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Original Article

Clinical, Bacteriological and Histopathological characteristics of Leprosy in Children in a Tertiary Care Centre

BK Katakam[1], G Narsimha Rao Netha[2], SB Kavitha[3], T Satyasri[4], T Rajeev Singh[5]

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Leprosy is a major public-health problem in developing countries like India. Studies pertaining to proportion and characteristics of pediatric cases are few in number. As these reflect indirectly the effectiveness of programme, this study has been carried out to know the clinical, bacteriological and histopathological characteristics of childhood leprosy cases who came to Dermatology Venerology Leprology (DVL) Outpatient Department of a Tertiary Care Centre in South India over a period of 2 years (from January 2015 to December 2016). This prospective observational study had 26 (23%) pediatric cases of leprosy out of 113 who attended DVL OPD. The age of childhood leprosy cases ranged from 10 to 18 years with mean of 14 years. 76% cases were males and 24% cases were females. 84% cases presented with hypopigmented, anaesthetic patches, 11% cases with grade 3 disabilities and 3% with tingling and numbness of both feet. 80% cases were MB and 20% were PB. 76% of children had multiple skin lesions and 24% had single skin lesion (SSL). Of the 20 multiple skin lesions cases examined histopathologically, 11 showed features of BT, BL and LL with overall concordance of 55% (11/20). Among cases clinically classified as MB, 33 % cases were smear positive. Overall 7/26 (26%) of child cases in our study were bacteriologically positive. Only 19% of patients had history of contact within the household. 8% cases developed LR. Six cases had deformities. The mean duration of symptoms was around six months. All the patients were treated with MDT. The present study though small and may/may not be representative of distribution/profile of leprosy in children at population level indicates the severity of childhood leprosy in society as evidenced by MB nature, high bacteriological positivity and unacceptable disability rate. After in depth studies at community level, strategy need to be improved to ensure early diagnosis and treatment.

Key words: Leprosy, Children, Clinico-pathological correlation, Tertiary Care Centre, Hyderabad, South India

Introduction

Leprosy continues to be one of the major public health problems in many developing countries including India. In India, the National Leprosy Eradication Programme (NLEP) is the centrally sponsored health scheme of the Ministry of

Department of Dermatology, Venereology and Leprosy, Gandhi Medical College, Hyderabad, Telangana - 500003, India.

[1] Dr Bhumesh Kumar Katakam, MD, DVL, DCH, Assistant Professor

[2] Dr G Narsimha Rao Netha, MD, Professor

[3] Dr SB Kavitha, MD, Assistant Professor

[4] Dr T Satyasri, MD, Assistant Professor

[5] Dr T Rajeev Singh, MD, Associate Professor

Correspondence: Dr. Bhumesh Kumar Katakam, **Email**: drbhumesh124@gmail.com

Health and Family Welfare, Government of India. While the NLEP strategies and plans are formulated centrally, the programme is implemented by states and union territories (UTs). The programme is also supported by WHO, ILEP, and few other nongovernmental organizations (NGOs). Due to their efforts, from a prevalence rate of 57.8/10,000 in 1983, India has succeeded with the implementation of MDT in bringing the national prevalence down to "elimination as a public health problem" of less than 1/10,000 in December 2005 and even further down to 0.66/10,000 in 2016 (NLEP 2015-2016). The principle of reducing the load of infection is the cornerstone of leprosy control. Although there is a decline in the prevalence and new case detection rate in the recent years, the curve of children acquiring leprosy have remained high accounting for more than 10% of the total new case load (NLEP 2012-2013). This reflects an active circulation of *M leprae* bacilli in Indian communities building endemicity. Early diagnosis and adequate drug treatment is very important aspect to reduce the load. For this, most of the times, clinical judgment and skin smear examination is adequate. But in some cases, to label only on clinical basis is difficult. So, confirmation of diagnosis in doubtful cases of leprosy is an important indication for histopathological examination. Moreover, correct labeling of paucibacillary and multibacillary cases is a prerequisite to treat them adequately which will reduce the chances of occurrence of resistant cases. So, clinico-pathological correlation of leprosy assumes a pivotal role for early diagnosis and classification of the case for adequate treatment. To offset the problems like resistance, relapse, and bacterial persistence, WHO has suggested different types of multidrug regimens, should be given in full dosages for an adequate period and without interruption in leprosy patients. As profile of leprosy in children in different parts of country may reflect the effectiveness of programme in that area, the present study was carried out to know the clinical, histopathological and bacteriological profile of leprosy in children reporting to a Tertiary Care Centre - part of Medical College Hospital at Hyderabad (Telangana) in South India.

Materials and Methods

All clinically diagnosed cases of Hansen's disease in children up to the age of 18 years in the Department of Dermatology, Venereology and Leprosy, Gandhi Medical College, Hyderabad, Telangana, India during the period of 2 years from January 2015 to December 2016, were studied. Predesigned and pretested proforma was filled after taking informed consent. Privacy and confidentiality were maintained. Detailed history and thorough clinical examination were carried out in each patient. Information was recorded using semi structured questionnaire guidelines by using local vernacular language. Family/ contact history was also noted. A family contact was defined as a person suffering from leprosy in the immediate family; like parents, siblings, and grandparents living in the same house. The cases in the neighborhood were defined as other than family contact and these were people living in the immediate neighborhood. Patients were diagnosed clinically on the basis of IAL consensus classification (IAL 1982). Slit skin smear was performed in each case at the time of diagnosis and 6 monthly thereafter. Skin biopsy was taken in all cases (20) with multiple skin lesions cases and subjected to the histopathological examination (HPE). HPE was not done, if the lesions had on the face and single lesion, because of non-acceptance by the parents. Patients were classified as PB and MB according to WHO guidelines (Skin lesions, number of nerves and demonstration of AFB) and treated with the

respective regimens (WHO 1982). In cases of lepra reactions, type 1 or type 2, patients were treated accordingly with glucocorticoids, non-steroidal anti-inflammatory drugs, zinc, multi-vitamins along with supportive therapy. The patients having disabilities were graded according to WHO guidelines and advised for physiotherapy and appropriate splints like gutter splint, adductor band, and micro cellular rubber shoes (WHO 1988). All the patients were followed up monthly till the completion of the therapy and 6 monthly thereafter.

Results

Of the 113 total leprosy cases reporting to Department of Dermatology, Venereology and Leprosy (DVL), Gandhi Medical College, Hyderabad, 26(23%) were children. The age of childhood leprosy cases ranged from 10 to 18 years with mean of 14 years. 76%(20) cases were males and 24%(6) cases were females. 84%(22) cases presented with hypopigmented, anesthetic patches, 11%(3) cases with deformities and 3%(1) case with tingling and numbness of both feet. 80%(21) cases were multibacillary (MB) and 20%(5) cases were paucibacillary (PB). Out of 80%(21) MB cases 72%(15) were BT (more than 2 nerves), 19%(4) were BL, 4.5%(1) LL and 4.5%(one) was PNL. In 20%(five) PB cases, 80%(4) were BT and 20%(1) was TT.

76%(20) of children had multiple skin lesions and 24%(6) had single skin lesion (SSL). Of the 76%(20) multiple skin lesions cases which were examined histopathologically, 40%(8) showed features of borderline tuberculoid, 10%(2) showed borderline lepromatous and 5%(1) was LL. Concordance between clinical and histological diagnosis was observed in 55%(11/20) cases in which HPE was done. Six cases had grade 2 deformities as per WHO grading (Brandsma & van Brakel 2003) in which five cases had skin and nerve involvement and only nerve involvement seen in one case. Out of 21 multibacillary cases, 33%(7) cases were smear positive. 19%(5) of patients had history of contact within the household. 76%(20) cases had two or more nerve involvements, four cases were single nerve involvement and nerve involvement was not seen in one case which is SSL. Out of 26 cases, 8%(two) cases developed lepra reactions (type 1 in BT, type 2 in BL). The mean duration of symptoms was around six months. All the patients were treated with MDT (multidrug therapy) as per WHO guideline based on age of the patient (If less than 15 years PB or MB MDT child and more than 15 years PB or MB MDT adult).

Discussion

Leprosy remains an important public health and social issue in developing countries, particularly in India. Its presence in childhood is an immense social burden on account of the associated disabilities and widely prevalent misconceptions regarding communicability and treatment potential. Besides, the proportion and profile of leprosy among children may point to possible lacunae showing early/delayed diagnosis which is very relevant in operation of the national programmes aimed at elimination of leprosy from the society. The proportion of children among newly detected cases of leprosy is also a strong indicator of disease transmission in the community.

Leprosy, also known as Hansen's disease, is a chronic, granulomatous, infectious disease that primarily affects the skin and the peripheral nerves. It is a spectral disease in which the clinical and pathological features reflect the cell-mediated immunity of the host, so it needs an appropriate classification because of its varied manifestations. The WHO classification (WHO 1988, 1998) of dividing leprosy into PB (<5 lesions) and MB ($\geq$ 5 lesions), lesions include skin patches

and nerves, is recommended for routine use and either Indian or Ridley-Jopling classification for research workers (Sachdeva et al 2010). Pure neuritic leprosy has been recognized as a separate group in Indian classification of leprosy and its modified version (IAL 1982).

All the pediatric cases of leprosy in our study belonged to the older age group that is above 9 years. Age profile of our cases shows the limitation of our study as very young children may not have reported to our OPD. Previous studies also reported a lesser occurrence in children less than 5 years (Singal et al 2011). A relatively long incubation period of leprosy may be one of the causes and the chances of misdiagnosing indeterminate skin patches as pityriasis alba and tinea versicolor in the initial stages may also lead to delayed diagnosis in some of these cases. However, leprosy can present in infancy as early as 3 weeks (Montestruc & Berdonneau 1954). As our data is not likely to represent the epidemiology of disease at community level, the distribution and profile of leprosy in children Hyderabad should be investigated by proper studies at population level.

A male preponderance (76%) was seen in our study. It is similar with the other studies probably owing to their greater activity and increased opportunities for contact and neglect of female child in the study area (Grover et al 2005).

Diagnosis of leprosy is based on different clinical parameters which involves detailed examination of skin lesions and peripheral nerves. Demonstration of acid-fast bacilli in slit skin smears by Ziehl-Neelsen's staining also aids in diagnosis of leprosy. A reliable diagnosis hinges around a good histopathological diagnosis and demonstration of bacilli in histopathological sections. Leprosy may be excluded if lesions present since birth, black/dark red/depigmented, itches, appears disappears suddenly, painful, scaly or shows any seasonal variation.

There is a considerable burden of leprosy in children. The high percentage of MB cases (80%) observed in our study, evidently indicates the grave nature of the problem of undetected childhood leprosy, continued active transmission and highlights the implications of this on individual patients and the community. The frequency of leprosy in children is an indicator of the level of transmission in community.

The mean duration of symptoms exceeded six months seen in our study, which can be attributed to poor knowledge of leprosy or barriers in access to health care or its utilization.

Though BT was the most common morphologic type in our study, we detected a significant number of older children with BL, LL and PNL. We also observed a high rate of smear positive leprosy (33%) which included all patients with BB, BL and LL as well as BT patients. Smear positive leprosy is considered uncommon in childhood and has been reported in less than 10% cases in many previous studies (Jain et al 2002). Only a few studies have reported higher smear positivity rates ranging from 17·4% to 30% (Grover et al 2005).

In our study 19%(5) of patients had history of contact within the household. The study by Sachdeva et al (2010) also noted positive history of leprosy in neighborhood in 35% of cases. It indicates that familial contacts play a significant role in development of the disease. All the positive contacts were intra familial and no extrafamilial contact history was available which may be due to stigmatic lack of disclosure of the disease in the neighborhood, if any. The risk of a person developing leprosy is four times higher when there is a neighborhood contact and up to 9 times higher when the contact is household

(Montestruc & Berdonneau 1954). This emphasizes the need for periodic screening of leprosy contacts specially the children in the family (van Beers et al 1999). Thus, it is important to take detailed contact history and screen family members whenever possible. This study found that only a small proportion of children with leprosy had history of contact (19%) with leprosy cases. This possibly reflects high endemicity and other undetected sources of transmission.

Out of 80%(21) multibacillary cases, 33%(7) cases were smear positive in our study. Overall 7/26 (26%) of child cases in our study were bacteriologically positive. Bacillary cases are observed in children as well, mostly reported from endemic Northern India (Burman et al 2003).

We observed a 55% (11/20) concordance between clinical and histological diagnosis as compared to 52% reported by Sehgal & Joginder (1989) and 60·6% by Kumar et al (2000). Kumar et al (2000) have also suggested that the non-specific histological features in childhood cases reflect the poor immune system in children, rather than the choice of biopsy site. Others like Nadkarni and Rege (1999) believe that selection of optimum lesion for biopsy might have been responsible for the high rate observed in our series.

Based upon the NLEP criteria, we observed MB leprosy to be more common than PB in children. This is in contrast to most previous studies which have reported pediatric leprosy to be predominantly paucibacillary (Prasad 1998). This difference is most likely due to the use of a different set of criteria for disease classification by previous workers such as the 1988 or 1998 WHO classification. While the 1998 WHO classification included the number of lesions as a criterion (which is different than WHO 1988 classification), neither considered the number of involved nerves as a differentiating factor (WHO 1998). Nevertheless inclusion of the number of involved nerves as a criterion increases the sensitivity of this classification and prevents under treatment of many patients deserving MB-MDT (Mehndiratta et al 2008). In our series too, a significant number of patients with BT leprosy qualified for MB disease due to more than one nerve involvement. Not surprisingly, a large proportion of MB 80% (21) cases were observed amongst children in this study. MB cases are more infectious and can contribute to transmission of the disease in the community. The large proportion of MB cases becomes a matter of concern. Single skin patch was the commonest symptom or sign of leprosy in children (Singal et al 2011).

A suspicion of a possibility of leprosy should arise in any child presenting with skin patches even if sensation is intact, and such cases should be observed for early detection. In incurrence with other studies, this study found a large proportion of children 76%(20) had multiple skin lesions and 24% (6) had SSL and it was on the face. Single hypo pigmented patch on the face in children has high-risk of misdiagnosis, since there are numerous common causes of hypo pigmented patches in children.

Clinical judgment and skin smear examination are required for early diagnosis and adequate treatment to make the patient noninfectious. Neuritic symptoms probably are the earliest symptoms of leprosy before development of skin lesions and that is why, patients of pure neuritic leprosy must be followed up for the long term. Histopathological examination is must only in doubtful cases of leprosy. Correct labeling of paucibacillary and multibacilllary cases is a prerequisite. No multibacilllary case should be

treated as paucibacillary case. Timely diagnosis and adequate treatment of cases with MDT, before nerve damage has occurred, is the most effective way to prevent deformities and disabilities.

Incidence of neuritis and reactions in children were low (8%) in our study in comparison with Jain et al. Prompt and judicious steroid therapy should be instituted in such cases to avoid development of further neurological damage (WHO 1998). 23%(Six) children had deformity. We observed that occurrence of neuritis significantly increases the risk of deformities, especially in older children with MB disease. Occurrence of deformities at such a young age is truly unfortunate and the significance of careful neurological examination at the time of diagnosis and during follow-up needs to be stressed. These findings point to the fact that these childhood leprosy cases were detected late during the course of the disease. Deformity in children is an unfortunate tragedy. Factors that may contribute to deformities in children are the older age, multiple skin and nerve lesions, multibacillary disease, presence of reaction, smear positivity, and delayed diagnosis. The occurrence of deformities at the time of diagnosis reflects the lacunae of the system in early case detection at the field level and referral services. Despite the feared adverse effects of oral steroids in children, we advocate judicious use of steroids in managing active neuritis or impending nerve paresis. Rehabilitative measures such as physiotherapy and corrective surgeries should also be offered to selected patients.

Leprosy continues to be a communicable disease of concern in the post elimination era. Presence of leprosy among children is a performance indicator of the NLEP and has immense moral and economic bearing upon the society in general. The clinical, bacteriological and histopathological characteristics of cases in children, especially the high percentage of MB cases as also observed in Kumar et al (2000) possibly indicates the grave nature of the problem of undetected child leprosy in some areas, continued active transmission either from community or family and highlight implications on individual patients and the community. Our study also highlights the importance of SSS and biopsy as an aid in diagnosis and classification. *M leprae* is the only bacterial agent infects peripheral nerves, resulting nerve function impairment (NFI) and associated deformities and disability that have made leprosy such a feared disease. So, the corner stone for control, prevention of deformities and disability of Leprosy is by preventing nerve function impairment (NFI) by early diagnosis and treatment in all age groups including children.

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