

Clinico-epidemiological Profile of 2000 Leprosy Cases Treated at a Tertiary Care Centre of Rajasthan, India from 2011 to 2020

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This retrospective study has been carried out to understand the clinico-epidemiological profile of leprosy treated at SMS Medical College Hospital, Jaipur a tertiary care center in Rajasthan from January 2011 to December 2020. The records of all patients diagnosed as leprosy at leprosy clinic of tertiary care hospital were collected and analyzed. Among 2000 enrolled patients, 71.7% were males with a male to female ratio of 2.53:1 of the patients (40.5%) were in the age group of 16-30 years, followed by 31-45 years (31.35%), 46-60 years (14.35%), above 60 years (11.65%) and 2.15% patients were in less than 15 years age group. Most common clinical presentation was erythematous plaques, seen in 62.7% patients, followed by patch 22.05%, nodule and plaque 4.85%, nodule and ulcer 1.35% and patch with ulcer 1.25%. A total of 9.5% patients had grade 2 disability; claw hand was most common (8.5%) followed by amputation (1%). History of contact was seen in 1% of patients. Borderline tuberculoid leprosy was the most common form of leprosy accounting for 25.2% patients followed by borderline-borderline leprosy (23.2%); lepromatous leprosy (18.2%); borderline lepromatous leprosy (13.3%) and tuberculoid leprosy (7%). Other variants were indeterminate leprosy constituting 5.8%; De-novo ENL 4%; pure neuritic leprosy (4%) and histoid leprosy (1.45%). Overall, more than half of cases belonged to multibacillary types. A total of 27.4% of patients reported leprosy reactions, in which Type 1 lepra reaction was observed in 5.3% and Type 2 lepra reaction was seen in 22.1% of patients. Eighty patients (4%) presented with De novo ENL without any previous history of leprosy or its treatment. Twenty patients received second line drugs and extended MDT due to lack of response to MDT MB. More than 50% (110/170) claw hand disabilities occurred during therapy indicating problems about timely reporting of complications like neuritis and their management. This data though may not exactly match with leprosy at community level, it would help in understanding the profile of leprosy cases in this area and is relevant for planning future interventions to eradicate leprosy.

Key words : Leprosy, De-novo ENL, MB, India, Tertiary Care Centre, Disabilities

Introduction

Leprosy or Hansen's disease (HD) is an ancient bacterial disease that, although curable, continues to be a significant health problem in many parts of the world. HD results from infection

with the *Mycobacterium leprae*, which produces a chronic infection in humans that affects not only peripheral nerves and skin but also other sites such as reticulo-endothelial system, eyes, mucous membranes, bones, and testes; produces

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a spectrum of clinical phenotypes (Walker & Lockwood 2007, Graham et al 2010, Polycarpou et al 2013).

Leprosy is a great imitator of all diseases so its classification is complex and may include clinical, histopathological, microbiological, and immunological features as proposed by Ridley and Jopling (1966), in this classification on one extreme of the spectrum lies the polar tuberculoid leprosy form (TT) with low bacterial load, predominant cell-mediated immunity, and low or absent specific antibodies while on other side of spectrum, polar lepromatous form (LL) with higher bacterial load and respond to infection with high production of antibodies and lower or absent *M. leprae*-specific cell-mediated immunity. Between the polar forms, lies the immunologically and clinically unstable forms known as borderline tuberculoid (BT), mid borderline or borderline borderline (BB), and borderline lepromatous (BL) (Ridley & Jopling 1966). Indian classification (IAL 1982) has many commonalities with Ridley & Jopling classification also deals with pure neuritic leprosy which is prevalent in our country.

Importantly, during the disease process, a significant proportion of patients develop acute inflammatory complications, known as leprosy or lepra reactions, classified as type 1 and 2; defined by the host immune response to *Mycobacterium leprae* (WHO 2012): Type 1 reactions are characterized by the appearance of new skin lesions in the form of erythematous plaques and or increased erythema and infiltration of existing lesions, peripheral edema and neuritis. Type 2 reactions are the most frequent, also known as erythema nodosum leprosum (ENL), it is characterized by recurrent crops of erythematous and painful subcutaneous nodules, fever, joint pain, malaise and sometimes neuritis (Mizoguti et al 2015).

As per the criteria, India as whole achieved leprosy elimination in December 2005 with prevalence rate <0.95/10,000 population (Sengupta 2018). Two states Bihar and Chhattisgarh were yet to attain elimination (Desikan 2012). A case of leprosy was defined as a person showing one or more of the following features: hypopigmented or erythematous skin lesions with definite loss of sensation, involvement of the peripheral nerves, as demonstrated by definite thickening with loss of sensation and skin smear positive for acid-fast bacilli. As the study is retrospective so we have used the clinical classification system of leprosy suggested by Indian Association of Leprologists (IAL 1982) and World Health Organization (WHO 1988, WHO 2005). WHO disability grading was used to grade disability in these patients (Brandsma & van Brakel 2003).

This retrospective study was conducted in our tertiary care institution of Rajasthan, which has been seeing leprosy cases in this post-elimination period. We reviewed the last ten-year data to study the clinical and epidemiological profile of leprosy coming for treatment and management of complications associated with leprosy.

Materials and Methods

This is a hospital based retrospective study done in the outpatient department of Dermatology, Venereology and Leprosy Department, SMS Medical College Jaipur, Rajasthan, India. The data of all the previous ten years (January 2011 to December 2020) leprosy cases attended our Centre were collected from leprosy clinic records and master chart prepared. Ethical approval from institutional ethics committee was obtained (letter number 482/MC/EC/2023 dated 09/02/2024). It includes, age, sex, clinical and histopathological diagnosis, initial presentation, history of contact, duration of symptoms, neuritis, type of reaction, BI, MI and treatment history. The diagnosis was based on WHO (1988) and IAL criteria (IAL 1982). WHO 1988 classification system was used

to classify the cases into paucibacillary (PB) and multibacillary (MB) types for treatment purposes (WHO 1988, WHO 2012).

Physical disability in leprosy is defined by the WHO in three categories. WHO classification of leprosy disabilities in three grades was used: Grade 0 – absence of disability (no anesthesia) and no visible damage or deformities on eyes, hands and feet; Grade 1 – loss of protective sensibility in the eyes, hands or feet, but no visible damage or deformities; and Grade 2 – presence of deformities or visible damage to the eyes (lagophthalmos and/or ectropion, trichiasis, corneal opacity, visual acuity less than 0.1 or difficulty counting fingers at 6 meters), visible damage on hands or feet (hand with ulcerations and/or traumatic, resorption, claw, fallen hand, ulcers; feet with trophic and/or traumatic injuries, resorption, claw, foot drop, ulcers, ankle contracture) (Brandsma & Vim Brakel 2003, WHO 2005).

Results

A total of 2000 leprosy cases were enrolled in the study. There was a significant males

predominance (n=1434) (71.7%) with a male to female ratio of 2.53:1. Most of the patients (n=810) (40.5%) were in the age group of 16 to 30 years, followed by 627 (31.35%) patients in 31 to 45 years age group; 287(14.35%) patients were in 46 to 60 years age group; 233 (11.65%) patients in more than 60 years age group; 43(2.15%) patients were in less than 15 years age group (Table 1).

Most of the patients presented with erythematous plaques, observed in 62.7%(n=1254) patients, followed by patch 22.05%(n=441), nodule and plaque 4.85%(n=97), nodule and ulcer 1.35%(n=27) and patch and ulcer 1.25%(n=25). According to Ridley-Jopling classification system borderline tuberculoid leprosy (BT) was the commonest form accounting for 504(25.2%) patients followed by borderline-borderline (BB) leprosy in 464 (23.2%) patients; lepromatous leprosy (LL) seen in 364(18.2%); borderline lepromatous (BL) leprosy in 226(13.3%) and tuberculoid (TT) leprosy seen in 215 patients (10.7%). Other variants were Indeterminate leprosy constituting 5.8% (n=117), de-novo ENL

Table 1 : Demographic profile of cases.

PARAMETER	TOTAL
Sex	
Male	1434
Female	566
Age Group (Years)	
0-15	43
16-30	810
31-45	627
46-60	287
>61	233
Residence	
Rural	1016
Urban	984

Table 2 : Clinical profile of cases included in the study.

PARAMETER	NO. OF PATIENTS
Type of Leprosy (WHO 1988 & IAL Classification 1982)	
BB	464
BT	504
BL	226
LL	365
TT	215
Pure Neuritic	80
Indeterminate	117
Initial presentation	
Patch	441
Nodule and plaques	97
Patch with ulcer	25
Nodule with ulcer	27
Plaque	1254
No visible skin lesion	156
History of treatment	
New	1568
Old	266
Defaulters	146
Suspected resistance (Already on 2nd line drugs with poor response to MDT)	20
Source of infection	
Unknown	1980
Father	20

Table 3 : Occurrence of lepra reactions.

Type of Lepra reaction	Before treatment	During treatment	During follow up	Total
Type 1	15	91	0	106
Type 2	80	362	0	442
No reaction	-	-	-	1558

Table 4 : Types of deformities/ disabilities observed in the study population.

Type of Deformity	Before treatment	During treatment	During follow up	Total
Claw hand	50	110	10	170
Amputation	20	0	0	20

4% (n=80), pure neuritic leprosy (IAL 1982) in 4% (n=80) and histoid leprosy in 1.45% (n=29) patients (Table 2). Among 2000 patients 1% (n=20) of patients had a history of contact with a case of leprosy (Table 2).

A total of 548 (27.4%) patients experienced lepra reactions (Table 3). Type 1 lepra reaction was observed in 5.3% (n=106) and type 2 lepra reactions seen in 22.1% (n=442) of patients. Eighty patients (4%) presented with ENL without any previous history of leprosy or its treatment. A total of 190 (9.5%) patients presented with grade 2 disability, among which claw hand was commonest seen in 8.5% (n=170) followed by amputation, seen in 1% (n=20) cases (Table 4).

Discussion

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae* (Walker & Lockwood 2007).

Globally, number of new cases of leprosy dropped sharply by 90% during the period of 1985-2005 (WHO 2005), there was a rapid fall of cases detected in India, a country that still contributes more than 50% of new cases in the world annually (WHO 2022). This is attributable to ongoing National Leprosy Eradication Programme of India. But new cases are continuing to occur indicating inadequate interruption in transmission.

The present study included 2000 patients, 71.7% were males with a male to female ratio of 2.53:1. Higher incidence in male patients may be due to higher chances of exposure among them or males getting preferential access to services. The maximum number of patients were in the reproductive age group, mostly, 16-30 years age group (n=810, 40.5%) followed by 31-45 years age group (n=627, 31.35%). These results were in accordance with study of Gupta et al (2019), in their study 24.35% belonged to 30 to 39 years age group followed by 20-29 years 23.49%, this age group is more important from social point of view

as it is more vulnerable to acquire or transmit the infection due to occupational and outdoor activities. Most patients in our study were in borderline spectrum [BB (23.2%), BT (25.2), BL (11.3%)] in comparison to polar spectrum {LL (18.25%), TT(10.75)}. These results are consistent with study by Gupta et al (2019) [BT (29.41%), LL(21%)]. However, Adil et al (2018) reported BL leprosy as commonest form seen in 38.2% of their subjects [BT=21.3%, BL=38.2%, LL=28%]. Most patients have multibacillary type of leprosy according to WHO classification (n=1570, 78.5%) while only 21.5% (n=430) have paucibacillary leprosy, similarly Gupta et al (2019) and Adil et al (2018) reported [MB=80.17% PB=19.83%] and [MB=73.3%, PB=26.7%] respectively. Thakkar & Patel (2014) reported almost equal presentation [MB=52.8%, PB=47.2%] which is not much different from our data.

According to report of WHO leprosy is endemic in several states and union territories of India, with the annual case detection rate of 4.56 per 100,000 population (WHO 2022). The prevalence rate of leprosy was 0.4 per 10,000 population in the country. Of the new cases detected during 2020-2021, 58.1% were multibacillary, 39% were women, 5.8% were children less than 14 years of age, and 2.41% had visible deformities. The rate of visible deformities was 1.1 per million population (WHO 2022). Disability/ deformity rate (9.5%) in our study population was thus much higher than national average, reasons for this need to be properly analysed. Major proportion of claw deformity occurred during the treatment, indicating the need to closely supervise the treatment and treat neuritis early and effectively.

Lepra reactions were noted in 27.4% of patients (n=548) with type 2 reaction being more common (n=442, 22.1%) than type 1 reaction (n=106, 5.3%). These results are consistent with Gupta et al (2019) as 34.9 % patients were in reactions.

Other studies show lower incidence of reaction Thakkar & Patel (2014) observed reaction in only 9.6% patients [6.4% with type 2 and 3.2% with type 1]. Most of the patients (n=453) developed reactions after initiation of MDT, however, 95 cases presented with de-novo reactions.

Source of infection was reported only in 1% patients (n=20). This is attributed to long incubation period, as contact tracing with the source is easier in diseases who have very short incubation period. This observation has disagreement with other studies such as Lustosa et al (2011) reported 38.3% of respondents live/have lived with someone affected by leprosy. Population density in this geographical area is very low and socioeconomical status of studied population is different from other studies. Nearly half of cases had given urban address, whether they had temporarily come to cities for treatment or work should be investigated. It is a fact that overcrowding is helpful in the transmission of infectious diseases. The prevention of deformities in leprosy is utmost important. Rathod et al (2020) reported 254 deformities, 168 (66.14%) deformities at the moment of diagnosis, 20 (7.87%) deformities occurred during the follow up phase. Of all patients in their study group, 21.25% had Grade 1 deformity and 6.31% had Grade 2 or more severe deformity. Deformities of hand were most common in 44.48%, followed by feet 39.76%, and face 15.74% respectively (Rathod et al 2020). Similarly in our study we observed 190 deformities, claw hand was commonest observed in 170 patients, 50 at the time of diagnosis, 110 during treatment and 10 during follow up. Amputation of digits seen in cases at time of diagnosis, however, none of the cases reported amputation of digits during or after the treatment.

In conclusion, the borderline tuberculoid is the most common form of leprosy observed at our leprosy clinic. Most of these cases were

multibacillary with unacceptably high deformity rates, mostly occurring during the course of treatment. The new cases of leprosy are coming with deformities and lepra reactions de novo in the geographic areas where leprosy was eliminated as public health problem (less than 1/10,000) in December 2005. Many of the cases are still requiring extended MDT-MB and addition of another drug as new lesions may still be developing and Morphological indices (MI) remaining persistently high. It gives the impression that the present strategies are inadequate to control or reduce the transmission of infection and burden of leprosy in society. To achieve eradication it requires an intensive approach in detection of new cases, prompt and adequate treatment of cases as well as early and proper management of neuritis so that the disabilities can be prevented.

As this study was retrospective it has limitations like we could not have baseline morphological index of the cases, other tests could not be done to assess the immunological status and gene sequencing of bacilli to find out the drug resistance could not be done. Community based studies to understand the dynamics of transmission in catchment area of our institution and measures to ensure early detection of disease / complications deserve top priority.

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