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Original Research Article

Histopathologial Study of Hansen's Disease in Correlation with Clinical Features at a Tertiary Care Centre

Chowdari Balaji[1], Sravani Ponnada[2], Rajendra Prasad Jagannadham[3], Dasari Mercy Mrudula[4], Tammineni Ashalata[5]

[1]Associate Professor, Department of Pathology, Andhra Medical College, Visakhapatnam
[2]Assistant Professor, Department of Pathology, Andhra Medical College, Visakhapatnam
[3]Associate Professor, Department of Pathology, Government Medical College, Eluru
[4]Assistant Professor, Department of Pathology, Andhra Medical College, Visakhapatnam
[5]Assistant Professor, Department of Radiodiagnosis, Andhra Medical College, Visakhapatnam

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Corresponding Author: Dr. Dasari Mercy Mrudula
Conflict of interest: Nil

Abstract:

Background: Leprosy is a chronic disease caused by Mycobacterium leprae, infectious in some cases, affecting the peripheral nervous system, the skin and certain other tissues**.** Hansen's disease is diagnosed and treated on clinical basis by WHO classification as Pauci bacillary and Multi bacillary. In problematic cases reliable diagnosis hinges around good histopathological diagnosis & demonstration of bacilli in the histological sections.

Methods: This is a hospital based observational study for a period two years in the department of pathology, Andhra medical college from May 2018 to April 2020 with a sample size of 60 cases.

Results: A total of 60 cases with a provisional clinical diagnosis of Leprosy were studied. The present study includes patients in the age range of 12-65 years with mean age of 35 years. The maximum incidence of Leprosy was observed in 21-30 years and 41- 50 years and the most commonly presenting skin lesion were plaques (60%) followed by nodules (26.7%). In our study BT Hansens was the most common clinical diagnosis, constituting 24 cases (40%), followed by LL Hansens in 12 cases (20%). In our study histologically, majority of the cases were BT type, constituting 22 cases (36.6%), followed by Indeterminate leprosy (21.7%). Fite Faraco stain for the lepra bacilli was positive in all the cases diagnosed histologically as Histoid hansen's, LL & BL (i.e 100%).

Conclusion: Clinical diagnosis may be the main stay for detection of leprosy, but histopathological examination combined with bacillary index is very much essential in diagnosing early lesions of leprosy, accurate typing of borderline lesions and differentiating leprosy from other dermatological lesions which mimics it.

Keywords: Leprosy, Tuberculoid Hansens, Lepromatous Hansens.

Introduction

Leprosy is a chronic infectious disease caused by Mycobacterium leprae. The disease mainly affects peripheral nervous system, the skin, and certain other tissues [1].

Hansen's disease is diagnosed and treated on clinical basis by WHO classification as Pauci bacillary and Multi bacillary. In problematic cases reliable diagnosis hinges around good histopathological diagnosis & demonstration of bacilli in the histological sections. Modified fite-faraco technique is the routinely used method to demonstrate mycobacterium leprae in tissue sections.

Aims and Objectives:

1. To evaluate the clinico-histopathological correlation of leprosy and compare it with previous studies.
2. To record the histopathological manifestations subjecting to hematoxylin and eosin stain and the Fite-Farao stain for all cases.
3. To evaluate the histopathological and bacillary index correlation and compare it with previous studies.

Materials and Methods

The present study is a two year observational study in the department of pathology, Andhra medical college from May 2018 to April 2020. Relevant clinical data, lab investigation results, and

dermatological findings and Skin punch biopsy findings were recorded in a structured proforma.

All the specimens were fixed in 10% formalin, routinely processed and paraffin embedded tissue sections were made, stained with hematoxylin and eosin and also were subjected to Modified Fite Faraco AFB stain for assessment of bacillary index. Data analysis was done in the form of percentages and proportions and represented as tables and figures.

Inclusion Criteria: All cases clinically diagnosed as Leprosy, were included in the study.

Exclusion Criteria: All cases where the biopsy was Inadequate were excluded from the study.

Results

The present study was carried out on a total of 60 clinically diagnosed Leprosy patients. In all cases, the biopsies were studied histologically in H&E stained section. Bacillary index was assessed in sections stained by modified Fite Faraco method.

Age and Sex Distribution: The age of the patients ranged from 12 years to 65 years, with a mean of 35 years. Most of the patients were in the age group of 21-30 years and 41- 50 years each accounting for 23.3%. Males were affected the most, accounting for 41 cases (68.3%) and females constituted 19 cases (31.7%). The male to female ratio (M:F) was 2.16 :1.

Table 1: Age and sex distribution of patients (n=60)

Age In Years	Total		Male		Female	
	No.	%	No.	%	No.	%
<20	13	21.8	10	24.3	3	15.8
21-30	14	23.3	10	24.3	4	21.0
31-40	11	18.3	8	19.6	3	15.8
41-50	14	23.3	8	19.6	6	31.6
>50	8	13.3	5	12.2	3	15.8
Total	60	100	41	100	19	100
MEAN±SD	35.2±5.9		33.82±5.8		38.15±6.0	

Clinical characteristics of the lesions: Most patients had skin lesions predominantly on the trunk. These account for 48.3%, while 15% of patients had lesions on the upper extremities. The lesions in most patients were plaques (60%), followed by nodules (26.7%), macules and patches 6.7% each in decreasing order of frequency. The skin lesions were hypoesthetic in majority of (70%) patients, Anesthetic in 8.3%. There were no sensory changes in 21.7%. Clinically most patients had a thickened right ulnar nerve i.e 56.7%.

Table 2: Clinical characteristics of the lesions (n=60)

		No. Of cases present	Percentage
Site:	Trunk	29	48.3
	Upper extrimity	9	15
	Others	22	36.7
Clinical Appearance	Macule	4	6.7
	Patch	4	6.7
	Plaque	36	60
	Nodule	16	26.6
Sensory Change	Hypoesthetic	42	70
	Anaesthetic	5	8.3
	No change	13	21.7
Peripheral Nerve Involvement	Right ulnar nerve	34	56.7
	Left ulnar nerve	28	46.7
	Right lateral popliteal nerve	15	25
	Left lateral popliteal nerve	17	28.3
	Right greater auricular nerve	6	10
	Left greater auricular nerve	4	6.7

Clinico-Histopathological Correlation: Out of the 60 clinically diagnosed cases of leprosy, a correlation between clinically diagnosed subtype and histological subtype of leprosy was observed in 45 cases. The percentage correlation was 75 % in the present study.

Table 3: Clinico-histopathological correlation:

Type of Leprosy	Clinical diagnosis number	Histopathologically correlated number	Percentage of correlation
HISTOID	4	4	100
LL	12	10	83.3
BL	8	6	75

TT	4	2	50
BT	24	16	75
IH	8	5	62.5
TOTAL	60	45	75

Clinico-Histopathological Correlation In Different Types Of Leprosy: Out of 60 cases, 24 cases with clinical diagnosis of BT Hansen's, histopathology along with bacillary index confirmed the diagnosis as BT Hansen's in 18 cases. Among the remaining 4 were diagnosed as IH and 2 were diagnosed as TT.

Among 12 cases with a clinical diagnosis of Lepromatous leprosy, 10 cases were confirmed as LL on histopathology, but in 2 cases the histological diagnosis was IH. Among 8 cases with clinical diagnosis of Borderline Lepromatous, 6 cases correlated histopathologically, one was diagnosed as BT and the other as IH. All the 4 cases clinically diagnosed as Histoid hansen's were confirmed as such on histopathology. Among 4 cases with a clinical diagnosis of Tuberculoid Hansen's, 2 cases correlated histopathologically, one was diagnosed as BT and the other as IH on histopathology. Overall,13 cases (21.7%) out of sixty cases sent with a clinical diagnosis of various forms of Leprosy, were diagnosed as indeterminate leprosy based on histopathology and bacillary index assessment.

Table 4: Clinico-histopathological correlation in different types of leprosy

Clinical Diagnosis	No. of Cases	Histopathological Diagnosis (H & E)					
		IH	BT	TT	BL	LL	HISTOID
HISTOID	4	-	-	-	-	-	4
LL	12	2	-	-	-	10	-
BL	8	1	1	-	6	-	-
TT	4	1	1	2	-	-	-
BT	24	4	18	2	-	-	-
IH	8	5	2	1	-	-	-
TOTAL	60	13	22	5	6	10	4

Bacillary Index Estimated In Skin Biopsies With Fite- Faraco Staining: Fite Faraco stain for the lepra bacilli was positive in all the cases diagnosed histologically as Histoid Hansen's, LL & BL (i.e 100%). It was negative for lepra bacilli in all tuberculoid leprosy cases. The mean Bacillary index was 1.1 in IL, 0 in TT,1.7 in BT, 3.8 in BL, 4.7 in LL and 6.0 in Histoid leprosy.

Table 5: Bacillary index estimated in skin biopsies with FITE- FARACO staining

Lesions on HPE	No. of Cases	Bacillary Index (FITE FARACO)			
		Positive	Negative	Percentage	Mean B.I
HISTOID	4	4 (B.I :5-6)	-	100	6
LL	10	10 (B.I :4-6)	-	100	4.7
BL	6	6 (B.I : 4-5)	-	100	3.8
TT	5	0 (B.I : 0)	5	100	0
BT	22	16 (B.I :1-2)	6	72.7	1.7
IH	13	10 (B.I :1-2)	3	76.9	1.1
TOTAL	60	46	14		2.89

Photographs:

Figure 1: (A) Clinical photograph showing hairless plaque with hypopigmentation over the face and visible left greater auricular nerve. (BT HANSENS)

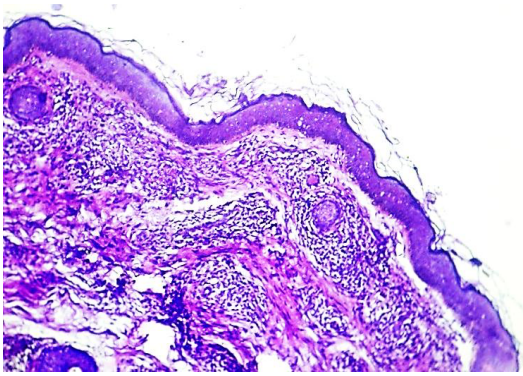

Figure 1: (B) Photomicrograph showing ill-defined granulomas, not extending upto the epidermis (H&E; 100X)

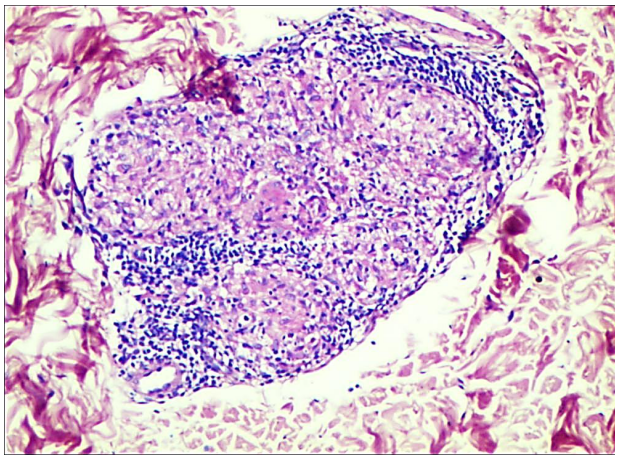

Figure 1: (C) Photomicrograph showing Infiltrates around adnexae, composed of epitheloid cells and mononuclear cells and few langhan giant cells. (H&E;100X)

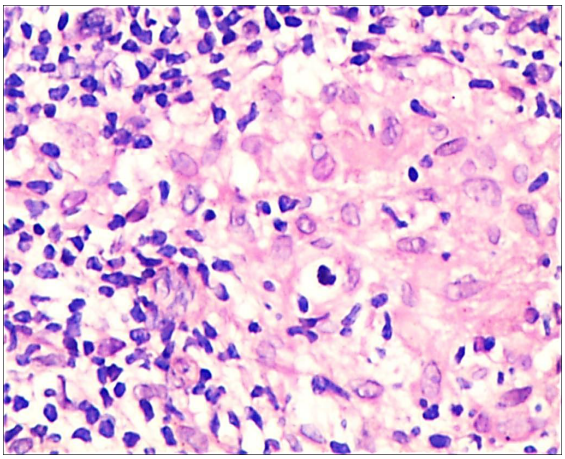

Figure 1: (D) Photomicrograph of higher magnification showing epitheloid cells and mononuclear cells. (H&E;400X)

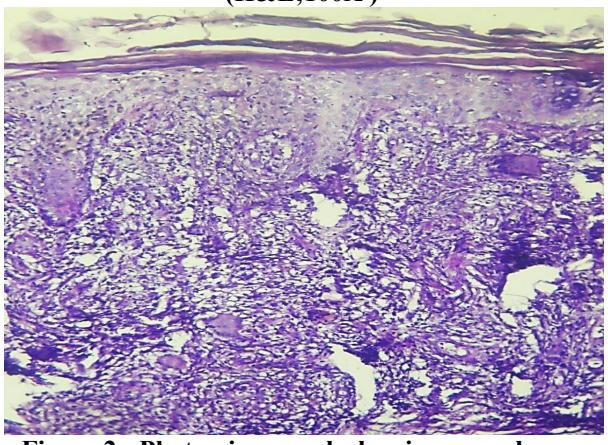

Figure 2: Photomicrograph showing granulomas hugging the epidermis. (H&E; 100X)- (TT HANSENS)

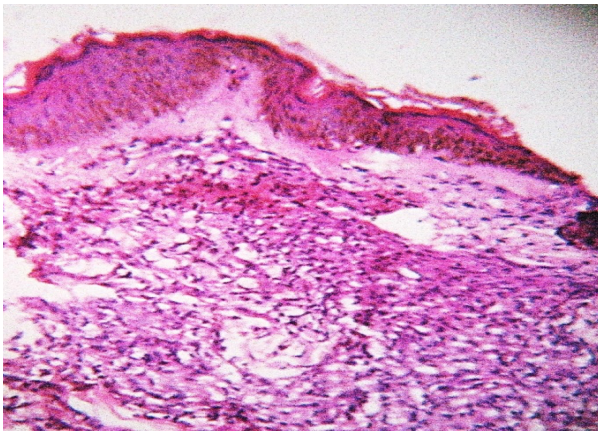

Figure 3: Photomicrograph showing sub epidermal free zone (Grenz-zone) and prominent lymphocytes with foamy macrophages. (H&E; 100X)- (BL HANSENS)

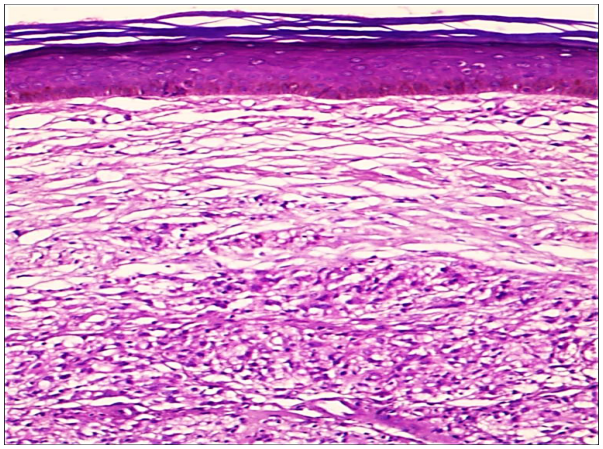

Figure 4: (A) Photomicrograph showing clear subepidermal free zone (Grenz zone) and prominent foamy macrophages. (H&E; 100X)- (LL HANSENS)

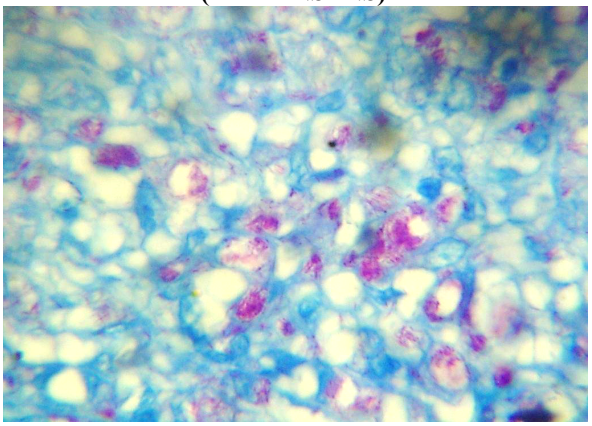

Figure 4: (B) Photomicrograph showing acid fast bacilli as globi. Bacillary index is 5+ (Fite Faraco; Oil Immersion) - (LL HANSENS)

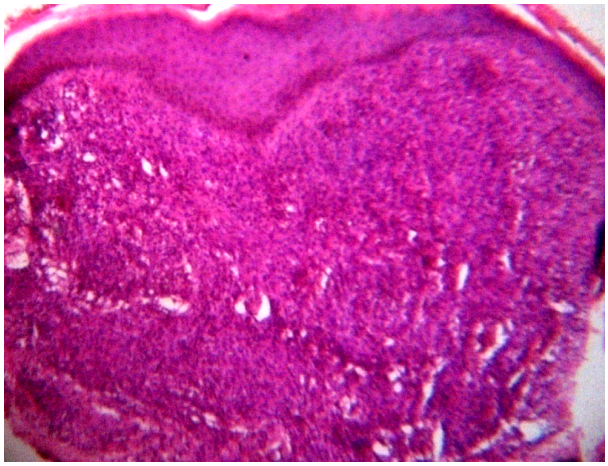

Figure 5: (A) Photomicrograph showing prominent spindle-shaped macrophages. (H&E;100X)- (HISTOID HANSENS)

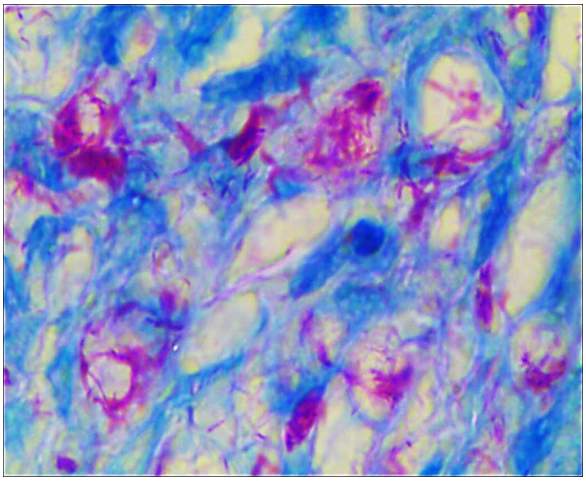

Figure 5: (B) Photomicrograph showing acid fast bacilli as sheaves of wheat. Bacillary index is 6+ (Fite Faraco ; Oil Immersion)- (HISTOID HANSENS)

Discussion

Leprosy constitutes a major public health problem in India with an annual new case detection rate of 0.84 per 10,000 populations [2]. Histological examination has a key role in diagnosis and categorisation of Leprosy. Modified Fite Faraco technique is routinely used method to demonstrate Mycobacterium Leprae in the tissue sections. In the present study, histological features were evaluated on H&E stained sections and bacillary index was assessed on modified Fite Faraco stained sections. The final histological diagnosis was compared with clinical diagnosis. Skin biopsies from a total of 60 patients, clinically diagnosed as Leprosy were studied.

In the present study, patients in the age group of 21-30 & 41-50 years were most commonly affected, constituting 14 cases each (23.3%), which was correlated with other studies like N. Jindal et al et al [3], B. Mehta et al et al [4]. Clinico-histopathological correlation was observed in highest proportions in Histoid hansen's (100%), followed by Lepromatous leprosy (83.3%), Borderline tuberculoid and Borderline lepromatous of 75% each and Tuberculoid leprosy (50%). In studies by K. N. Shivaswamy et al [5], B. N. Moorthy et al [6], highest clinicopathological correlation was observed in LL cases. In one study by Arjun Singh et al [7], 100% correlation was observed in TT cases. Bhatia et al [8] and Amrish pandya [9] et al showed that BT cases showed highest clinico-histopathological correlation in their study.

In the present study of all the 60 cases, 76.6% showed positive staining for lepra bacilli with Modified Fite Faraco stain. In B.N.Moorthy et al and Amrish pandya et al showed positive staining for lepra bacilli in 70.7%, 68.3% respectively.

Observations from present study as well as several other studies show that maximum disparity in the results from H&E stained sections and Bacillary index assessment is observed in the BT & IH, where as in the polar subgroups the results were similar. These differences are attributed to varied histopathology at different sites and lesions in the BT & IH cases, which thus requires Bacillary index assessment in order to upgrade or downgrade the lesion.

On histopathology erosion of the epidermis by the granulomas, presence of granulomas around the neurovascular bundles and sweat glands are seen both in Tuberculoid type and Borderline tuberculoid. The differentiation between the two is possible on bacillary index. In Tuberculoid type the bacillary index is 0 where as in Borderline tuberculoid type the index is 1+ to 2+. Indeterminate leprosy and early Lepromatous leprosy can present as macular lesions, on microscopy both the lesions show variable number of lymphocytes and macrophages around the neurovascular bundles, erector pili muscle, dermal vessels and sweat glands. The bacillary index of indeterminate leprosy is 1+, but in Lepromatous leprosy it is 4+ to 5+.

The bacillary index in Borderline lepromatous and Lepromatous leprosy is similar, but on histopathology if more number of lymphocytes are seen in proportion to macrophages then it is Borderline lepromatous. In Borderline borderline leprosy, the bacillary index is 3+ to 4+. Hence correlation of clinical and histopathological features combined with assesment of bacillary index appears to be more useful for accurate typing of leprosy than considering any one parameter alon

Conclusion

- Clinical diagnosis may be the main stay for detection of leprosy, but histopathological examination along with bacillary index assesment is very much essential in diagnosing early lesions of leprosy, accurate typing of borderline lesions and differentiating leprosy from other dermatological lesions which mimic it.
- There is a wide spectrum of manifestations of Leprosy disease with considerable overlap between different types along this spectrum. Both Clinical and Histopathological features along with Bacteriological index are more useful than any single parameter in arriving at a definitive diagnosis and classification of the disease.
- As there is overlap in histopathological features of different types of leprosy, morphology alone is not specific, thus adequate clinical data can help in good Clinicopathological correlation.

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