Original Research Article

A Clinical study of Hansen's Disease and Histopathological Correlation from a Tertiary Care Centre in East India

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International Archives of Integrated Medicine, Vol. 10, Issue 2, February, 2023.
Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 6-2-2023 **Accepted on:** 19-2-2023
Source of support: Nil **Conflict of interest:** None declared.

How to cite this article: Rajesh Sinha, Pinki Kumari, U K Pallavi, Bipin Kumar. A Clinical study of Hansen's Disease and Histopathological Correlation from a Tertiary Care Centre in East India. IAIM, 2023; 10(2): 28-34.

Abstract

Background: Leprosy or Hansen's disease caused by Mycobacterium leprae is a chronic granulomatous disease characterized by hypoesthetic skin lesions and nerve involvement. The objective of the study was to find clinicohistopathological correlation of Hansen's disease diagnosed at a tertiary care centre of eastern India.

Material and Methods: Hospital based retrospective study was conducted that included cases of leprosy diagnosed clinically and examined for histopathology at Indira Gandhi Institute of Medical Sciences, Patna from January 2021 to December 2021. Clinical diagnosis was correlated with that of histopathological diagnosis.

Result: From this study, it was observed that, the commonest age group affected by leprosy was 20 to 40 years, males were more commonly affected than females (M:F = 1.83: 1) and commonest clinically diagnosed spectrum was Tuberculoid leprosy (TT) (48.03%). It was observed that there was complete agreement between clinical diagnosis and histopathological diagnosis in 84.3% cases and disagreement was observed in 15.7% cases.

Conclusion: Combining clinical, and histopathological finding of leprosy is essential for accurate diagnosis and thus proper treatment of the patient and prevention of complications.

Key words

Hansen's disease, Histopathology, Ridley-Jopling (RJ) Classification.

Introduction

Hansen's Disease or Leprosy is a chronic infectious disease caused by *Mycobacterium leprae.* It usually affects the skin and peripheral nerves. It can also affect muscles, eyes, bones, testes, and other internal organs [1]. Leprosy presents with variety of skin lesions in the spectrum of disease in relation to host immunity, which plays a pivotal role [2]. Lesions of lepromatous leprosy are poorly defined with mild hypopigmentation or erythematous papules and nodules. If untreated, dermal infiltration and thickening gives rise to the "leonine facies." Infiltration to nasal structures results in septal perforation and destruction of the anteriornasal spine leading to saddle nose deformity [3]. Leprosy is the best example of a disease showing an immunopathologic spectrum where by host immune reaction to the infective agent ranges from apparently none to marked, with a consequent range of clinicopathologic manifestations. The World Health Organization (WHO) has classified leprosy in two groups, paucibacillary (PB) and multibacillary (MB), depending upon the number of skin lesions, nerves involved and acid-fast bacilli (AFB) positivity of the skin smear [6]. In 1982, the PB group included all polar tuberculoid (TT), borderline tuberculoid (BT) and indeterminate (I) cases diagnosed clinically or histopathologically with a BI of 2 or less than 2 on the Ridley scale [4]. The MB group consists of polar lepromatous (LL), borderline lepromatous (BL) and mid-borderline (BB) patients. In1988, this was modified again and all smear positive patients were included in the MB group for treatment with multidrug therapy (MDT) [5]. Clinical classification gives recognition only to gross appearances of the lesions, while the parameters used for the histopathological classification are well defined, precise and also take into account the immunological manifestations which enable it to successfully bridge the pitfalls in leprosy diagnosis. Histopathology provides confirmatory information for suspect cases which can be missed in clinical practice or epidemiological studies and helps in exact typing. Histology also gives indication of progression and regression of disease under treatment [2, 10]. Ridley and Joplin were the first to suggest a subdivision of leprosy on an immunological basis into five types; tuberculoid (TT), borderline tuberculoid (BT), midborderline (BB), borderline lepromatous (BL) & lepromatous (LL) [7]. Later they further developed this idea and correlated clinical and bacteriological findings in each group with respective immunological and histological findings [8]. When the host immunity is good, it limits bacterial multiplication and the disease presents with tuberculoid (TT) and borderline tuberculoid (BT) type of leprosy. When host immunity is weak, it does not control bacilli multiplication and the disease presents with Borderline leprosy (BB), Borderline lepromatous (BL) or Lepromatous leprosy (LL) [9]. Clinical judgment and skin smear examination is essential for early diagnosis and adequate treatment to make the patient noninfectious. But in some early and borderline cases of leprosy, it is difficult to label only on clinical basis. So, histopathological examination is a must for confirmation of diagnosis in doubtful cases of leprosy. Moreover, correct labeling of paucibacillary and multibacilllary cases is a prerequisite. No multibacilllary case should be treated as paucibacillary case. So, clinicohistopathological correlation of leprosy cases is important for early diagnosis and for proper labeling of a case [10].

Few studies have been conducted where the clinical impression of subtype of leprosy was compared with the histopathological subtype. The aim of the present study was to evaluate the concordance rates between the clinical and the histopathological diagnosis in leprosy and also to compare the results with the available literature.

Materials and methods

This retrospective study was conducted in the in Department of Skin & VD at Indira Gandhi Institute of Medical Sciences Patna, Bihar, India. All cases of leprosy diagnosed clinically and on

skin biopsy specimen in the department from January 2021 to December 2021 were included in the study. Informed consent forms were taken from all study participants. Study was started after institutional ethical clearance. A total of 105 clinically suspected untreated patients irrespective of their age, sex, socioeconomic status and occupation were included. Previously diagnosed cases and cases already taking treatment were excluded. The clinical diagnosis was done by consultant in dermatology OPD. History of patients was recorded. Clinical examination of skin lesions included the type, number, size, site, margins, Erythema, dryness, loss of hair and sensation and presence of neural involvement. All the cutaneous and peripheral nerves were palpated and findings like number, size, nodularity, abscess formation, tenderness and sensory or motor complaints were noted. The Hansen's disease patients were classified according to Ridley-Jopling (RJ Scale) into tuberculoid (TT), borderline tuberculoid (BT), mid-borderline (BB), borderline lepromatous (BL), and lepromatous (LL) types. Apart from RJ Scale indeterminate leprosy (IL) category was also included for classification of cases Demographic data, clinical diagnosis and bacillary index were retrieved from the clinical case report and histopathology report form. Samples for punch biopsy of 4 mm size were collected according to standard procedures. The modified Ziehl Neelsen (ZN) and Fite- Faraco (FF) stain for demonstration of AFB were used in all cases. Clinical diagnosis was correlated with that of histopathological diagnosis.

Results

During the study period of one year from January 2021 to December 2021, 105 clinically diagnosed untreated cases of Hansen's disease and their skin biopsy specimens were reviewed. The total disease duration ranged from 2 days to 11 years. Most patients (73.33%) had disease duration of less than 1 year and 3 (2%) case were having disease for more than 4 years. Only 7 patients (4.6%) had family history of leprosy. Only 2 cases (2.6%) were less than 12 years of age (pediatric age group). Commonest type of skin lesion in our study was hypopigmented macular lesions in 109 cases (72.6%) followed by erythematous plaque and nodule. Most common site was upper limb 118 cases (79%), followed by trunk and lower limb. Trophic ulcers were present in only 7 cases (4.5%). Ocular involvement was predominantly seen in Lepromatous type with 39% having ocular lesions. Ocular manifestations included brow and eyelash madarosis in 23%, Lagophthalmos 7.2 %, Exposure Keratitis and corneal opacity 6.2% and chronic dacroyocystitis 2% of cases. Cataractous changes in lens were seen in 19% of the patients, due to senile lens changes in patients of older age group. Most commonly affected peripheral nerve was the Ulnar nerve (61.3%), followed by the common peroneal nerve (46.6%) and the radial cutaneous nerve (38.3). Other nerves were involved in less than 18 % of the cases. The sensory function of the nerve was affected in a patients (84.7%), whereas motor damage was seen in 28.6 %. Clawing of hand was noted in 11 patients and foot drop was noted in 4 patients. Histopathological features of leprosy were observed only in biopsies of 102 cases (Table-2). 3 cases showed no evidence of leprosy histologically. Out of 102 cases were 66 were males and 36 were females with male to female ratio of 1.83: 1. There ages ranged from 8 to 78 years with majority of them in the age group of 20-30 years, followed by 30-40 years (**Table - 1**). Most common lesion noted were hypopigmented plaques (64% of cases), followed by macules (28% of cases) and nodules (8% of cases). All cases of indeterminate leprosy and most of the cases of tuberculoid leprosy (48 out of 52 cases) had single lesions. In borderline leprosy only 2 cases had lesion less than 6. In borderline lepromatous and lepromatous leprosy there was full correlation between RJ classification and WHO classification.

Table – 2 and **Figure - 1** showed clinico histopathological correlation of various types of leprosy. On the basis of RJ classification maximum number of cases were of TT leprosy (42 cases, 41.1%), followed by LL (19 cases,

18.62%). Least number of cases were of histoid leprosy (2 cases, 1.96%)

Table - 1: Age distribution.

Age group (Years)	No. of patients
1-10	12
10-20	22
30-40	35
40-50	19
50-60	9
60-70	3
70-80	2

Full concordance between clinical and histopathological examination was noted in histoid leprosy. Least concordance was seen in indeterminate leprosy in which 50% of cases diagnosed clinically as indeterminate leprosy failed to demonstrate any conclusive evidence of leprosy histopathologically.

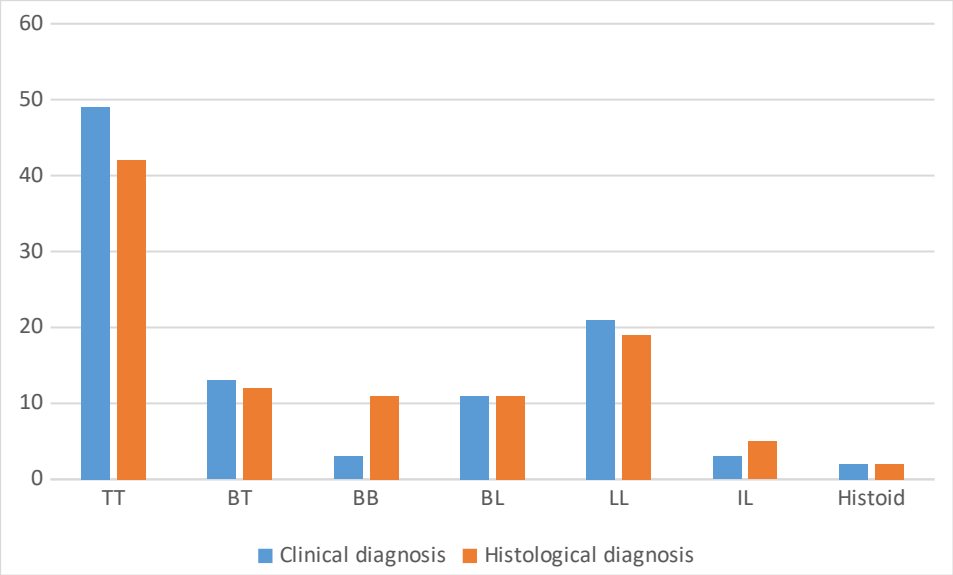
Discussion

Hansen's disease or leprosy is a chronic granulomatous infection caused by Mycobacterium tuberculosis, manifests commonly with hypopigmented and hypoesthetic skin lesions. In our study, leprosy was slightly more common in males than in females with male to female ratio of 1.83:1. This findings correlates with the findings of other studies showing M: F ratio of 1.5-2:1 [11-14]. Increased male to female ratio may be due to various socio-cultural factors like low status of women, strong traditional belief and illiteracy and poor knowledge leading to under reporting of leprosy in females and increased chances of exposure due to work related mobility in males.

Table - 2: Clinical and histopathological spectrum of leprosy cases.

Clinical diagnosis	Number	Percentage	Histological diagnosis	Number	Percentage
TT	49	48.03	TT	42	41.11
BT	13	12.74	BT	12	11.76
BB	3	2.94	BB	11	10.78
BL	11	10.78	BL	11	10.78
LL	21	20.58	LL	19	18.62
IL	3	2.94	IL	5	4.40
Histoid	2	1.96	Histoid	2	1.96
Total	102	100	**Total**	102	100

Figure - 1: Chart showing Clinico-Histopathological correlation of Leprosy.



The most common age group affected was between 30-40 years in our study. Tiwari, et al. reported commonest age group affected being 20 – 40 age group [15]. Another study reported commonest age group being affected by leprosy to be 31- 50 years [16]. Our result was in concordance with these studies. The age of onset of the disease varies in different countries and different areas within the same country [17]. The youngest patient affected in our study was 8 years old and eldest patient was 78 years. This shows that no age group is immune to this disease. Leprosy have been reported in infant of 9 months [18].

Despite having such an accurate classification, there are diversities between the clinical and histopathological features. Clinical spectrum of leprosy in the present study revealed maximum cases to be - TT (41.11%), followed by LL (18.62%). Though rare, two cases of Histoid leprosy was found in our study (1.96%). Fite-Faraco stain for lepra bacilli in histopathology was positive in 98% cases of LL type or MB type of leprosy. Positivity in clinically diagnosed pausbacilliary was in only 3 percent. But this has clinical implication as these patients are shifted to multiballiciary regime. Slit-skin smear test is an intial screening tool for leprosy. However, this test has high specificity but low sensitivity and in our study 67% of leprosy cases were smear negative. Bacillary index was highest in LL types and low in BT types. It also shows the variation of cell mediated immunity and bacillary load as the spectrum of leprosy moves from tuberculoid pole to lepromatous pole.

Lepra reactions occur in different types of leprosy. They are important cause of morbidity in these patients. Erythema nodosum leprosum also known as type 2 lepra reaction is an immunological complication affecting approximately 50% of the patients with LL and 10% of BB. In the present study, three patients of LL presented with ENL after completion of MDT. Knowledge of the different clinical manifestations of ENL is useful for the early diagnosis, successful management and is helpful in preventing of permanent disabilities [19].

The Ridley and Joplin classification (RJ classification) determines the position of patient in the disease spectrum based on parameters clinical bacteriological, histological and immunological features. It classifies leprosy into a five types namely tuberculoid (TT), borderline tuberculoid (BT), borderline borderline (BB), borderline lepromatous (BB) and lepromatous (LL). It does not include indeterminate and pure-neuritic type and histoid leprosy. The polar type of TT and LL are immunologically stable whereas borderline forms are unstable [20]. The histological variants as per RJ Classification noted in our stuty were BT (41.11%), BL (18.62%), TT (11.76%), BB (10.78%), and LL (10.78%). Histoid leprosy was found in 2 cases (1.96%). Indeterminate type was reported in 5 cases (4.90 %).

In the present study, the histopathological characteristics were consistent with the clinical diagnosis in 86 cases out of 102 cases (84.3%). Clinico-pathological correlation reported in various study from as low as 53.55 and as high as 89.00 [21, 22]. The better clinico-histological correlation was seen for the polar spectra of leprosy. Since borderline lesions are clinically and immunologically unstable, clinico-histological correlation was not seen to be as notable for cases clinically diagnosed as BT or BL. In our study, Indeterminate leprosy did not correlate with the clinical diagnosis. This could be because IL is an early and transitory stage of leprosy found in persons, whose immunological status is yet to be determined. It may also heal by itself without treatment. it may develop to one of the other determinate forms of the disease. The clinical findings are mainly non-specific in the form of xerosis of vague hypopigmentation without anesthesia. Histopathology continues to be viewed as the gold standard for the diagnosis; particularly in early stage of Hansen's disease. The histopathological features in Hansen's disease provide complete tissue details for precise diagnosis. The biopsy features point to the

accurate tissue response while the clinical features show only the gross morphology of the lesions caused by the underlying pathology. It also provides details on the nature of host response by which one can expect the likely course of the disease and the likely response to multidrug therapy [23].

Conclusion

Leprosy elimination has been declared in India in 2005. In spite of that leprosy cases are not infrequent in this region. A leprosy patient presents in different clinicopathological forms, depending on the host immune status. Early diagnosis of leprosy is important to prevent nerve damage and permanent disabilities. Histopathological examination of skin lesions is leprosy is important for accurately classifying the type of leprosy for treatment point of view. Also clinical diagnosis may be difficult in early cases, in which histopathology helps in confirming the diagnosis. Our study reveals that clinicohistopathological correlation is better in polar forms of leprosy. Many cases who fall under paucibacillary cases turns out to be case of multibacillary and histopathology serves as an important tool for diagnosing such cases and therefore planning for adequate treatment.

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