

## Original Research Article

# A study of clinico pathological spectral correlation in multibacillary leprosy

Anita Sanker<sup>1</sup>, P. S. Mathew<sup>2</sup>, G. Nandakumar<sup>3</sup>, Sandhya George<sup>1</sup>, V. G. Binesh<sup>4\*</sup>

<sup>1</sup>Department of Dermatology and Venereology, Government Medical college Manjeri, Malappuram, Kerala, India

<sup>2</sup>Department of Dermatology and Venereology, Century hospital, Mulakkuzha, Alappuzha, Kerala, India

<sup>3</sup>Department of Pathology, Government Medical college, Thiruvananthapuram Kerala, India

<sup>4</sup>Department of Dermatology and Venereology, Government Medical college, Thrissur, Kerala, India

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### \*Correspondence:

Dr. V. G. Binesh,

E-mail: [drbineshvg@gmail.com](mailto:drbineshvg@gmail.com)

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## ABSTRACT

**Background:** Leprosy expresses itself in different clinico-pathological forms, depending on the immune status of the host. The diagnosis and classification of leprosy have traditionally been based on the clinical examination with additional information from skin smears and histopathological examination. Very often, disparities between clinical and histopathological findings are observed. This study was aimed to correlate between clinical and histopathological spectral correlation of newly diagnosed multibacillary leprosy cases for a period of 1 year.

**Methods:** The study was conducted in the Department of Dermatology and Venereology, Government Medical College, Thiruvananthapuram, for a period of 1 year. All newly diagnosed multibacillary leprosy cases were included.

**Results:** A total of 40 patients with clinically diagnosed multi bacillary leprosy were studied. Maximum numbers of leprosy patients studied were in the age group of 40-49 years. Maximum clinical and histopathological correlation was found in 75% (9/12) in lepromatous leprosy and least correlation of 44.44% was noted in borderline lepromatous (4/9).

**Conclusions:** In this study maximal clinico-histopathological spectral correlation was found in lepromatous spectrum. The percentage of correlation was considerably less in all the other groups.

**Keywords:** Borderline, Histopathological correlation, Lepromatous, Multibacillary leprosy, Tuberculoid

## INTRODUCTION

Leprosy is a chronic disease caused by Mycobacterium leprae affecting the peripheral nervous system, the skin and certain other tissues.<sup>1,2</sup> The disease primarily affects the peripheral nerves and Mycobacterium leprae is the only bacterium known to infect peripheral nerves.<sup>3,4</sup> The clinical system of classification for the purpose of treatment by WHO includes the use of number of skin lesions and nerves involved as the basis for grouping leprosy patients into multibacillary (MB) and

paucibacillary (PB) leprosy.<sup>5</sup> In India, nearly 20% of the cases belong to the multibacillary group and the remaining 80% to the paucibacillary group. The diagnosis and classification of leprosy have traditionally been based on the clinical examination, with additional information from skin smears and histopathological examination.<sup>5,6</sup> Clinical diagnosis of leprosy lesions in the early stages is difficult even for an experienced physician. The study of pathological changes in leprosy lesions has contributed a great deal to the understanding of the disease.<sup>7,8</sup>

Clinico-pathological correlative studies have provided further insights into the disease, and its varied manifestations and complications.<sup>9,10</sup> Very often, disparities between clinical and histopathological findings were observed. This study was aimed to study the clinical and histopathological spectral correlation in multibacillary leprosy.

Objective was to study the clinical and histopathological spectral correlation in Multibacillary Leprosy among the newly registered leprosy cases in the Department of Dermatology and Venereology, Government Medical College Thiruvananthapuram, Kerala for a period of 1 year from September 2003 to August 2004. For classification to spectral groups, a combination of the IAL and Ridley and Jopling classifications has been adopted.

## METHODS

This is a descriptive cross-sectional study conducted in the Department of Dermatology and Venereology, Government Medical College, Thiruvananthapuram for a period of 1 year from September 2003 to August 2004 after receiving clearance from the Institutional Ethical Committee.

The study included 40 newly diagnosed multibacillary leprosy patients in the Department of Dermatology during that period. Consent from the patient was taken before including in the study. Children below 12 years, pure neuritic cases and relapse cases were excluded. A detailed history about the presenting complaints with duration was recorded with special emphasis on the type of lesions, neurological symptoms and symptoms suggestive of lepra reaction. A dermatological examination with special reference to leprosy was done in all cases. The types of skin lesions, their borders, surface changes and distribution were noted and various modalities of sensations over the lesions were examined. The peripheral nerves were palpated for any thickening, nodulation, tenderness or abscess formation. Earlobe smear and slit skin smears from minimum of two lesional sites and one from apparently normal looking skin were taken and the bacteriological and morphological indices were recorded. Compiling the clinical and bacteriological findings, the clinical spectrum of each case was identified. Skin biopsies were performed in all the cases from a representative skin lesion under local anesthesia and sent for histopathological examination, after getting the consent of the patients. Skin biopsy specimens fixed in 10% formalin were processed and multiple sections were taken. The sections were stained with Hematoxylin and Eosin. Special stain for AFB with Fite-Faraco stain was also done.

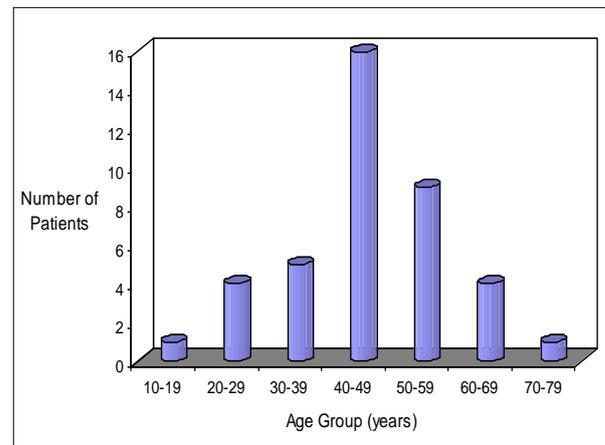
Depending on epidermal and dermal changes, type of granuloma, characteristics of infiltrate and AFB staining characteristics, a histopathological spectral typing was done.

In this study, the classification proposed by Ridley and Jopling (1966) as well as the IAL (1981) classification were combined and adopted subdividing leprosy to the following groups: Tuberculoid leprosy, Borderline tuberculoid leprosy, Mid Borderline leprosy, Borderline lepromatous leprosy, Lepromatous leprosy and Indeterminate. The extent of correlation between the clinical spectrum and histopathological spectrum were assessed

Descriptive statistics were produced for demographic, clinical, and laboratory characteristics for this study sample of patients. Quantitative variables and qualitative variables were analysed and summarized as counts and percentages. Data analysis was performed using Microsoft Excel.

## RESULTS

Study included patients from 19 years to 70 years. Maximum number of patients (16) belonged to the age group of 40-49 years (40%) (Figure 1). Number and type of skin lesions, symmetry of skin lesions, diffuse infiltrations of skin, leonine facies, ear lobe infiltrations and satellite lesions were the clinical findings to arrive on clinical spectrum.



**Figure 1: Age wise distribution of patients.**

Nerve involvement was noticed in all the cases. Nineteen patients (47.5%) were smear negative. Compiling all these, clinical spectral classification was done and it was observed that twelve cases (30%) were of the lepromatous type. Ten cases (25%) were observed to be mid borderline, nine patients each (22.50%) were of the borderline tuberculoid and borderline lepromatous types (Figure 2).

Major epidermal change noted among the patients under study was atrophy, which was noted in 28 patients (70%). Location and content of granuloma were the additional factors contributed for histopathological spectral classification. Twenty-two cases (55%) were found to be positive for AFB by modified Fite-Faraco method. They

were seen as single scattered rods and also as clumps inside the macrophages. Histopathological examination from the skin lesions revealed that eight cases each (20%) were lepromatous, borderline tuberculoid, tuberculoid, borderline lepromatous types. Indeterminate leprosy was diagnosed in seven cases (17.50%). One case (2.5%) belonged to tuberculoid type (Figure 3).

Among the 40 cases of multibacillary leprosy diagnosed clinically, 23 patients (57.50%) showed histopathology consistent with the clinical diagnosis. Among the nine borderline tuberculoid (BT) leprosy cases, histopathological spectrum was consistent with the clinical spectrum in 5 cases (55.56%). Histopathological diagnosis of tuberculoid (TT) was made in one case (11.10%) and indeterminate leprosy in 3 cases (33.33%). Out of the 10 mid borderline leprosy (BB) cases, histopathological diagnosis was indeterminate leprosy in two cases (20%), borderline tuberculoid in 2 cases (20%), borderline lepromatous leprosy in one case (10%) and 5 cases showed the same spectrum (50%). Among the nine-borderline lepromatous (BL) leprosy cases, histopathological diagnosis was the same in four cases (44.44%), while two cases (22.22%) were indeterminate leprosy, two were mid borderline leprosy (22.22%) and one case (11.11%) was diagnosed as borderline tuberculoid.

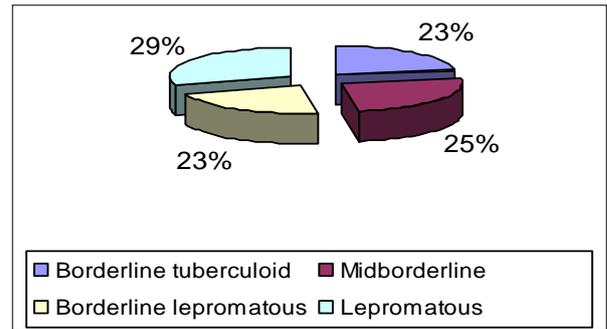


Figure 2: Clinical spectrum.

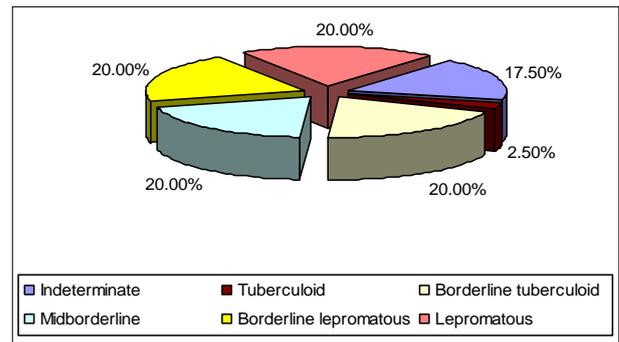


Figure 3: Histopathological spectrum.

Table 1: Clinical and histopathological correlation.

Clinical Diagnosis	Total	Histopathological diagnosis						Positive Correlation (%)
		HD-1	TT	BT	BB	BL	LL	
BT	9	3	1	5				55.56
BB	10	2		2	5	1		50.00
BL	9	2		1	2	4		44.44
LL	12				1	2	9	75.00

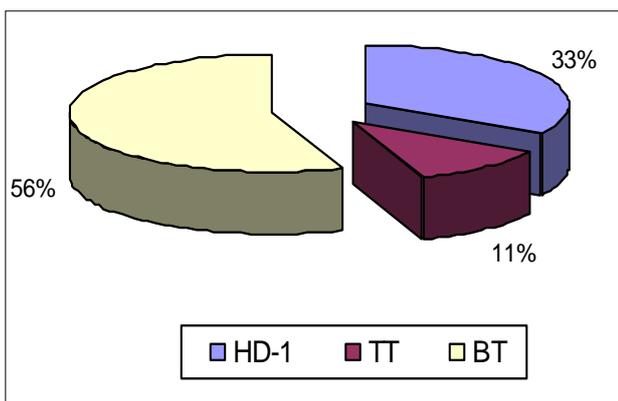


Figure 4: Percentage of correlation of clinical and histopathological diagnosis HD (BT).

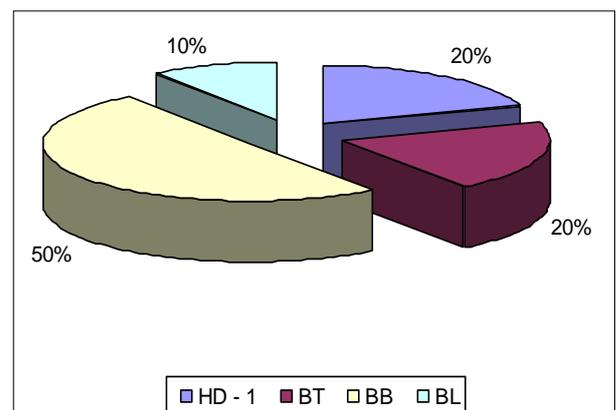
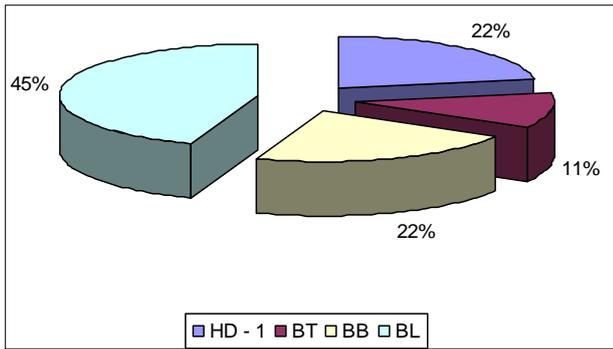
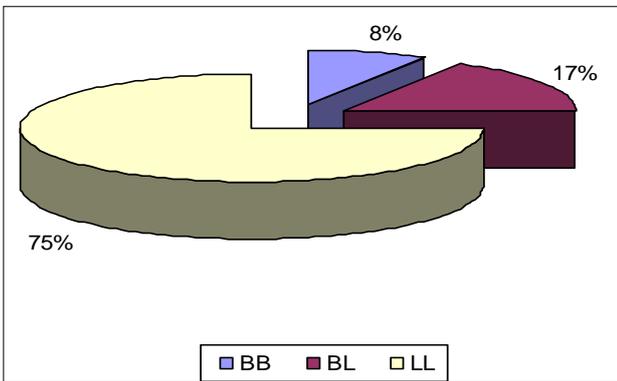


Figure 5: Percentage of correlation of clinical and histopathological diagnosis HD (BB).



**Figure 6: Percentage of correlation of clinical and histopathological diagnosis HD (BL).**

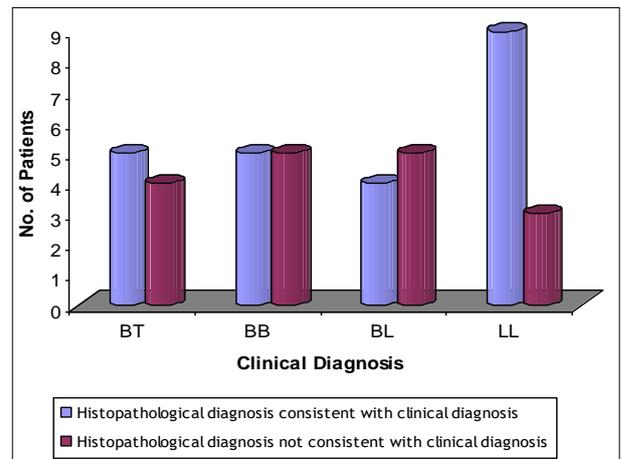


**Figure 7: Percentage of Correlation of Clinical and Histopathological Diagnosis HD (LL).**

Among the 12 lepromatous (LL) cases, maximum spectral correlation was seen in this clinical subtype in

nine cases (75%). In others histopathological diagnosis was mid borderline in one case (8%) and borderline lepromatous leprosy in two cases (17%). (Table 1 and Figure 4-7).

In our study LL cases showed maximum clinic-pathological correlation. Clinical and histopathological diagnosis was correlated in nine out of the 12 cases. Clinically and histopathologically consistent borderline tuberculoid was seen in five out of nine patients (55.56%) and in five out of ten mid borderline patients (50%). Four out of the nine clinically classified borderline lepromatous cases showed histopathological correlation (44.44%) (Table 2 and Figure 8).



**Figure 8: Histopathological and clinical diagnosis correlation.**

**Table 2: Histopathological and clinical diagnosis.**

Clinical diagnosis	Total no. of cases	Histopathological diagnosis consistent with clinical diagnosis	Percentage of positive correlation	Histopathological diagnosis not consistent with clinical diagnosis	Percentage of negative correlation
BT	9	5	55.56	4	44.44
BB	10	5	50.00	5	50.00
BL	9	4	44.44	5	55.56
LL	12	9	75.00	3	25.00
Total	40	23	57.50	17	42.50

**DISCUSSION**

A disease like leprosy needs an appropriate classification and the most commonly accepted classification by research workers is that of Ridley and Jopling which is primarily based on immunity but has been correlated with clinical, histopathological and bacteriological findings.<sup>8</sup> Despite having such an accurate classification, leprosy

cases showed so many diversities between the clinical and histopathological features.

Out of the 40 multibacillary leprosy cases studied majority of the clinical spectrum (12 cases) belonged to lepromatous and the next predominant group being mid borderline (25%). BT and BL constituted 22.5% each (Figure 2).

Regarding the histopathological diagnosis, BT, BB, BL, LL constituted 20% each, followed by indeterminate leprosy 17.5%. Only one case had a histopathological diagnosis of TT, 2.5% (Figure 3). Out of the 40 multibacillary cases studied, 23 patients showed histopathology consistent with the clinical diagnosis (57.50%). The clinical and histopathological correlation found in lepromatous leprosy cases was 75% (9/12) and 55.56% in borderline tuberculoid leprosy, 50% in mid borderline and a least correlation of 44.44% was noted in BL (4/9).

In 1977, Sehgal et al in a study of a group of 95 cases found clinical and histological correlation only in one third of cases.<sup>11</sup> But Meyers et al, in a study of 1429 cases, observed clinical and histopathological correlation in 77.20% of the patients.<sup>12</sup> A correlative study by Moorthy et al during 1997 to 1999, showed 62.63% clinico-pathological correlation.<sup>13</sup> Highest correlation was noticed in LL (80%). Another study by Singh et al in 21 cases noticed a variation in 52.4% of cases and the disagreement was maximum in Borderline which includes BT, BB and BL.<sup>14</sup>

Present study showed an overall positive clinico-histopathological correlation of 57.50% (22/40). The maximum clinico-histopathological correlation observed in this study was in lepromatous spectrum 9/12 cases (75%) similar to that in the study by Moorthy et al.<sup>13</sup> The percentage of correlation was considerably less in all the other groups in accordance to previous study by Singh et al which also showed a disagreement similar to our study.<sup>14</sup> The clinico histopathological correlation observed in BT and BB were 55.56% and 50%. Correlation observed in BL (44.46%) was low compared to other spectrum. The overall clinical and histopathological correlation observed in the study group was 23/40 (57.50%) similar to study by Singh et al.<sup>14</sup> It is clear from all these studies that, the correlation was better in lepromatous pole than the tuberculoid pole. The correlation was least in indeterminate except in the study conducted by Jerath and Desai in 1982.<sup>12</sup>

The variation in different studies may be due to different criteria used to select the cases and difference in number of cases of each study. Various factors also influence the histopathological diagnosis such as differences in sample size, choosing the biopsy site, age of the lesion, immunological and treatment status of the patient at the time of biopsy. The other important point to be considered is inter-observer variation, both clinically and histopathologically.<sup>11-14</sup> The disparity between clinical and histological observations was anticipated because the parameters used for the histopathologic classification are well-defined, precise and also take into account the immunologic response of the tissue, while the clinical classification gives recognition only to the gross appearances of the lesions which is due to the underlying pathological change.<sup>15</sup>

It is evident from our study that maximal clinico-histopathological spectral correlation was found in LL spectrum indicating the stable nature of spectrum both clinically and histopathologically. The percentage of correlation was considerably less in all the other groups which shows unstable nature of the disease in the borderline spectrums. This is in accordance to previous study by Singh et al which also showed a disagreement similar to our study.<sup>14</sup> It is also noted that our study showed a lower overall clinic-pathological correlation than some of the previous study results.<sup>11-13</sup> This variations reinforces that there is no independent gold standard for diagnosis of leprosy. Moreover, a sizable proportion of leprosy cases (BT+BB+BL) are in a continuously changing immunological spectrum and histological classification gives a better indication for any recent shift of a case position in the spectrum.<sup>15</sup> If a biopsy is taken at an early stage, there is likely to be discordance between the clinical and histopathologic observations. As disparity depends upon the lesion biopsied at the time of study, biopsy from the lesion which is morphologically suggestive of clinical diagnosis, serial biopsies from the same lesion, or from paired lesions, should be studied for a better clinico-histopathological correlation.

## CONCLUSION

As there can be some degree of overlap between different types of leprosy, both clinically and histopathologically, correlation of clinical and histopathological features along with bacteriological index appears to be more useful to arrive at a correct clinical spectrum than considering any one of the single parameters alone.

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*Ethical approval: The study was approved by the institutional ethics committee*

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