

Screening household contacts of children diagnosed with leprosy in a tertiary referral centre, Chhattisgarh State, India

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Summary

Objective: The study aimed to screen the household contacts of children diagnosed with leprosy in a tertiary referral centre.

Methods: This hospital based study involved 117 children, aged up to 14 years and newly diagnosed with leprosy, who attended a tertiary referral centre Hospital, Champa, Chhattisgarh, India. We enumerated all the household contacts of the registered child cases and invited them to attend for screening for leprosy.

Results: Of the 117 children, 72 (62%) were male and 45 (38%) were female with ages ranging from 3 to 14 years. Nearly half of them (47%) were diagnosed as multibacillary cases. A total of 358 household members was enrolled for screening. Of these, 214 (60%) were examined for leprosy. Ninety-three household members were found to have signs of leprosy, and among these, 17 were identified as new cases, 30 were known cases currently on treatment and 46 had been previously treated for leprosy.

Conclusion: The study showed that a household contact survey is an effective method for case detection in leprosy control programmes. Continued health education and motivation of household contacts will enhance the voluntary reporting for periodical screening.

Keywords: Leprosy, Childhood, Contact screening, Disability

Introduction

Leprosy in children is an indicator of disease transmission, while the occurrence of disability is evidence of delay in access to services.¹ Studies have found a significantly higher incidence

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of nerve function impairment in MB as compared to PB leprosy patients.^{2–4} Children with MB leprosy are found to be at higher risk of reversal reactions⁵ and require regular follow-up and prompt intervention to prevent disability. Higher bacterial loads increase the risk of disability.⁶

India achieved elimination of leprosy at national level in December 2005. Moreover, India accounts for 62% of total leprosy cases reported worldwide,⁷ and recorded 135,485 new leprosy cases during the year 2016–17.⁸ Chhattisgarh (CG) is a state with high endemicity for leprosy and continues to have the highest prevalence rate, even after decades of elimination efforts at national level. The child case rate is showing a gradual increase from 2.05 to 2.75 per 100,000 population during 2012–13 to 2016–17.⁸ In CG state, the new case detection rate has been static over the past decade and the childhood proportion among new cases is consistently between 6 and 7%.⁸

Close and prolonged contact with intra-familial sources of infection exposes children to high risk of acquiring leprosy.⁹ The source of infection may be a case of untreated multibacillary leprosy within the family or the community and the children are more susceptible to infection.^{10,11} The risk of developing leprosy is five to ten times higher if one member of the family has developed the disease previously – higher if the primary case has lepromatous leprosy and lower for tuberculoid leprosy.¹ Follow-up of contacts is an efficient method of cases detection of leprosy in the general population.¹²

From this study, we can understand the importance of following up family contacts, to identify any untreated cases or infectious sources.

Method

STUDY DESIGN, SETTING AND PARTICIPANTS

An institution-based study was conducted among 117 children newly diagnosed with leprosy who attended Bethasda Leprosy Mission Hospital, Champa between April, 2012 and March, 2016. Children, aged up to 14 years, were included and their household contacts living in the same house and sharing the same kitchen for at least 6 months prior to start of MDT, were invited for screening.

PROCEDURE

When a new child case is registered for multi-drug therapy (MDT), an initial visit is arranged, with their parents/guardian, with a physiotherapist trained in leprosy who describes the study to them. We obtained informed consent to perform the interview with a semi-structured questionnaire covering demographic factors and the disease profile of the child case and their household contacts. The household contacts at the initial visit were examined for evidence of leprosy. We listed in a register the remaining household members living with the child case and motivated continuously to bring all of them for screening. The household contacts were educated on the early signs of the disease and their significance, and were asked to return if any suspected skin lesions, or motor or sensory changes occurred.

Results

A total of 117 children were included in the study of whom 72 (62%) were male and 45 (38%) were female. Their ages ranged from 3 to 14 years and 56 (48%) of them were diagnosed as MB; four had a positive Bacteriological Index and six had Grade 2 disability at the time of diagnosis (Table 1).

DETAILS OF HOUSEHOLD CONTACT SCREENING

There was no association between the child’s classification and the probability of other cases in the household ($P = 0.904$). Among the children with the presence of leprosy in a household contact, 34 (55%) had one family contact, 22 (35%) had two family contacts and six (10%) had three or more.

Of the 358 household members enrolled for screening, 214 (60%) members were examined for leprosy. Ninety-three household contact members were identified affected with leprosy, among these 17 were detected as new cases, 30 were currently on under treatment (UT) and 46 were treated for leprosy (RFT) (Table 2).

Amongst household contacts enumerated, 62% (222/358) were parents, and of the 58% (129/222) screened 6% (8/129) were new cases. Among household contacts enumerated, 22% (78/358) were siblings and of the 62% (48/78) screened, 17% (8/48) were new cases. For comparison, 6% (17/282) of all the apparently healthy contacts examined were undiagnosed cases (Table 2).

Of the 93 leprosy affected with household members, 16 (14%) were aged between 5–14 years and 51% were female. At the time of diagnosis, 81% of them had MB disease and 44% had a positive Bacteriological Index (BI). At the time of screening, 15% had Grade 1 disability and 10% had Grade 2 disabilities (Table 3).

Table 1. Demographic data of newly registered child case for MDT

	Male <i>n</i> = 72	Female <i>n</i> = 45	Total <i>n</i> = 117
Age			
5 years and below	1	1	2 (2%)
6 to 10 years	23	22	45 (39%)
11 to 14 years	48	22	70 (59%)
Disease type			
Multibacillary (MB)	39	17	56 (48%)
Paucibacillary (PB)	33	28	61 (52%)
Bacterial Index (BI)			
Negative	53	38	91 (78%)
Positive	15	7	22 (19%)
BI above 4+	4	0	4 (3%)
WHO Disability grade			
Grade 0	64	43	107 (92%)
Grade 1	2	2	4 (3%)
Grade 2	6	0	6 (5%)

Table 2. Results of household contact screening of the 117 children

Active screening	Relationship						Total
	Father	Mother	Brother	Sister	Grand Parents	Cousin	
Enrolled	111	111	38	40	23	35	358
Screened	76	53	23	25	15	22	214
Outcome of screening							
New case	5	3	2	6	0	1	17
Under treatment (UT)	7	8	4	4	2	5	30
Released from treatment (RFT)	15	14	4	3	7	3	46

Discussion

The literature suggests that targeted interventions should be aimed at close contacts both inside and outside the household, particularly when genetically related.¹³ Through this study of household contact screening, 17 new cases were detected, 30 individuals were currently on treatment and 46 had been previously treated for leprosy.

Table 3. Demographics of household contacts with leprosy ($n = 93$)

Status	New	UT	RFT	Total
	$n = 17$	$n = 30$	$n = 46$	$n = 93$
Age				
5 to 14	7	6	3	16 (17%)
15 to 30	3	12	14	29 (31%)
31 to 45	7	10	20	37 (40%)
46 to 60	0	1	6	7 (8%)
Above 60	0	1	3	4 (4%)
Sex				
Male	7	14	25	46 (49%)
Female	10	16	21	47 (51%)
Disease type*				
Multibacillary (MB)	8	26	41	75 (81%)
Paucibacillary (PB)	9	4	5	18 (19%)
Bacterial index*				
Negative	13	11	28	52 (56%)
0-1 to 2	1	3	6	10 (11%)
2-01 to 4	1	7	4	12 (13%)
Above 4	2	9	8	19 (20%)
EHF score				
Score 0	15	21	34	70 (75%)
Score 1	1	2	0	3 (3%)
Score 2	1	3	6	10 (11%)
Score 3 and above	0	4	6	10 (11%)
WHO disability grade				
Grade 0	15	21	34	70 (75%)
Grade 1	2	8	4	14 (15%)
Grade 2	0	1	8	9 (10%)

Note: *. At the time of diagnosis

Breaking the chain of transmission between patients and the healthy population remains 'the strategic choice' for controlling leprosy. Studies show the importance of household contact examination in leprosy control programmes.^{11,14} The National Leprosy Eradication Programme (NLEP) in India included household contact examination as an essential component of their leprosy control programme.¹⁵

The risk of a person developing leprosy is four times higher when there is a leprosy contact in the neighbourhood, whereas the risk is increased to nine times in the immediate household.¹⁶ Jain *et al.* (2002) in a study among leprosy affected children in India, found that 39% of them had a history of contact with leprosy, and 95% of these had a contact within the family.¹¹ A recent study in India found that 42% of child cases had a family member who once suffered from leprosy before the child was diagnosed as having leprosy, and among these 16% had two or more contacts.¹⁰ In this study, 53% of the children had the presence of a household contact with leprosy, including a number of new, old and currently being treated cases.

Sales *et al.* (2011) in a study in Brazil found that among the index case risk factors, an elevated bacillary load was the only variable associated with leprosy in the contacts.¹⁷ In children, the source of infection may be an untreated MB leprosy patient within the family or the community.^{1,18} In this study, 81% of the pre-existing cases in households were MB, suggesting that these children (although denoted as the index case) were not the source of infection, but recipients of infection.

Continued counseling and motivation was provided to all the participant parents/guardians in every visit and 60% of the household contacts reported voluntarily for screening. A majority of the cases amongst household contacts were diagnosed as MB and nearly half them were BI positive. At the time of diagnosis, one-fourth of them had Grade 1 or Grade 2 disabilities.

Early detection and treatment have benefits not only for the termination of infection transmission but also for the prevention of the disabilities of leprosy. Detection of leprosy in children is evidence of continued transmission of the disease in the community, while Grade 2 disabilities indicate delayed detection of the disease. The World Health Organization launched its Global Strategy for 2016–2020, aiming for zero-Grade 2 disability among newly detected child leprosy cases.¹⁹

Examining the household contacts includes not only the family members, but should extend to the neighbours and other people in the neighbourhood, wherever possible. The high rate of leprosy in household contacts emphasizes the continuing need to screen and follow up the asymptomatic contacts of newly diagnosed leprosy patients.^{11,20,21} Moreover, this study suggests that special attention be paid to examining the siblings of the index child cases.

This study has some limitations. In an institutional-based voluntary household contact screening exercise, there is a chance of self-selection bias amongst the household contacts themselves. Furthermore, strengthening the referral system will help to identify suspect household members by other health workers doing household contact examinations for a previous case in the family.

In conclusion, this study showed that household contact screening is an effective method for case detection in the leprosy control programme. Identifying the contacts of leprosy patients who are at high risk of disease is of utmost importance for the leprosy control programme to break the transmission of disease. Continued health education and motivation of household contacts will enhance the voluntary reporting for periodical screening.

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Contribution of each author

Mr. Senthilkumar Ramasamy was involved in the study conceptualisation and design, obtaining permission for conducting the study, conducting interviews, data collection and manuscript writing.

Dr. Archana Kumar, was involved in the study conceptualisation and design, monitoring the study and commenting on the manuscript.

Mr. Pitchaimani Govindharaj, was involved in data analysis and interpretation, drafting first draft of manuscript and finalising it for submission.

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