RESEARCH PAPER

Childhood Leprosy in an Endemic Area of Central India

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Objective: To study clinical-epidemiological aspects of children affected with leprosy in a high-endemicity area.

Methods: Hospital-based study (April 2010 to March 2015) of newly diagnosed children (≤18 years) with leprosy, from a leprosy research institute in Chhattisgarh, India.

Results: 551 new childhood cases were diagnosed constituting 16% of the total newly leprosy cases examined; 221 (40.1%) were multibacillary cases with 11.2% smear positivity. 243 (44.1%) had known contact history of leprosy, 17.6% of children developed Lepra reaction, and 17.4% had visible deformity. 68% of subjects completed treatment within the prescribed time.

Conclusion: Transmission of leprosy is still continuing in the area, and high disability and deformity rates are seen in children.

Keywords: *Disability, Multibacillary, Paucibacillary, Slit skin smear, Voluntary muscle test*.

A high proportion of leprosy in children among new cases reflects a high level of transmission of the disease in a given population. If the transmission of leprosy reduces in an area, it is expected that the proportion of children affected will also decrease [1].

India is one of the 16 high-burden countries which contribute to the 50% of the global load of new leprosy cases [2]. The child case rate is 0.95/100,000 populations, with children constituting 9.5% of the newly detected leprosy cases [2]. Chhattisgarh is one of the Indian states with high endemicity for leprosy [3]. This study was conducted to assess the clinico-epidemiological pattern of leprosy in a group of children (<18 year) diagnosed at a research institute for leprosy.

METHODS

This hospital-based study with follow-up was done among children (≤18 years) affected with leprosy attending Regional Leprosy Training and Research Institute during 1st April, 2010 to 31st March, 2015. All the new leprosy patients who had attended at the Institute during the study period were included in the study after obtaining informed consent from accompanying person. Basic demographic details, past and present history, family and other contacts, registration delay, a history of reaction, steroid usage, etc. were collected. A person affected by leprosy living together with family members and sharing the same roof and meal from common kitchen was called household contact. A detailed clinical evaluation was conducted by the clinician and data was recorded into a structured form. The patients were subjected to slit skin smear, and motor and sensory examination. Leprosy was defined as a person with one or more cardinal signs of leprosy and yet to complete a full course of MDT. Initial categorizations of all patients were done by the WHO classification based on the number of skin lesions, peripheral nerve involvement and slit skin smear. Lepra reaction in the study group was treated with Prednisolone and dosages were adjusted as per body weight and tapering of dosage as per response of subject. The dosage and duration of treatment was supervised (2 weeks) to be as per programme guidelines. Nerve function assessment was done by Voluntary Muscle Testing (VMT) for function of muscles supplied by the nerve and sensory Test (ST) testing for sensory loss in the areas supplied by the nerve in TII proforma as per standard procedure [4]. If the patient could not identify the touch within 2 cm of the tested site (eyes closed), it was recorded as one insensitive point and marked X. Motor nerve function impairment was assessed by voluntary muscle testing of the commonly examined peripheral nerves and graded as strong (S),weak (W), and paralyzed (P). Both W (weak) and P (paralyzed) were recorded as motor Nerve Function Impairment (NFI) present. For assessing motor nerve function impairment in hands, thumb up, little finger out and extension of the wrist against resistance was tested separately for both sides. Similarly for feet, tested

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movements were dorsiflexion of feet against resistance. Any visible impairment on hands and feet like cracks/ wounds, absorption of fingers or toes, clawing of fingers or toes, contractures, wrist or any other impairment were recorded. For eyes, it was noted whether blinking of the eyes was Present (Pre) or absent (Abs). Light closer lid gap by measuring scale measured in mm and the patient's ability to in close the eyes, both lightly and tightly against resistance was also tested. Visual acuity was tested by a Snellen's chart for each eye separately at 6 meters distance. Grade II was severe visual impairment (vision worse than 6/60; inability to count fingers at six meters). WHO disability classification followed in order to hands, feet and eyes. For an overall disability grade of a patient the maximum grading at any of these sites was considered. EHF (Eye, Hand and Feet) scores of an individual are calculated disability guide for each eye, hand and feet and were ranged from 0 to 12. All children and their parents or accompany the person had undergone first point counselling. MDT dosages were adjusted as per bodyweight. Those subjects who were willing to take MDT from the institute were enrolled and followed till completion of MDT, others were referred to the nearest health facility and not included in the follow-up.

Data was collected, compiled and analyzed using MS Excel. Comparison between various variables were done using appropriate tests. *P* value of less than 0.05 was considered as significant.

RESULTS

A total of 551 new cases of child leprosy were diagnosed during this period. 404 (73.3%) of these children were school-going. Eighty-three (15.1%) children presented with lepra reaction as a first sign to the hospital while 12 (2.1%) developed a lepra reaction during MDT treatment. ***Table* I** presents the sociodemographic and clinical details of study children. ***Table* II** depicts that proportion of disability was more among older children; hands were the most commonly involved site defining disability. Commonly ulnar nerve was involved, while 15 children had both ulnar and median nerve involved. Foot drop was noted among seven children, ulcer over sole was present in six children, and only one child has lagophthalmos. Multiple case families were found among 18 (3.2%) child cases. Usual interfamily contacts were mother, 61 (11.0%), father, 48 (8.7%) and siblings 45 (8.1%). Duration of delay between onset of sign and symptoms and first contact to health institute was significantly more in multibacillary cases (*P*=0.016). Highest number of cases reported to health facility within a year of the appearance of symptoms. Most of the children presented with hypo-pigmented patches with anesthesia and exposed parts of the body were the commonest sites of skin lesions, followed by the chest and the buttocks. Multiple peripheral nerve trunk involvement was recorded in 12 (4.3%) children. Slit skin smear (SSS) was positive in 62 (11.2%) of children with BI ranges from 1+ to 5.66+ and MI from 0 to 10%. EHF (eye, hand and foot) score of 446 leprosy affected children was zero (no sensory and motor loss) while the remaining subjects it ranges from 1 to 8. Of the total, 60 (10.8%) children were followed monthly till completion of treatment and remaining (89.2%) was referred to the nearest health facility for further treatment. Sixty-eight percent completed treatment within the prescribed time and remaining 21% were defaulters. Three childrens are under treatment and taking MDT regularly till date.

DISCUSSION

This hospital-based study of 551 children with leprosy found majority of patients from rural areas and in the 13-

TABLE I CHARACTERISTICS OF CHILDREN WITH LEPROSY (*N*=551)

Variable	*Paucibacillary leprosy, n=330*	*Multibacillary leprosy, n=221*
Age, mean (SD)	13.05 (3.79)	13.28 (3.99)
Male, *n* (%)	188 (57.0)	135 (61.1)
Rural residence	213 (64.5)	125 (56.6)
**Contact*		
Intra family	115 (34.8)	94 (42.5)
Extra family	24 (7.3)	9 (4.1)
#Duration of delay, mo	8.4 (9.2)	10.5 (10.1)
Lepra Reaction: Type I	33 (10)	56 (25.3)
Type II	0 (0)	8 (3.6)
WHO disability: Grade I	3 (0.9)	6 (2.7)
Grade II	53 (16.0)	43 (19.5)

**1 child with multibacillary leprosy had both intra - and extra-familial contacts; #P=0.016*

Table II DISABILITY AMONG LEPROSY-AFFECTED CHILDREN *

Site of Disability	*6 -12 yr (n=175)*	*13- 18 yr (n =352)*		*Total*
	Grade II	*Grade I*	*Grade II*	
Hand	22 (12.5)	5 (1.4)	59 (16.7)	86 (16.3)
Foot	4 (2.2)	4 (1.1)	6 (1.7)	14 (13.3)
Both hand and feet	1 (0.5)	0	3 (0.8)	4 (0.7)
Eye	1 (0.5)	0	0	1 (0.1)
Total	28 (16.0)	9 (2.5)	68 (19.3)	105 (19.9)

**No disability among childrens young than 6 y and no grade I disability among these aged 6-12 y; All values in no. (%).*

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WHAT THIS STUDY ADDS?

- High visible deformity among new cases and occurrence of lepra reaction, disability, deformity and delay in seeking treatment were more among older children.

18 year age group; with delay in health-seeking seen more in multibacillary cases.

As this is a hospital-based study, the results may not reflect the status of childhood leprosy in the community in context of disability burden, reaction and treatment outcome. We were able to follow-up only 60 children out of 551; others were from far-off locations and unwilling for regular follow-up after initial assignment.

In the present study, the child proportion among new cases attained was 16% during the study period, which is higher than previous reports [5-8]. This could be due to the high prevalence of leprosy in Chhattisgarh. The study revealed that children in the age group of 13-18 years were common sufferers of the disease, but maximum incidence peak in 14 years (14.9%). In earlier studies [5,9] reported early age peak of leprosy than the teenage group. The preponderance of older children could be due to the long incubation period of leprosy or reported late to the health facility. The mean duration of symptoms and reporting to the hospital was 13-14 months in 56% of children. Other studies on childhood leprosy have reported a mean duration of disease ranging from less than 1 year to 1.6 years [5,6,10]. Delay could be due to lack knowledge of leprosy, ignorance, numerous barriers in access to health care or its utilization. This could also be the reason for the high percentage of patients with disabilities at the time of diagnosis.

A positive contact history of childhood leprosy has been shown to vary from 8.7% to 38.8% in various studies [10-13]. Proportion of paucibacillary cases are more as compare to multibacillary disease in children. Similar finding was noted by most research studies [7,10,11]. Lepra reactions were observed in 17.8% of children. These figures are the same in comparison to previous studies [5-7,12]. However, few hospital-based studies have also reported a low rate of reactions in childhood leprosy [6,12,14].

In this study, higher disability rate (19.4%) was seen as compared to previous studies (0.5-24%) [5,7,15]. This could be due to delay in reporting to a health care facility, lepra reaction, multinerve involvement and extensive involvement seen in our patients. Early detection and timely access to the health care system would help to prevent and halt progressive deformity. The EHF score is more sensitive to change over time than the disability grade itself. An increase or decrease in the EHF score, whether of an individual organ or the overall score would indicate some new or additional disability or no disability.

Most of the affected children above 5 years of age, denoting the importance of school health surveys in early case detection and prompt referral services to general health care setup. Emphasis on carrying out household contact survey in detection of multibacillary (MB) and child cases should be properly done and reviewed at each level. Early case detection, regular and complete treatment, early detection of impairment and disability has played a pivotal role in reducing the disease and disability burden in the community.

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