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Clinical Spectrum of Leprosy in Children Below 15 Years at A Tertiary Care Center

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Abstract

Background: Childhood leprosy is an important indicator of ongoing transmission of Mycobacterium leprae within the community. Inspiet of the implementation of multidrug therapy and the National Leprosy Eradication Programme, new pediatric cases are getting reported from endemic regions of India. Early diagnosis is needed to prevent disability and interrupt disease transmission.

Objectives: To study the clinical profile of childhood leprosy among children below 15 years of age attending a tertiary care teaching hospital; to determine the age and sex distribution; to classify patients according to the Ridley–Jopling and World Health Organization (WHO) operational classifications; to assess the clinical presentation with respect to the number, distribution, and morphology of skin lesions; and to evaluate disability status according to the WHO disability grading system.

Methodology: This hospital-based observational descriptive study was conducted in the Departments of Dermatology, Venereology and Leprosy and Pediatrics over a period of 12 months. 80 children below 15 years of age with newly diagnosed leprosy were included using consecutive sampling. Detailed clinical evaluation, neurological examination, slit-skin smear, and skin biopsy (where indicated) were performed.

Results: Most children belonged to the 11–14-year age group (55.0%) and males constituted 62.5% of cases. Borderline tuberculoid leprosy (61.3%) and paucibacillary disease (65.0%) were the predominant clinical types. Household contact history was present in 38.8% of children. Two to five skin lesions were seen in 47.5% of cases, and peripheral nerve involvement was present in 57.5%, with the ulnar nerve being the most commonly affected. Hypopigmented patches were the commonest lesion morphology (65.0%). A statistically

significant association was seen between household contact and WHO operational classification (p=0.010), as well as between peripheral nerve involvement and disability (p=0.010).

Conclusion: Childhood leprosy reflect active community transmission. Early diagnosis, systematic household contact screening, prompt multidrug therapy, and regular neurological assessment remain essential to prevent disability and strengthen leprosy control programmes.

Keywords: Childhood leprosy, Mycobacterium leprae, Peripheral nerve involvement, Household contact, WHO disability grading

Introduction

Leprosy or Hansen's disease, is a chronic granulomatous infectious disease caused by Mycobacterium leprae, an obligate intracellular acid-fast bacillus that primarily affects the skin, peripheral nerves, mucosa of the upper respiratory tract, and eyes. The disease has a long incubation period, usually ranging from 2 to 10 years, but shorter incubation periods have been reported in children owing to close household exposure. Inspite of progress in disease control after the introduction of multidrug therapy (MDT), leprosy is a significant public health problem in several developing countries, particularly India, Brazil, and Indonesia, which together contribute most new cases reported worldwide. [1–3]

Childhood leprosy occurs in children below 15 years of age, and is considered an important epidemiological indicator of active and ongoing transmission within the community. The occurrence of new pediatric cases shows recent infection from untreated or inadequately treated sources, within the household. So, the proportion of childhood leprosy among newly detected cases is an important indicator of the effectiveness of national leprosy control programmes. [2,4]

India achieved the status of elimination of leprosy as a public health problem at the national level in 2005, but the country continues to report the highest number of new leprosy cases globally. According to the World Health Organization (WHO), India accounts for more than half of all newly detected leprosy cases reported worldwide each year. Increased proportion of these cases occur in children below 15 years of age, indicating persistent transmission despite sustained implementation of the National Leprosy Eradication Programme (NLEP).[2]

The clinical manifestations of leprosy depend largely on the host's immune response against *M. leprae*. The disease exhibits a wide clinical spectrum ranging from tuberculoid leprosy, characterized by strong cell-mediated immunity and localized lesions with few bacilli, to lepromatous leprosy, which is associated with poor cell-mediated immunity, numerous lesions, and heavy bacillary load. Intermediate borderline forms display varying clinical and immunological characteristics. [5] Ridley–Jopling classification categorizes leprosy into tuberculoid (TT), borderline tuberculoid (BT), borderline borderline (BB), borderline lepromatous (BL), and lepromatous leprosy (LL) based on clinical, histopathological, bacteriological, and immunological findings. [6]

In children, the disease commonly presents with one or more hypopigmented or erythematous patches associated with sensory impairment. Peripheral nerve thickening, loss of sensation, muscle weakness, trophic changes, and deformities may occur if diagnosis is delayed. The ulnar, common peroneal, posterior tibial, and great auricular nerves are among the most commonly involved peripheral nerves. Lepra reactions, but less common in children than in adults, may contribute significantly to

nerve damage and disability if not recognized and managed promptly. [3 7]

Factors associated with disease transmission include overcrowding, poor socioeconomic conditions, malnutrition, inadequate sanitation, delayed diagnosis of index cases, and limited access to healthcare facilities. [8] Studies have showed that active surveillance of household contacts substantially improves early case detection and reduces disease transmission within endemic communities. [9]

Prevention of disability through early case detection, regular follow-up, appropriate management of lepra reactions, and comprehensive rehabilitation remains an essential component of leprosy control programmes.[4]

Some hospital-based studies done in India have reported borderline tuberculoid leprosy as the predominant clinical subtype among children, with a higher prevalence in males and in the older pediatric age group. Household contact has been identified in a considerable proportion of affected children, emphasizing the importance of systematic contact screening. [10–12] In view of the continued occurrence of pediatric leprosy cases in endemic regions of India, the present study was undertaken to evaluate the clinical profile of childhood leprosy in children below 15 years attending a tertiary care teaching hospital.

Objectives

- To study the clinical profile of childhood leprosy among children below 15 years of age attending a tertiary care teaching hospital.
- To determine the age and sex distribution of childhood leprosy.
- To classify patients according to the Ridley–Jopling classification and the World Health Organization (WHO) operational classification.
- To study the clinical presentation with respect to the number, distribution, and morphology of skin lesions.
- To assess the disability status according to the WHO disability grading system.

Methodology

Study Design

Hospital-based observational descriptive study.

Study Setting

The present study was done in the Department of Dermatology, Venereology and Leprosy with the Department of Pediatrics at a tertiary care teaching hospital for 12 months from May 2025 to April 2026

Study Population

Children below 15 years of age diagnosed clinically with leprosy and attending the Dermatology Outpatient Department or admitted to the hospital during the study period.

Sample Size

Based on the study by Singal and Sonthalia[7], childhood leprosy constituted 20% of leprosy cases in selected endemic settings in India.[1] so, as per this formula $N=4PQ/E^2$, 80 children diagnosed with leprosy were included in the study.

Inclusion Criteria

- Children aged less than 15 years.
- Newly diagnosed cases of leprosy based on clinical examination with or without bacteriological confirmation.
- Parents or legal guardians willing to provide written informed consent.

Exclusion Criteria

- Children already receiving multidrug therapy (MDT).
- Patients with incomplete clinical records.
- Children whose parents or guardians refused consent.

- Patients with severe systemic illness interfering with clinical assessment.

Ethical Considerations

Written informed consent was obtained from the parents or legal guardians of all enrolled children. Assent was obtained from older children whenever appropriate. Confidentiality of patient information was maintained throughout the study.

Study Procedure

After obtaining informed consent, each child underwent a detailed clinical evaluation using a predesigned and pretested proforma.

Patients were classified according to the Ridley–Jopling classification as:

Tuberculoid (TT)

Borderline Tuberculoid (BT)

Borderline Borderline (BB)

Borderline Lepromatous (BL)

Lepromatous Leprosy (LL)

Operational classification according to WHO guidelines was also performed as:

Paucibacillary (PB)

Multibacillary (MB)

Disability was graded according to the WHO Disability Grading System as Grade 0, Grade 1, or Grade 2.

Investigations

The following investigations were carried out wherever indicated:

- Complete blood count
- Erythrocyte sedimentation rate (ESR)
- Slit-skin smear for acid-fast bacilli
- Skin biopsy for histopathological examination in clinically doubtful cases
- Other investigations as clinically indicated

Data Management and Statistical Analysis

Data collected were entered into Microsoft Excel and analysed using the Statistical Package for the Social Sciences (SPSS) software version 22.0

Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as mean ± standard deviation (SD) or median with interquartile range, depending on the distribution of data.

Chi-square test was used to assess the association between categorical variables. Student's *t*-test was used for comparison of continuous variables where appropriate. A p value of <0.05 was considered statistically significant.

Results

The majority of the study participants belonged to the 11–14 years age group, accounting for 44 (55.0%) cases, followed by the 6–10 years age group with 28 (35.0%) cases. Children below 5 years constituted 8 (10.0%) of the study population.

Male children predominated in the study with a male-to-female ratio of 1.7:1.

According to the Ridley–Jopling classification, Borderline Tuberculoid (BT) was the most common clinical type, seen in 49 (61.3%) children. This was followed by Borderline Lepromatous (BL) in 11 (13.8%), Borderline Borderline (BB) in 8 (10.0%), while Tuberculoid (TT) and Lepromatous Leprosy (LL) each accounted for 6 (7.5%) cases.

Based on the WHO operational classification, 52 (65.0%) children had Paucibacillary (PB) disease, whereas 28 (35.0%) had Multibacillary (MB) disease.

A positive household contact with leprosy was documented in 31 (38.8%) children, while 49 (61.2%) had no identifiable contact history.

With respect to the number of skin lesions, 38 (47.5%) children presented with two to five lesions, 26 (32.5%) had a single lesion, and 16 (20.0%) had more than five lesions.

Peripheral nerve involvement was detected in 46 (57.5%) children, whereas 34 (42.5%) had no clinically detectable nerve thickening or neurological deficit.

Among the children with peripheral nerve involvement, the ulnar nerve was the most commonly affected.

Table 1: Clinicodemographic and Clinical Profile of Children with Leprosy (n = 80)

Variable	Category	Number (n)	Percentage (%)
Age (years)	0–5	8	10.0
	6–10	28	35.0
	11–14	44	55.0
Sex	Male	50	62.5
	Female	30	37.5
Ridley–Jopling Classification	Tuberculoid (TT)	6	7.5
	Borderline Tuberculoid (BT)	49	61.3
	Borderline Borderline (BB)	8	10.0
	Borderline Lepromatous (BL)	11	13.8
	Lepromatous (LL)	6	7.5
WHO Classification	Paucibacillary	52	65.0
	Multibacillary	28	35.0
Household Contact	Present	31	38.8
	Absent	49	61.2
Number of Skin Lesions	Single	26	32.5
	Two to Five	38	47.5
	More than Five	16	20.0
Peripheral Nerve Involvement	Present	46	57.5
	Absent	34	42.5

Morphology of skin lesions

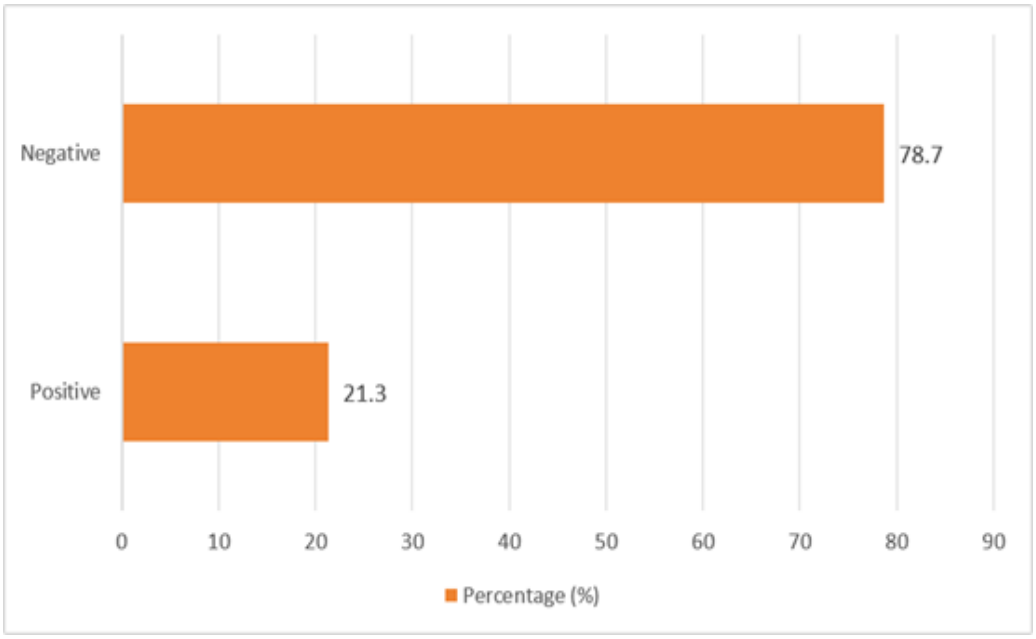
Table 2: Distribution and Morphology of Skin Lesions among Children with Leprosy (n = 80)

Variable	Category	Number (n)	Percentage (%)
Site of Skin Lesions	Upper limbs	18	22.5
	Lower limbs	26	32.5
	Trunk	14	17.5
	Face	6	7.5
	Multiple sites	16	20.0
Morphology of Skin Lesions	Hypopigmented patches	52	65.0
	Erythematous plaques	16	20.0
	Infiltrated plaques	8	10.0
	Nodular lesions	4	5.0
	Total	80	100.0

The lower limbs were the most commonly affected site, accounting for 26 (32.5%) children.

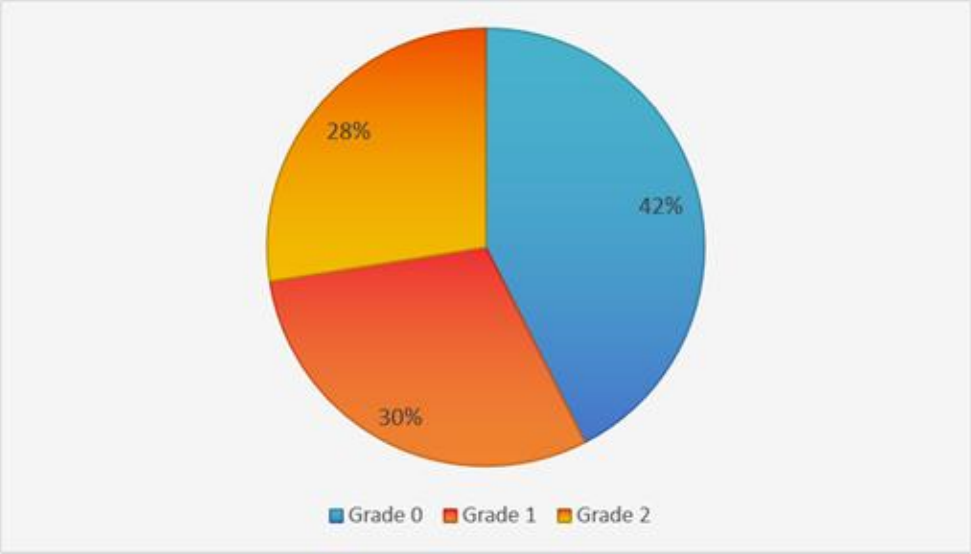
Hypopigmented patches were the most common presentation, seen in 52 (65.0%) children.

Slit-skin smear examination Slit-skin smear positivity was seen in 17 (21.3%) children.



Graph 1: Slit skin smear examination

WHO disability grading- Most children (n=46) had disability at presentation.



Graph 2: WHO disability grading

Table 3A: Association between Household Contact and WHO Operational Classification

Household Contact	Paucibacillary n (%)	Multibacillary n (%)	Total	p value
Present	26 (83.9)	5 (16.1)	31	
Absent	26 (53.1)	23 (46.9)	49	
Total	52	28	80	0.010

There was a statistically significant association between household contact history and WHO operational classification (Chi-square test, p = 0.010).

Table 3B: Association between Peripheral Nerve Involvement and Disability

Peripheral Nerve Involvement	Disability Present n (%)	Disability Absent n (%)	Total	p value
Present	21	25	46	
Absent	25	9	34	
Total	46	34	80	0.01

There was statistically significant association between peripheral nerve involvement and disability (p = 0.01).

Childhood leprosy is an important indicator of ongoing transmission of Mycobacterium leprae within the community. Despite the substantial reduction in disease burden following multidrug therapy (MDT) and the National Leprosy Eradication Programme, new pediatric cases continue to be reported from endemic regions of India, showing the need for early diagnosis, active surveillance, and household contact screening.[1,2]

In the present study, the majority of children belonged to the 11–14-year age group (55.0%). Similar findings have been reported by Singal and Sonthalia[7] and Rao and Suneetha[13], who found that pediatric leprosy is more common in older children. This age distribution is due to prolonged incubation period of *M. leprae*, which ranges

from two to ten years, causing clinical manifestation of disease during late childhood.[3]

Male predominance (62.5%) was seen in the present study, which is consistent with previous Indian studies.[7,8] More proportion of affected boys may be explained by excess outdoor exposure, increased opportunities for contact with infectious children, and sociocultural factors affecting healthcare-seeking behaviour. But gender distribution may vary across different geographical regions and healthcare settings.[11]

Borderline tuberculoid (BT) leprosy was the most common clinical subtype (61.3%), followed by borderline lepromatous disease. Similar observations have been reported in earlier Indian studies and are consistent with the Ridley–Jopling spectrum described in childhood leprosy.[6,7]

According to the WHO operational classification, 65.0% of children had paucibacillary disease, while 35.0% had multibacillary disease. Comparable findings have been documented in previous studies.[11,12]The predominance of paucibacillary disease suggests that many children were diagnosed before extensive dissemination of bacilli; but presence of multibacillary cases is epidemiologically important because these patients contribute to continued transmission within the community.

Household contact with a known case of leprosy was documented in 38.8% of children, where most (61.2%) had no identifiable household contact. The present study showed statistically significant association between household contact history and WHO operational classification ($p = 0.010$). Children with a household contact were more likely to have paucibacillary disease than multibacillary disease. This finding shows the value of contact tracing and regular surveillance of household members for early case detection and timely initiation of treatment.

Regarding clinical presentation, two to five skin lesions were the most common pattern (47.5%). The lower limbs were the most commonly affected site (32.5%), followed by the upper limbs, while hypopigmented patches constituted the predominant lesion morphology (65.0%). These findings are consistent with previous studies identifying hypopigmented anesthetic patches as the most common manifestation of childhood leprosy.[7] Early recognition of these characteristic lesions by primary care physicians and pediatricians is essential for prompt diagnosis and prevention of nerve damage.

Peripheral nerve involvement was present in 57.5% of children, with the ulnar nerve being the most commonly affected nerve (60.9%), followed by the common peroneal and posterior tibial nerves. Similar findings have been reported by Scollard et al.[3] and Walker and Lockwood[11].

Slit-skin smear positivity was seen in 21.3% of children, which is expected given that the majority had paucibacillary disease. Similar observations have been reported in previous hospital-based studies from India.[7]

57.5% had no disability at presentation, indicating relatively early diagnosis before the development of irreversible nerve damage. Comparable findings have been documented in earlier studies.[11,12] The present study showed statistically significant association between peripheral nerve involvement and disability ($p = 0.01$). But careful neurological assessment is needed because untreated nerve involvement may lead to permanent disability.

Overall, the findings of the present study are comparable with those reported in previous Indian and international studies. The predominance of older children, male sex,

borderline tuberculoid leprosy, paucibacillary disease, hypopigmented skin lesions, and ulnar nerve involvement shows proper clinical profile of childhood leprosy in endemic settings. The significant association between household contact and WHO operational classification proves the importance of systematic household contact screening, active surveillance, community awareness, and uninterrupted availability of multidrug therapy for sustained control of childhood leprosy.

Conclusion

In the present study, most children were older than 10 years, males, and had borderline tuberculoid leprosy with paucibacillary disease. A significant association was seen between household contact history and WHO operational classification, showing the importance of systematic contact tracing and surveillance for early detection. Strengthening household contact screening, increasing community awareness, ensuring prompt diagnosis, and initiating multidrug therapy without delay remain essential strategies for preventing disability and interrupting disease transmission. More multicentric studies with larger sample sizes are needed to better understand changing epidemiological trends and improve early detection and management of childhood leprosy.

References

1. World Health Organization. Guidelines for the diagnosis, treatment and prevention of leprosy. New Delhi: World Health Organization, Regional Office for South-East Asia; 2018.
2. World Health Organization. Global leprosy (Hansen disease) update, 2023: ending transmission. Wkly Epidemiol Rec. 2024;99(36):421-444.
3. Scollard DM, Adams LB, Gillis TP, Krahenbuhl JL, Truman RW, Williams DL. The continuing challenges of leprosy. Clin Microbiol Rev. 2006;19(2):338-381. doi:10.1128/ CMR.19.2.338-381.2006.
4. Lockwood DNJ, Suneetha S. Leprosy: too complex a disease for a simple elimination paradigm. Bull World Health Organ. 2005;83(3):230-235.
5. Ridley DS, Jopling WH. Classification of leprosy according to immunity. A five-group system. Int J Lepr Other Mycobact Dis. 1966;34(3):255-273.
6. Fine PEM. Leprosy: the epidemiology of a slow bacterium. Epidemiol Rev. 1982;4:161-188.
7. Singal A, Sonthalia S. Childhood leprosy in India: an overview. Indian J Dermatol Venereol Leprol. 2013;79(1):50-59. doi:10.4103/0378-6323.104670.
8. Narang T, Kumar B. Leprosy in children. Indian J Paediatr Dermatol. 2019;20(1):12-24. doi:10.4103/ ijpd.IJPD_108_18
9. Moet FJ, Pahan D, Schuring RP, Oskam L, Richardus JH. Physical distance, genetic relationship, age, and leprosy classification are independent risk factors for leprosy in contacts of patients with leprosy. PLoS Negl Trop Dis. 2008;2(4):e271. doi:10.1371/ journal.pntd.0000271.
10. Britton WJ, Lockwood DNJ. Leprosy. Lancet. 2004;363(9416):1209-1219. doi:10.1016/S0140-6736 (04)15952-7.
11. Walker SL, Lockwood DNJ. Leprosy. Clin Dermatol. 2007;25(2):165-172. doi:10.1016/ j.clindermatol. 2006.05.012.
12. Sehgal VN, Sardana K, Dogra S. The imperatives of leprosy treatment in the post-elimination era. Int J Dermatol. 2008;47(10):1013-1018. doi:10. 1111/j.1365-4632.2008.03732.x.
13. Rao PN, Suneetha S. Current situation of leprosy in India and its future implications. Indian Dermatol

Online J. 2018;9(2):83-89. doi:10.4103/ idoj. IDOJ_282_17.

14. Ministry of Health and Family Welfare, Government of India. National Leprosy Eradication Programme: Operational Guidelines. New Delhi: Directorate General of Health Services, Ministry of Health and Family Welfare; 2023.
15. Hastings RC, Opromolla DVA, editors. Leprosy. 2nd ed. Edinburgh: Churchill Livingstone; 1994

Figure 1: