Indian J Lepr 2023, 95 : 181-189

http://www.ijl.org.in

Original Article

A Retrospective Study of Profile of Leprosy in Paediatric Population Between 2017-2021 in a Tertiary Care Hospital of North Chennai

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Received : 21.11.2022 Revised : 28.01.2023 Accepted : 27.03.2023

'Childhood Leprosy', leprosy occurring in the age group of 0-14 years, is considered as a marker of ongoing active transmission of the disease in the community. This percentage is used to assess the progress/impact of leprosy control programmes. The aim of the study is to determine the epidemiological and clinic-pathological profile of Paediatric leprosy patients visiting a tertiary care centre over a period of 5 years. It is a single centre retrospective observational Study conducted in the Department of DVL, Government Stanley Medical College and Hospital, North Chennai, Tamil Nadu, India. Leprosy is known to occur at all ages ranging from early infancy to old age. Case records of leprosy patients treated at a tertiary care hospital over 5 years from 2017 to 2021 were studied retrospectively. Proportion of child leprosy cases ranged from 6.59% in 2018 to 12.8% in 2020 (average 7.91%). These percentages are similar to national average and much lower than NLEP overall figures of about 20% from Tamil Nadu and Chennai city. Of the total 27 childhood leprosy cases which were studied, a male predominance of 18(66.66%) was noted to that of female 9(33.33%). Majority of the children in the study were in the age group of 10-14years. Higher frequency in older children may be due to the long incubation period of leprosy (5–7 years), sometimes delay in diagnosis of early lesions and difficulty in assessing the sensory loss in younger children. Borderline tuberculoid (BT) Hansen's was the most frequent spectrum noted in our study with a total of 18(66.66%) followed by 6 (22.22%) tuberculoid (TT) cases. At the time of presentation, two children (7.14%) were diagnosed with Type 1 lepra reaction and two other children (7.14%) with type 2 deformity. Most of our child leprosy cases were of paucibacillary types 25/27 (93%) versus 2/27 (7%), with SSS positivity of 7%. While this shows good awareness in the community catered by our tertiary care centre, 2/27 these child cases ending up with grade 2 disabilities is not desired and should not be accepted in future.

Keywords : Childhood Leprosy, North Chennai, Tamil Nadu, India

Introduction

"Childhood leprosy" is defined as the percentage of children (up to 14 years of age) among all new cases of leprosy detected. Although leprosy affects all age group, leprosy in children is of special importance as it is an indicator of transmission in the community and reflects the efficacy of the control program. Elimination of leprosy as a public health problem (prevalence of less than 1/10,000 population) was attained at a

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global level in the year 2000. This elimination was achieved in India in the year 2005 on December 31st at a national level. Government of India officially announced this achievement on January 30, 2006 (Dhillon & Bartakaty 2006).

There were about 1,27,558 new leprosy cases detected globally in the year 2020 as per the official figures from 139 countries from the 6 WHO regions. It included about 8,629 children below 15 years. Globally, the new case detection rate among the childhood population was recorded to be 4.4 per million child population (who int). As per the NLEP annual report on 2011-12 at the national level, the average child leprosy rate is 9%. This proportion of the child cases was more than 10% in eleven states/union territories in the country. Of which six of them – Tamil Nadu, Punjab, Bihar, Dadra and Nagar Haveli, Mizoram and Arunachal Pradesh showing very high rates ranging from 14-23% (Rao & Suneetha 2018).

Tamil Nadu was the first state to integrate leprosy services with the general health care system in July 1997 itself and in other parts of India it was after 2004. To analyse the situation of the proportion of childhood leprosy cases in Tamil Nadu, this study was undertaken. The objective of the study was to retrospectively analyse the clinical profile of childhood cases of leprosy presenting at our tertiary care hospital in North Chennai, in the decade after its declared elimination as a public health problem.

Materials and Methods

It was a single centre retrospective observational study conducted in the Department of DVL, Government Stanley Medical College and Hospital, North Chennai, Tamil Nadu, India Case records of the leprosy patients treated over 5 years from April 2017 to March 2021 were analysed year-wise separately and studied retrospectively. Institutional Ethical committee approval was obtained. Informed consent was also obtained from the parents of those children included in the study. COVID pandemic affected years 2020 and 2021 were taken into consideration during analysis.

An active case of leprosy is defined as an individual who is untreated or has not completed the course of treatment and has one or more of the three cardinal signs- i) hypo pigmented or erythematous skin lesions with definite loss or impairment of sensation, ii) involvement of the peripheral nerves as demonstrated by definite thickening with sensory impairment, iii) acid-fast bacilli. All cases that fulfilled the above definition of leprosy were included. Case records which are complete concerning basic demographic data, history (onset, detection, and contact history), examination details (lesion count, nerve involvement, deformities, and reactionary episodes), treatment details (the type of multidrug treatment), and laboratory investigations (slit skin smears and histopathology) were included in the study.

All newly diagnosed paediatric Hansen's patients either clinically proven or biopsy proven were included in the study. Those childhood leprosy cases who have defaulted therapy or have come with relapse/ reinfection were excluded from the study.

These cases were diagnosed and classified as per criteria of Indian Association of Leprologists (IAL 1982) and Ridley & Jopling (1966). For treatment purpose these were divided into paucibacillary (PB) and multibacillary (MB). Paucibacillary (PB) cases included up to five skin lesions, only one trunk nerve involvement and acid-fast bacilli (AFB) negative. Multibacillary (MB) cases included six or more skin lesions, more than one trunk nerve involvement and AFB positivity.

The children diagnosed with indeterminate type and tuberculoid leprosy were classified as paucibacillary (7 cases) and started on blue kit – multidrug therapy for a duration of 6 months. The remaining 20 cases belonging to

the borderline-tuberculoid, mid-borderline and borderline lepromatous were started on yellow kit – multidrug therapy for a complete course of 12 months with regular follow-up. Two children developed type 1 leprosy reaction which resolved completely with NSAIDS and systemic steroids. Grade 2 deformity in the form of mobile claw hand was noted in 2 children (7.14%) who were started physiotherapy and transcutaneous electrical nerve stimulation. Two children came with type 1 leprosy reaction at the time of presentation which resolved completely with NSAIDS and systemic steroids. Two other children (7.14%) were diagnosed with Grade 2 deformity in the form of mobile claw hand at the time of presentation for which physiotherapy and transcutaneous electrical nerve stimulation was initiated with good improvement. No history of leprosy in any of the family members could be found.

After collecting data, these were compiled and entered in MS Excel and analysed using statistical software. All continuous variables were expressed as mean and standard deviation. All categorical variables were expressed as percentages and proportions.

Results

The results of our study are shown in Tables 1 to 3 and Figs. 1-4, these are as follows:

A total of 341 leprosy cases were diagnosed at our hospital of which the total number of childhood leprosy cases detected in our centre between the year 2017-2021 was 27 (Table 1). Male children constituted the majority 18 (66.66%) compared to

Table 1 : Year-wise distribution of the cases in the present study.

Year	No. of Paediatric new leprosy cases			Total New leprosy cases (child + adult)	Percentage of childhood new leprosy cases
	Male children	Female children	Total children		
2017	4	3	7	82	8.53%
2018	3	3	6	91	6.59%
2019	2	3	5	74	6.75%
2020	5	0	5	39	12.8%
2021	4	0	4	55	7.27%
Total	18 (66.66%)	9 (33.33%)	27	341	7.91%

Table 2 : Age-wise distribution of the child leprosy cases.

Age group in years	No. of cases (Male child)	No. of cases (Female child)	Total	Percentage
Less than 3 years	-	-	-	0
3-5 years	-	1	1	3.7%
6-9 years	2	1	3	11.11%
10-14 years	16	7	23	85.18%
Total	18	9	27	100%

Table 3 : Spectrum of leprosy as per Ridley Jopling classification.

Age group in years	Indeterminate	TT	BT	BB	BL	LL
Less than 3 years	-	-	-	-	-	-
3-5 years	-	-	1	-	-	-
6-9 years	1	1	1	-	-	-
10-14 years	-	5	16	1	1	-
Total	1(3.7%)	6(22.22%)	18(66.66%)	1(3.7%)	1(3.7%)	-

Table 4 : Year wise - new cases, child cases and child proportion (%) as per National Leprosy Eradication Programme report (2017-2021).

National leprosy Eradication Programme												
Year wise - New cases, Child cases and Child proportion (%)												
Year	Chennai			Thiruvallur			Tamil Nadu			India		
	New cases	Child cases	%	New cases	Child cases	%	New cases	Child cases	%	New cases	Child cases	%
2017-18	264	40	15.15	179	43	24.02	4277	664	15.52	126164	10282	8.15
2018-19	394	104	26.40	211	59	27.96	4793	834	17.40	120334	9230	7.67
2019-20	350	77	24.44	220	54	24.55	4252	651	15.31	114451	7863	6.87
2020-21	74	4	5.41	96	5	5.21	1769	154	8.71	65147	3753	5.76
2021-22	91	14	15.38	136	16	11.76	2434	228	9.37	75394	4107	5.45
Total	**1173**	**239**	**20.3**	**842**	**177**	**21.02**	**17525**	**2531**	**14.4**	**501490**	**35235**	**7.02**

the female children about 9 (33.33%). Proportion of child leprosy cases ranged from 6.59% in 2018 to 12.8% in 2020 (average 7.91%).

Majority of the children in the study were in the age group of 10-14 years constituting about 85.18% (Table 2).

The most common spectrum of leprosy observed in our study was borderline tuberculoid Hansen's 18 (66.66%) followed by tuberculoid Hansen's 6 (22.22%). No pure neuritic type was diagnosed in our study (Table 3).

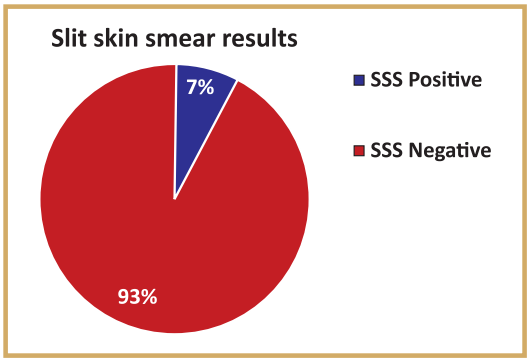

Fig. 1 : Slit skin smear Results

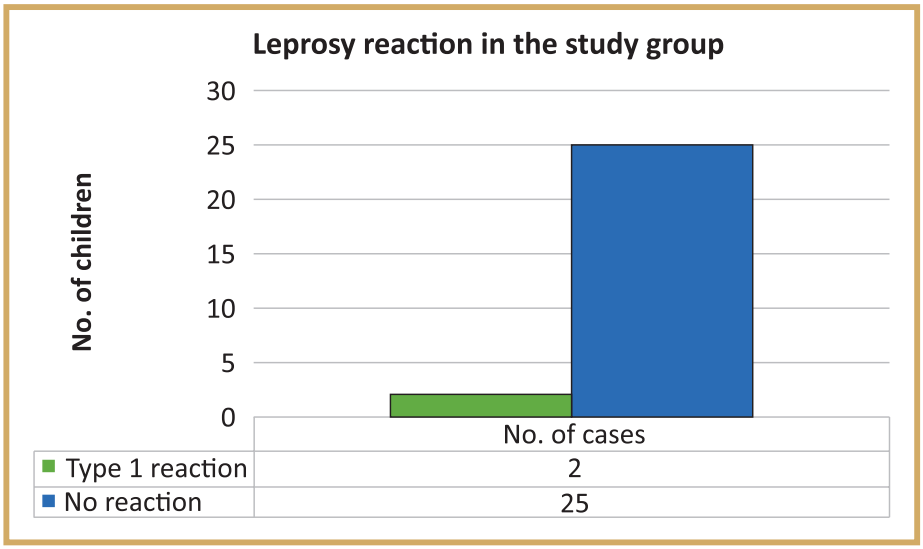

Fig. 2 : Type 1 lepra reactions noted in the study group.

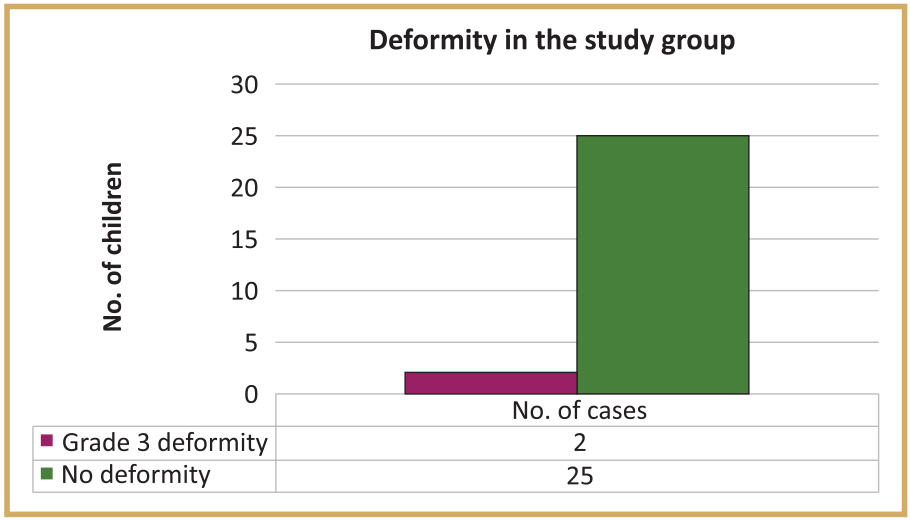

Fig. 3 : Grade 2 deformities noted in the study group.

Fig. 1 shows the slit skin smear results in the childhood cases studied. Since majority of the cases belonged to the tuberculoid spectrum (24/27), there was very low SSS positivity rate 2 (7%). One of these positive cases was having BB and other BL type of leprosy. In the SSS-negative group, the diagnosis was made mainly on a clinical basis. In two children who presented with

Fig. 4 : A borderline tuberculoid Hansen's disease case.

a single hypopigmented patch with a variable sensation, biopsy was done on suspicion and was consistent with borderline tuberculoid Hansen's disease.

Two children (7.14%) presented with type 1 reaction at the time of diagnosis (Fig.2). As depicted in Fig. 3, 2/27 (7.14%) presented with ulnar mobile claw hand.

All 27 cases were routinely followed up throughout the complete course of treatment for development of reactions and proper treatment adherence.

Discussion

Leprosy is one of the oldest diseases known to mankind. Archaeological studies reveal absolute evidence of leprosy in an Egyptian skeleton of the 2nd century BC, although the written records of the disease come from India which date back to 600 BC. Leprosy is a chronic granulomatous disorder caused by *Mycobacterium leprae*. The organism was identified by Gerhald Henrich Armauer Hansen in 1873. In 2011, about 83% of the world's newly detected leprosy cases belonged to three countries, with India responsible for 58% of the cases, Brazil for 16%, and Indonesia for 9% (WHO 2012).

Leprosy is known to occur at all ages ranging from early infancy to old age. Among children, the disease tends to occur with the highest frequency in 5–14 years of age group and up to 6% cases are below 5 years of age (Adraity et al 2020). In our series, 22/27 (81.5%) were above 6 years of age with 21/27(77.7%) belonging to 10-14 years age group. Burman et al (2003) have reported child leprosy cases in 6-14 years age group in their hospital. Higher frequency in older children may be due to the long incubation period of leprosy (5–7 years), may be some delay in diagnosis of early lesions and difficulty in assessing the sensory loss in younger children.

Clinical features may be classical as seen a BT Hansen's case (Fig. 4). Histology can be of help, however, in some cases in children usually non-specific histological features are noted owing to the immature immunity status (Kumar et al 2000). Paediatric leprosy indicates the recent (less than 5-7 years old exposure) and ongoing transmission in the community (Barbieri & Marques 2009, Chaitra & Bhat 2013). Most of our child leprosy cases were of paucibacillary types 25/27 (93%) versus 2/27 (7%), with SSS positivity of 7%, this shows good awareness in the community which is being catered by our tertiary care centre. However, 2/27 these child cases ending up with grade 2 disabilities is not desired as they will have lifelong consequence. Life without disabilities in leprosy continues to be the national and global goal for global leprosy strategy 2016-2020 (WHO 2016b). Any failure should not be accepted in future.

The youngest patient diagnosed to have leprosy so far was only 3 weeks old, from Martinique, a small island near West Indies (Narang et al 2019). Among children, as is apparent from our data, boys are more commonly affected than girls (Burman et al 2003); however, this may

not represent the true statistics as detection in girls may possibly be lower than boys due to neglect of the female child and greater mobility and increased opportunities for contact in the male child. One of the most important sources of infection in childhood cases is familial contact with leprosy. The risk of developing leprosy in a person is four times when there is a neighbourhood contact. However, this risk increases to nine times when the contact is intra-familial (van Beers et al 1999). Further, the risk gets higher (up to 14 times) if the contact has MB form especially lepromatous disease and when the index case is mother or where the number of patients was more than one.

As per the above data released by the state and National Leprosy Eradication Programme (https://leprosy.icmr.org.in/login/), of the total 5,01,490 new leprosy cases identified in India between the year 2017 – 2021 (Table 4), the childhood leprosy cases constituted about 7.02% (35,235). Whereas in case of Tamil Nadu of the total 1,173 new cases diagnosed, 20.3% (239) constituted paediatric leprosy cases.

Table 4 also shows that there has been a drastic fall in the leprosy cases in Tamil Nadu from 4,252 cases in 2019-20 to 1,769 cases in 2020-21. In Chennai, 350 leprosy cases were recorded in 2019-20 while in 2020-21, number has reduced to 74 cases. The Prevalence rate in Tamil Nadu has dropped to 1.4 per 10,000 population (tnhealth.tn.gov.in).

In our study during the pre-covid era between 2017-2019, the percentage of child leprosy detection rate ranged from 6-8%. Although the COVID-19 pandemic disrupted the health care services in general, it provided a window to strengthen the health initiatives for diagnosis, referral, monitoring and training staffs. Following the COVID pandemic, although the overall number of cases detected reduced in our centre, the relatively proportion of the childhood cases detection increased from 7-12%. This could be attributed to the absence of school surveys during the pandemic curfew, where most of the cases were referred to the functioning tertiary care centres. The number of female childhood leprosy cases detected during the covid pandemic was nil. This implies that during school surveys equal importance was given to both male and female child. The lower female child detection rate may also be attributed to the lesser importance being shown to female children and their hesitancy to come forward to seek medical advice for the skin lesions in the unexposed sites.

There have been several studies from urban, rural and hospital settings from India (Kumar et al 2000, Jain et al 2002, Grover et al 2005, Shetty et al 2009, Singal et al 2011, Chaitra & Bhat 2013, Narang & Kumar 2019), Nepal (Burman et al 2003, Jha & Marhatta 2021), Cuba (Ruiz-Fuentes et al 2019), Brazil (Barbieri & Marques 2009, Oliveira & Diniz 2016) which provide figures about proportions and profile and also provide insight into the issues that are relevant to diagnosis and public health management. However, such data are largely not comparable, and need is always for local studies which would be relevant to develop/ modify strategies for appropriate management of leprosy in children. Overall, percentage of child leprosy cases (range from 6.5 to 12%, average 7%) is like national average, however, it is lower than NLEP data of about 20% from Chennai and Tamil Nadu. Such high proportion of child cases in the community is alarming. However, very high proportion of PB child cases coming to a tertiary care centre shows good public awareness and access. The skills for diagnosing and managing leprosy is diminishing leading to missed and may lead to misdiagnosis/ missing of leprosy in infants and young children. Regular School Surveys should be promoted for early detection of cases. Early diagnosis and treatment would help to reduce leprosy related

complications and school dropouts in children. Efforts will have to be sustained over a long period.

In Tamil Nadu, regular skin camps and training of medical officers in order to improve the detection rate and prevent deformities are being carried out. Rehabilitation and prevention of impairment and disabilities clinics are conducted in all primary health centres on Tuesdays throughout the state from January 2001. Reconstructive surgery campaign for willing patients with help and co-operation from the non-governmental organisations are carried out (tnhealth.tn.gov.in).

Our data is meaningful. However, being a single centre data from a tertiary care centre, it has limitations and must be analysed in the context of NLEP data as well as well conducted studies at community level. 20% child proportion indicates active transmission which has to be appropriately and adequately addressed**.** WHO (2016a) has been stressing on timely action, accountability and inclusion. Achieving zero transmission specially in children has been a major global goal (WHO 2018) and we must strive to achieve that fast.

Conclusion

Of the patients visiting the Dermatology outpatient Department between 2017-21, a total of 341 leprosy cases were newly diagnosed. Among these 341 cases, paediatric Hansen's constituted about 7.91% (27 cases) which is a significant number. Although leprosy being eliminated as public health problem at national level from our country, still ongoing childhood leprosy case detection rate warrants the need for a lot more attention and sustained efforts for several coming years. The female paediatric leprosy cases had dropped to zero during the pandemic indicating a possible discrimination parameter that has to be improved. Regular school surveys and skin camps play an important role in the childhood case detection especially female children. Mass health education and awareness among people and practicing physicians has contributed to good new case detection amidst the pandemic. These efforts should be strengthened and sustained in future for achieving zero transmission.

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How to cite this article : Anandan V, Anbulakshmi J, Saraswathy P et al (2023). A Retrospective Study of Profile of Leprosy in Paediatric Population Between 2017-2021 in a Tertiary Care Hospital of North Chennai. *Indian J Lepr.* **95**: 181-189.