Abstract
Background: Childhood leprosy is an important marker of the status of the ongoing leprosy control program, as it is an indicator of active disease transmission in the community. Despite achievement of elimination status of leprosy in 2005, the reported prevalence of childhood cases continues to be high. Materials and Methods: A retrospective analysis of 10-year records of leprosy patients aged <15 years in a tertiary care hospital of central Delhi was carried out from 2005 to 2015. Data were analyzed using the SPSS 22.0 system. Results: A total of 113 (7.6%) cases of childhood were reported during the 10-year period from 2005 to 2015. Multibacillary cases constituted a total of 57 (50.4%) cases, whereas paucibacillary constituted 56 (49.5%) cases. The M:F ratio noted was 2.5:1. Signs of reaction were noted among 15% of cases, while deformity was noted in 24.7% of cases. Conclusion: The rate of childhood leprosy continues to be high. Lack of proper access to health facilities, ignorance among the general population, high susceptibility due to immature immune system, etc., make this population highly vulnerable.

Keywords: Childhood leprosy, current scenario of leprosy, retrospective analysis

Introduction
India achieved elimination status in 2005,[1] however, the reported prevalence continues to be high in some of the states and union territories. An important marker of the operational efficacy of the ongoing leprosy control program is the proportion of childhood leprosy. It reflects the active case transmission in the community. Many factors such as lack of awareness among the general population, difficulties in access to the health-care system, and lack of well-defined clinical signs in children make this section of population highly vulnerable. The present study was undertaken to access the clinicoepidemiological features in a hospital setup.

Materials and Methods
A retrospective analysis of all leprosy cases aged <15 years during the 10-year period (January 2005–December 2015) attending the leprosy clinic at Lok Nayak Hospital, New Delhi, was carried out. The hospital caters to a large population of central Delhi as well as immigrant population from the neighboring states. The case detection was passive; no active search was carried out. A detailed history and examination findings recorded were analyzed. The age at onset, domicile, history of contact with a leprosy case, gender, etc., were noted. Detailed note of the examination findings included number of skin lesions, peripheral nerve thickening, signs suggestive of Type 1 and 2 reaction, presence of neuritis, etc., Slit-skin smear examination was done in all cases; histopathology was done wherever deemed necessary. Cases were classified according to the Ridley–Jopling classification.[2] The WHO classification was used for grading of the disability.[3]

Results
In the data analyzed from 2005 to 2015, 113 cases of childhood leprosy were recorded of the total 1487 (7.6%). The year-wise distribution of cases is shown in Table 1. Multibacillary cases constituted a total of 57 (50.4%) cases, while paucibacillary constituted 56 (49.5%) cases. The MB:PB ratio was 1.01.

Demographic profile
Majority of the cases 86 (76.1%) belonged to 11–15 years of age, followed by 25 (22.1%) in 6–10 years and 2 (1.7%) into 1–5 years [Figure 1]. The preponderance of cases in the older age group can be accounted for by the long incubation period of the disease. Males outnumbered females...
in the present study, a total of 81 (71.6%) were males whereas 32 (28.3%) belonged to female gender (M:F ratio being 2.5:1).

The majority of the cases were immigrant population from neighboring states. Most of the cases were found to belong to Uttar Pradesh 51 (45.1%), followed by Bihar 41 (36.2%). Patients belonging to Delhi were 16 (14.1%), while a minority of cases 1 (0.88%) were found to belong to Haryana, Himachal Pradesh, Karnataka, Nepal, and West Bengal [Table 2].

Clinical spectrum

A history of contact was elicitable in 4 (3.5%) cases, only household contacts were included in the study. Close prolonged contact with intrafamilial cases is an important factor in childhood leprosy transmission, especially when the index case is the mother. According to the Ridley–Jopling classification, majority of the cases 90 (79.6%) belonged to the borderline tuberculoid spectrum, followed by lepromatous spectrum (5.3%). Among the total cases, 11 (9.7%) presented with only nerve involvement, whereas only 1 (0.88%) case of indeterminate leprosy was noted [Table 3].

Five or less lesions were present in 80 (70.7%) cases, whereas 33 (29.2%) reported more than five skin lesions. Single lesion was noted in 46 (45%) cases. A total of 67 (59.2%) cases presented with multiple nerve involvement, ulnar nerve being the most common followed by common peroneal.

Smear positivity and histopathology

Slit-skin smear positivity was found among 8 (7%) cases, whereas the rest 105 (92.9%) did not reveal acid-fast bacilli on slit-skin smear examination. Among the positive cases, two belonged to borderline lepromatous spectrum, while 6 belonged to the lepromatous leprosy spectrum.

Histopathology from the cases with skin lesions revealed consistent characteristics in 51 (50%) with the clinical diagnosis, while 16 (15.6%) revealed no specific findings [Table 4].

Reaction and deformity

A total of 17 (15%) cases presented with signs of reaction. Among these, 14 (12.3%) reported signs of Type 1 reaction, while 3 (2.6%) cases were found have Type 2 reaction. The spectrum-wise distribution of reaction is shown in Figure 2. Two cases reported signs of neuritis.

Deformity was noted in 28 (24.7%) cases, majority of the cases 21 (18.5%) had Grade 2 deformity, while 7 (6.1%) reported Grade 1 deformity [Figure 3]. Most of the cases presenting with deformity belonged to multibacillary spectrum (71.4% in both Grade 1 and 2 deformity).

Treatment

All cases with slit-skin smear positivity, more than five skin lesions and more than one peripheral nerve involvement, were classified as MB and received 12-month treatment, while the rest were classified as PB and underwent treatment for 6 months. Among the total patients receiving paucibacillary treatment, 45 (80.3%) completed treatment, while among the multibacillary cases, 47 (82.4%) completed treatment. A total of 18.5% of cases were defaulters. A history of previous treatment intake was elicitable in 12 (10.6%) cases.

Reactions were treated according to the severity. Mild episodes with only cutaneous involvement were treated with only

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### Table 1: Year-wise distribution of the cases of childhood leprosy

| Year       | Number of childhood cases | Percentage of total cases |
|------------|---------------------------|---------------------------|
| 2005-2006  | 12/224                    | 5.3                       |
| 2006-2007  | 10/152                    | 6.5                       |
| 2007-2008  | 9/125                     | 7.2                       |
| 2008-2009  | 7/119                     | 5.8                       |
| 2009-2010  | 14/183                    | 7.6                       |
| 2010-2011  | 11/111                    | 9.9                       |
| 2011-2012  | 5/85                      | 5.8                       |
| 2012-2013  | 12/123                    | 9.7                       |
| 2013-2014  | 6/107                     | 5.6                       |
| 2014-2015  | 13/143                    | 9.09                      |
| 2015-2016  | 20/191                    | 10.47                     |

### Table 2: The domicile of the cases

| State                  | Number of cases (%) |
|------------------------|---------------------|
| Uttar Pradesh          | 51 (45.1)           |
| Bihar                  | 41 (36.2)           |
| Delhi                  | 16 (14.1)           |
| Haryana                | 1 (0.88)            |
| Himachal Pradesh       | 1 (0.88)            |
| Karnataka              | 1 (0.88)            |
| Nepal                  | 1 (0.88)            |
| West Bengal            | 1 (0.88)            |
| Total                  | 113                 |

### Table 3: Spectrum of the disease in the study

| Spectrum                   | Number of cases (%) |
|-----------------------------|---------------------|
| Indeterminate               | 1 (0.88)            |
| Borderline tuberculoid      | 90 (79.6)           |
| Borderline lepromatous      | 5 (4.42)            |
| Lepromatous leprosy         | 6 (5.3)             |
| Pure neuritic               | 11 (9.7)            |
| Total                       | 113                 |

### Table 4: Results of the histopathological findings among the cases with skin lesions

| Number of cases (%) |
|---------------------|
| Consistent          | 51 (50)            |
| Nonspecific         | 16 (15.6)          |
| Not available       | 35 (34.3)          |
| Total               | 102                |
anti-inflammatory agents, while those complicated with systemic involvement received course of systemic corticosteroids. Patients with neuritis were given supportive measures such as slings, etc., along with corticosteroids. Deformities were managed with intensive physiotherapy and corrective surgeries.

**Discussion**

According to the progress report by NLEP 2015, a total of 125,785 new leprosy cases were detected during the year 2014–15, making the annual case detection rate 9.73/100,000 population. The proportion of childhood cases reported was 9.04%. The child disability rate was 0.019/100,000 population. The proportion of childhood cases is an important indicator of the success of the disease control program. It is governed by many factors such as thoroughness of case detection, Bacillus Calmette–Guerin vaccination, and stage of the control program. At the beginning of the control program, the rate may be lower due to greater burden of adult cases and tends to stabilize later. As the duration increases, the rate becomes lesser.

The percentage of childhood leprosy in Delhi during the year 2014–2015 was 5.22%. The percentage of MB cases among these was 3.42%, while PB was 1.80%. The child disability case rate noted in Delhi was 0.03/100,000 populations.

In the present study, childhood cases constituted 7.5% of the total leprosy cases registered from 2005 to 2015. This finding in our study is similar to a study conducted by Grover et al. from Delhi and they reported the childhood leprosy cases to constitute 7.06% of the total cases. Other studies have reported childhood leprosy rates to be 4.5% and 9.6%. Difference in the prevalence noted by different studies may be due to the difference in the cutoff age used in these studies along with other factors such as difference in case finding methods. Similar to the current study, other studies have also reported majority of the cases belonging to the higher age group (5–15 years). The higher prevalence of cases in the older age group can be accounted for by long incubation period of the disease and failure to report in early stages. A high M:F ratio (2.5:1) was noted in our study. This finding is consistent with previous studies and can be attributed to neglect of girl child in the Indian setup.

A history of contact was elicitable in 3.5% of the cases in the present study although the multibacillary/paucibacillary status of the contacts was not available from the records. The risk of transmission of leprosy is four times higher in case of neighborhood contact, while risk increases to nine times in case of intrafamilial contact. Close contact with leprosy cases at home is an important source of infection, especially in children who have a weak immune response. This reinforces the importance of screening of family members in a case of leprosy. Most of the patients belonged to borderline tuberculoid spectrum, this finding is consistent with other similar studies. Single lesion was recorded in 45% of cases in our study. Previous studies have reported mixed results regarding the number of lesions. While some studies have reported single lesion to be more common, others have reported higher rate of multiple lesions. Dogra et al. reported multiple nerve thickening in 56.3% of cases in their study, which is similar to the figure cited in the present study (59.2%). The presence of multiple nerves is a risk factor for the
development of deformities and reactions. Smear positivity was noted among 7% of the cases. Previous studies have documented rate of smear positivity to be <10% in cases of childhood leprosy.[16,17]

Multbacillary cases outnumbered the paucibacillary cases by a small margin. Many studies have reported paucibacillary cases to predominate in case of children;[13,18] however, finding similar to the current study has also been documented in previous studies.[17] The probable explanation cited by the author includes difference in the classification system used in the different studies.

The histopathological concordance was seen in 50% of cases in the present study. Kaur et al.[9] reported a rate of 52%, while Kumar et al.[11] reported concordance in 60.6% of cases. Nonspecific findings in histopathology point toward an impaired immune response in children. Selection of lesions and the site for biopsy play a crucial role in the histopathological diagnosis.

A total of 15% of cases presented with signs of reaction in the current study, similar findings have been noted in previous studies.[5,7] Deformity was noted among 24.7% of cases. Deformities in childhood cases are unfortunate and increase psychological and economic burden on the family as well as the society. High prevalence of deformity may be due to multibacillary disease, multiple nerve thickening, lack of awareness among the general population regarding the disease, delay in seeking treatment, and decrease index of suspicion by the health-care professionals.

**Conclusion**

Although leprosy has been eliminated at the national level, areas of endemicity exist where the transmission continues to be high. Childhood leprosy rate is thus an important marker of the ongoing active transmission in the community. Childhood leprosy still contributes to a significant proportion of the total case load denoting the continuing active horizontal transmission of leprosy. Although the number of new cases registered annually has been decreasing, a much larger share of multibacillary cases is a reason for concern.

High rate of Grade 2 deformity and leprosy reactions at presentation in our patients reinforces the need for early detection, through active search in community.

Probably, in our zeal to eliminate leprosy, we seem to be reaching a juncture where the number of cases is less, but the disease burden is far more.

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**Conflicts of interest**

There are no conflicts of interest.

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