cases were recorded in the year 2012–2013 with a child case rate of 1.07/100,000 population.² Children constituted 9.93% of the newly detected leprosy cases in the same year.² As with other chronic infectious diseases, prevalence of leprosy in children reflects the level of transmission of the disease in a given population, because it indicates recent infection.

Literature survey reveals that childhood leprosy differs from adult disease on several aspects; there is a gender predilection towards male; pauci-bacillary cases, mostly borderline tuberculoid (BT) disease, are commoner and episodes of reactions and related deformities are less frequent in this age group.^{3–8} Though theoretically infants remain resistant to the disease because of its long incubation period, leprosy has been reported in children as young as 6–9 months.^{3–5}

Diagnosis of childhood leprosy is a special issue. Interpretation of sensory testing in this age group is difficult. Clinical differentiation from other similar-looking skin lesions may not be possible at times. However, detection and treatment of each case of childhood leprosy takes us one step closer towards the goal of eradication.

Karnataka is one of the Indian states with low-endemicity for leprosy. According to NLEP data (2012–2013), the population of the state is slightly above 62 million and the prevalence rate for leprosy is 0.44.² At present, it is one of the 12 states in India where the proportion of childhood cases is more than 10% of the newly detected cases (15.63%).² Karnataka is also one of the five states where the proportion of pauci-bacillary child patients is high (11.87%).²

Clinico-epidemiological parameters of leprosy in a group of children and adolescents diagnosed during 2006–2013 (post-elimination period) in a tertiary care hospital have been presented. Data collected through community survey at the district leprosy office during the same period have also been analysed.

Materials and Methods

The tertiary care hospital is located in a district town of the Karnataka state of south India. Retrospective data was collected from the records maintained in the leprosy clinic of the hospital from January 2006 to August 2013. The hospital caters for a mixed population of both rural and urban background with many migrated families. Patients who come to the hospital with symptoms suggestive of leprosy and those referred from other departments of the same hospital or other nearby hospitals and private practitioners are registered in the leprosy clinic attached to the Department of Dermatology.

In the leprosy clinic, initial categorisation of all patients is done by the Ridley-Jopling classification. Skin biopsy and slit skin smears are performed as and when indicated. Based on the number of skin lesions and peripheral nerve involvement, the patients are also categorised as multi-bacillary (MB) or pauci-bacillary (PB) cases. This categorisation is done for therapeutic purposes. These patients continue to receive multi drug therapy (MDT) from

the clinic until they are released from treatment, and followed up thereafter for a stipulated time period. Cases with motor deformities and trophic ulcers are provided with special care in the institution in collaboration with the departments of orthopedics and physiotherapy, at a minimal cost.

As per the protocol of the leprosy clinic all patients' data are documented in a numbered proforma and kept serially year-wise. Two authors performed the retrospective data analysis from the proforma over a period of 2 weeks.

One of the authors collected the retrospective data on childhood leprosy (January 2006 to October 2013) obtained by the trained health workers through community survey in the District Leprosy Office. In this data, the patients were categorised as MB or PB cases. The Ridley-Jopling classification was not used; slit skin smear and skin biopsy were not done on this group of patients, as they were detected at field level.

Both the sets of data were analysed.

Results

In the leprosy clinic attached to the tertiary care hospital, total 309 new cases of leprosy were diagnosed during this period, of which 61 were children and adolescents (0–18 years). This age group constituted 19.7% of the total diagnosed leprosy cases during January 2006 to August 2013. Of them, 39 were in the school-going age (6–15 years), 20 were adolescents (16–18 years), and two were in the pre-school age group (0–5 years). The gender ratio was almost equal (Male: Female = 29:32).

Thirty two of these children were students, the rest were either school drop-outs or had never attended an educational institution; three patients of the latter group were agricultural workers, two were industrial labourers and four were involved in miscellaneous jobs like construction site work, tailoring, domestic help and grocery shop helper.

Gender-wise clinical types of the disease among the affected children has been presented in Table 1.

Thirty seven children (60.6%) suffered from borderline tuberculoid (BT) disease, 13 among them (35.13%) had a single lesion. Eight patients (13.11%) had BT disease with features of downgrading. Three patients (4.91%) had borderline lepromatous (BL) disease and six patients (9.83%) had lepromatous leprosy (LL). Four (6.55%) and two children

Table 1. Clinical spectrum of leprosy among affected children detected in hospital

Type of disease	No. of patients		
	Male	Female	Total (%)
Borderline tuberculoid(BT)	19	18	37 (60.6)
BT downgrading to BL	05	03	08 (13.11)
Lepromatous leprosy (LL)	02	04	06 (9.83)
Indeterminate	–	04	04 (6.55)
Borderline lepromatous (BL)	02	01	03 (4.91)
Tuberculoid (TT)	–	02	02 (3.27)
Histoid leprosy	01	–	01 (1.63)

(3.27%) had indeterminate and tuberculoid (TT) disease respectively. A 17-year-old boy was diagnosed as histoid leprosy. Indeterminate and TT leprosy were seen only in girls. Twenty four (39.34%) cases were pauci-bacillary and 37 (60.65%) were multi-bacillary.

In the above group, the extremities were the commonest sites of skin lesions ($n = 19$) in patients with BT, followed by the face ($n = 10$) and the buttocks ($n = 3$). Multiple peripheral nerve trunk involvement was recorded in 34 patients (55%), commonest nerves affected being ulnar, radial cutaneous and popliteal. Fourteen children did not show clinical evidence of peripheral nerve involvement.

Ten among the 61 children (16.4%) had leprosy reactions during the disease course; Type 1 and Type 2 reaction in five patients (8.19%) each. Two children with LL disease had florid Type 2 reaction at presentation and they suffered from recurrent episodes of erythema nodosum leprosum (ENL). Visible deformities were present in five patients (8.19%), three patients had more than one type; trophic ulcer was present in three children, claw hands and foot drop in two and three patients respectively.

Slit skin smear (SSS) was positive in five of these patients (8.19%), those with LL and histoid disease. Skin biopsy report was available in 13 patients and clinico-histopathological correlation was present in eight cases.

History of familial contact was present in 11 of the 61 children (18.2%) detected in the hospital. Multiple members were affected with leprosy in four families. Usual contacts were siblings ($n = 6$) and mother ($n = 6$), others being father ($n = 4$) and grandfather ($n = 1$).

A total of 1,049 leprosy cases were recorded in district leprosy office (January 2006 to October 2013) who had been detected through community survey by trained health workers. The number of affected children and adolescents (0–18 years) were 223 (21.25%) in this group. Boys were more commonly affected (Male: Female = 134:89). Age distribution of the patients was identical to the tertiary care hospital data (0–5 years = 3, 6–15 years = 164 and 16–18 years = 56); most commonly affected age group being those going to school. Pauci-bacillary cases were more common ($n = 155$, 69.5%) in this group of patients as compared to multi-bacillary cases ($n = 68$, 30.49%). Leprosy reaction was recorded in 11 (4.93%) children. All of them had Type 1 reaction and no case of Type 2 reaction was recorded. Deformities involving extremities (hands/feet or both hands and feet) were recorded in 13 (5.82%) of the 223 childhood cases. WHO Grade 2 deformity was recorded in four patients (1.79%).

The data on childhood leprosy recorded in the leprosy clinic of the tertiary care hospital and that collected by community survey and reported at district leprosy office has been presented in Table 2.

Discussion

The data collected from the leprosy clinic attached to the tertiary care hospital revealed that school children (5–15 years) were common sufferers of the disease. Unlike the prevailing pattern of male preponderance among leprosy-affected children, there was no predilection for the boys in this series of patients. Exposed body parts like extremities and face were the common sites of involvement in children suffering from BT leprosy.

Familial and non-familial close contacts play an important role in the epidemiology of childhood leprosy. The type of disease in the contact and proximity to the child (household or neighbourhood) are important determining factors in the transmission.⁴ Children with

Table 2. Data on childhood leprosy from the leprosy clinic of a tertiary care hospital compared with the district level data collected through community survey

Source	Total cases	Childhood cases (%)		M:F	Age group (Years)			Classification (%)		Reaction (%)		Deformity (%)
		M:F	0-5		6-15	16-18	PB	MB	Type 1	Type 2		
Community survey (data at district leprosy office)	1049	223 (21.25)	03	164	56	155(69.50)	68 (30.49)	11(4.93)	0	13(5.82)		
Leprosy clinic register at hospital	309	61(19.7)	02	39	20	24 (39.34)	37 (60.65)	5 (8.19)	5 (8.19)	5 (8.19)		

household contacts have a 9-fold higher risk of developing leprosy, as they have an early exposure to the leprosy bacillus.⁹ Family history of leprosy was present in 18.2% of the childhood cases recorded in the hospital. All the affected parents and grandparents who were the household contacts of these children had smear-positive, multi-bacillary leprosy. Mothers of the two children below 5 years of age had LL leprosy and they were on WHO MDT, multi-bacillary regime (MDT-MBR). In a community-based survey of leprosy patients conducted in defined rural and urban areas of Maharashtra state (2007), percentage of close contacts for childhood leprosy cases ranged from 19% (urban area) to 47% (rural area).¹⁰ One of the teen-aged boys detected in the leprosy clinic, was suffering from histoid leprosy; he belonged to a family migrated from Bihar (a leprosy-endemic state in northern India), though no other family member had clinical disease.

The threat of leprosy in patients of this age group is the residual deformity, which persists life-long with resultant stigma.¹¹ Children with repeated reactions are more vulnerable to deformity and related psychological stress, and pose economic burden to the family. Visible deformities like claw hand, drop foot and trophic ulcers were seen in 5 (8.19%) among the 61 children recorded in the hospital. Clinical diagnoses in three of them were LL and BT downgrading to BL, whereas the other two had multi-bacillary BT leprosy. The prevalence of deformity in children suffering from leprosy detected in Schieffelin Leprosy Research and Training Centre (Karigiri, south India), was 10.5% (2005).¹¹ The authors found that the higher risk factors for the development of deformity in children with leprosy were: older children, multiple skin lesions, multi-bacillary cases, smear positivity, multiple nerve involvement, thickened nerve trunks, reactions at presentation, and delay in availing health care.¹¹ In the community survey by Shetty et al, deformities were recorded (Grade 1 and 2) in 9% of the children detected only from the rural area.¹⁰

The data collected at the tertiary care hospital is mostly on a par with that obtained through community survey by field health workers reported at the district leprosy office, except in few aspects. In the hospital patients gender distribution was almost equal, whereas boys were more commonly affected in the latter group. More pauci-bacillary cases were recorded through community survey, whereas multi-bacillary cases were more in the hospital patient group. In this regard, the community survey data from the district leprosy office confirms the fact that the PB child proportion is higher in this state. The probable reason for more multi-bacillary cases recorded in the hospital is that, it being a tertiary health care centre, children with more severe disease were brought directly or referred to the clinic with the hope of getting care directly from the specialists. The same may be the reason for the non-detection of even a single case of Type 2 leprosy reaction during community surveys, whereas five cases (8.19%) were recorded in the hospital.

Type 2 leprosy reaction is a highly symptomatic, multisystem illness prompting the parents to bring their affected children directly to a higher centre. The percentage of children presented with visible deformity was higher (8.19%) in the hospital patients as compared to the community survey data (1.79%). This corroborates the findings of Kar *et al.* who reported a higher incidence of Grade 2 deformity among children with leprosy attending a leprosy research and training centre (10.5%) as compared to the community prevalence (1.4%) in that region (2005).¹¹ In addition to the motor deformities, three of the leprosy-affected children detected at the hospital had trophic ulcer(s), a feature not recorded among the cases detected through community survey. The availability of treatment facilities for deformities and trophic ulcers might have attracted families with such children to the tertiary care centre. In the community-based survey by Shetty et al, not a single case of leprosy reaction was detected

among the children with leprosy,¹⁰ a finding similar to the data collected through community survey at the district level in this study.

Screening of school children has been considered an effective way to detect cases of childhood leprosy. In this regard, the role of school and house-to-house surveys has been stressed by many authors.^{10,12} In developing countries many children work as daily wage earners rather than attending school and may remain undetected through school surveys. Twenty nine children with leprosy recorded in the hospital were not enrolled for formal education at the time of detection and a few of them were daily wagers. Community-based case detection or house-to-house surveys is a better way to pick up such cases. However, the surveyor may have to visit the households of working children on several occasions to catch them at home.

A higher proportion of multi-bacillary cases and smear positive leprosy among children detected in the hospital is a cause for concern, and implies the need to perform slit skin smears at the peripheral level. There is a report of several cases of histoid leprosy from this region of Karnataka and many of these cases were *de novo*, i.e., without history of inappropriate treatment in the past.¹³ The adolescent boy detected with histoid leprosy (BI 6+, MI 2%) in the hospital was one such case. There was no history of any contact of leprosy in this boy; neither had he received anti-leprosy treatment in the past.

A literature search revealed five studies on childhood leprosy from India, which have been published during the post-elimination period.^{5-8,10} We aimed to compare the data on childhood leprosy generated from the present study with these previous studies. Three of these studies were conducted in tertiary care hospitals.^{5,6,8} One study was conducted at a Leprosy Mission Hospital, a referral centre for leprosy patients.⁷ The fifth study was a population-based survey in defined rural and urban areas of a state located in Western India. The first four studies presented a mixed data of childhood leprosy from both the pre- and post-elimination period (ranging from the year 2000-2009), and could not be compared with the data collected in the present study during the post-elimination period. The study by Shetty *et al.*¹⁰ was conducted during the early post-elimination period (June-September, 2007); it was a community-based, house-to-house survey, and the data collected from the tertiary care centre was not comparable to that.

This study presents the data on childhood leprosy during the post-elimination period in the Karnataka state of south India. Two sets of data were collected, one from the leprosy clinic attached to a tertiary health care hospital, and the other, collected by the trained health workers through community survey and reported at the district leprosy office. Both sets of data were analysed.

There are certain limitations of the study: the sample size of the hospital was much smaller compared with that of the community survey conducted at district level during the same time period. This may be because of the fact that the hospital mainly catered for self-reported and clinician-referred cases of leprosy, rather than the active community survey adopted by the district leprosy health workers as per the current policy of NLEP, which is considered to be a superior method of patient detection in leprosy. Moreover, the hospital data might have been skewed towards more severe cases because of the above-said passive modes of case detection, since mostly severely affected and complicated cases attended the hospital, resulting in a discrepancy with the data collected at district level through active community survey.

Conclusion

From the findings of this study it can be surmised that transmission of leprosy still continues to be a hurdle in the leprosy eradication programme of the country. The presence of household contacts, multi-bacillary cases, and smear-positive childhood cases are warning signals to be taken care of. Smear positive cases and those of histoid leprosy are likely to generate many more new cases in future because of their infectivity. Such cases should be detected and provided with early treatment.

Thorough examination of the contacts of a case of leprosy is still a neglected part, especially in tertiary care hospitals with a heavily crowded and busy dermatology outpatient department. It should be made mandatory to screen the children of families with a case of leprosy, either pauci-bacillary or multi-bacillary. A child with a deformity related to leprosy bears the stigma for life.¹¹ All children suffering from leprosy should be scrutinised for the 'risk factors for development of deformity'¹¹ at presentation.

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