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Histopathological correlation of skin biopsy in leprosy: A tertiary care hospital-based study

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Abstract:

Background:
Among developing countries leprosy operates as a major public health issue. Hansen's disease also carries its alternative name as Leprosy after the work of Norwegion physician Armover Hansen. The chronic bacterial infection known as leprosy develops after mycobacterium leprae infection occurs. Bacteria primarily targets the peripheral nerves together with the skin tissue. Skin bacilli infection in leprosy patients leads to dermatological symptoms while nerve infection causes nerve damage through the loss of senses combined with disability later developing into deformities. The complete progression of the condition leads to damage in multiple sections of the human body.

Methods:
Our study utilized a cross sectional approach named "Histopathological correlation of skin biopsy in leprosy: a tertiary care hospital-based study" to evaluate patients who sought outdoor skin department services in our institution. Sample size was 60.

Results:
The results demonstrated lepromatous leprosy presented maximum correlation at 72.22% while the percentage for borderline lepromatous leprosy was 35.71%. The assessment of borderline tuberculoid leprosy showed a weak relationship with a rate of 31.25%. Borderline tuberculoid patients revealed the highest level of disagreement among the studied groups at 31.25%.

Conclusions:
The patient group aged between 14 to 68 years included most of those affected by leprosy. Laboratory L type proved to be the main form of leprosy observed among the patients. Grenz zone appeared in 8 biopsies of the patients who had received a diagnosis of LL. LR type showed the presence of lymphohistiocytic aggregates together with ILL forming granulomas and LL type. The bacterial index in LL & BL type demonstrated 5+ to 6+ while BT type and TT and IL showed 1+ and BI-0 results respectively. The clinical diagnosis of LL affected the most individuals at 30%

Keywords:
Leprosy, Ridley Jopling classification, Histopathology.

INTRODUCTION

The developing world faces leprosy as a major social health problem particularly in India. Lepra disease received its alternative name from Armover Hansen because he first discovered the microorganism that triggers the illness [1].

The chronic infectious disease known as leprosy develops because of mycobacterium leprae. Leprosy manifests itself in both genders and people at any stage of life [2]. The bacteria principally targets peripheral nerves together with skin structures [3-4]. The location of bacilli in skin tissue results in dermatological disease appearances while nerve bacillus infection leads to sensory disruption through neurological function damage and tissue demyelination which creates disability and deformity conditions [5-6]. The disease continues to affect various sections of the human body which leads to depigmentation of skin, madarosis or eyebrow loss, dactylitis, pathologic bone fractures, unusual joint and bone changes, palate and nasal septum perforations, claw-hand development, testicular atrophy and muscle atrophy [1].

People qualify as having leprosy when they exhibit any one of these features while under a completed treatment course according to the seventh WHO expert committee on leprosy.

A skin lesion featuring hypopigmentation or reddish pigmentation combined with definite sensory loss defines a leprosy case.

Direct involvement of peripheral nerves shows through definite nerve thickness and concurrent nerve loss of sensation and muscle weakness resulting from nerve supply.
• Skin smear positive for acid fast bacilli.

METHOD

A study named Histopathological correlation of skin biopsy in leprosy: a tertiary care hospital-based study conducted at our institution examined skin biopsy patients from our outpatient departments. Sample size was 60.

Study design: Prospective study
The study included all cases of leprosy which medical diagnosis confirmed clinically and met the necessary conditions.

Study duration: 6 months

Selection of cases

Inclusion criteria:
- Clinical tests of leprosy diseases included all skin biopsies examined
- All investigated cases that possessed signs matching those seen with leprosy.

Exclusion criteria:
- Tests of this study will exclude skin biopsies when the clinical diagnosis determines another disease than leprosy.
- Leprosy cases that were clinically suspected using post-approval guidelines of the WHO expert committee for Leprosy were enrolled from the outdoor skin departments of our institute.
- A proper clinical examination allows diagnosticians to make leprosy diagnoses in most cases. Every clinical examination performed on suspected leprosy patients followed a standardized process. The tissue underwent formalin fixation at 10% before it received tissue processing in histopathology. A pathologist used paraffin to embed the tissue for thin section production. H & E staining followed by wade Fite Faraco stain served to identify leprae bacilli in the section.

RESULTS

Table No. 1: ***Histopathological Types of Leprosy***

Types	No of cases	Percentage
TT	7	11.66%
BT	11	18.33%
BB	0	0
BL	16	26.65%
LL	18	30%
IL	3	5%
T1R	1	1.65%
T2R	3	5%
H	1	1.68%
Total	**60**	**100%**

Most common histological types of leprosy were LL 18 (30%) followed by BL 16(26.65%) and BT 11(18.33%) [Table 1].

Table No. 2: ***Bacterial Index in leprosy***

Bacterial index	TT	BT	BB	BL	LL	IL	T1R	T2R	H	Total
0	7	9	0	2	1	3	1	0	0	**23 (38.33%)**
1+	0	2	0	2	1	0	0	1	0	**6(10%)**
2+	0	0	0	4	0	0	0	0	0	**4 (6.66%)**
3+	0	0	0	2	0	0	0	0	0	**2 (3.33%)**
4+	0	0	0	3	2	0	0	1	0	**6(10%)**
5+	0	0	0	3	6	0	0	1	0	**10 (16.66%)**
6+	0	0	0	0	8	0	0	0	1	**9 (15%)**
Total	**7**	**11**	**0**	**16**	**18**	**3**	**1**	**3**	**1**	**60**

In present study we studied 60 cases, among FF stain positive 37(61.66%) cases, 10 (16.66%) cases have bacterial index (5+) out of which 6 were diagnosis of LL & 3 were diagnosis of BL, followed by 9 cases having bacterial index (6+) , out of which 8 were diagnosis of LL [Table 2].

Table No. 3: ***Histopathological correlation of skin biopsy in leprosy***

Clinical diagnosis	Histopathological diagnosis									Total
	TT	BT	BB	BL	LL	IL	T1R	T2R	H	
TT	2 (33.33 %)	4 (66.66%)	0	0	0	0	0	0	0	6
BT	4 (25%)	5 (31.25%)	0	6 (37.5%)	0	1 (6.25%)	0	0	0	16
BB	0	0	0	0	0	0	0	0	0	0
BL	1 (7.14%)	1 (7.14%)	0	5 (35.71%)	5 (35.71%)	2 (14.28%)	0	0	0	14
LL	0	1 (5.55%)	0	4 (22.22%)	13 (72.22%)	0	0	0	0	18
IL	0	0	0	0	0	0	0	0	0	0
T1R	0	0	0	1 (50%)	0	0	1 (50%)	0	0	2
T2R	0	0	0	0	0	0	0	3 (100%)	0	3
H	0	0	0	0	0	0	0	0	1 (100%)	1
Total	7	11	0	16	18	3	1	3	1	60

Among 60 cases, maximum correlation was observed in Lepromatous leposy13 (72.22%) and borderline lepromatous leprosy 5 (35.71%). A poor correlation was seen in borderline tuberculoid leprosy 5(31.25%). Maximum disagreement was seen in borderline tuberculoid leprosy (31.25%), out of 16 clinically diagnosed cases were Classified as 6 BL, 5 BT, 4 TT & 1 IL on histopathology [Table 3].

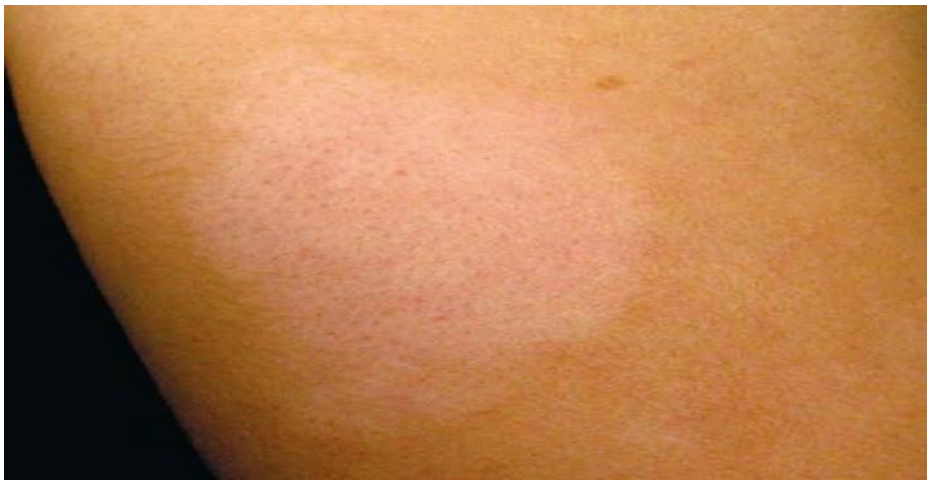

Figure No.1: ***Hypopigmented patch in patients of leprosy***

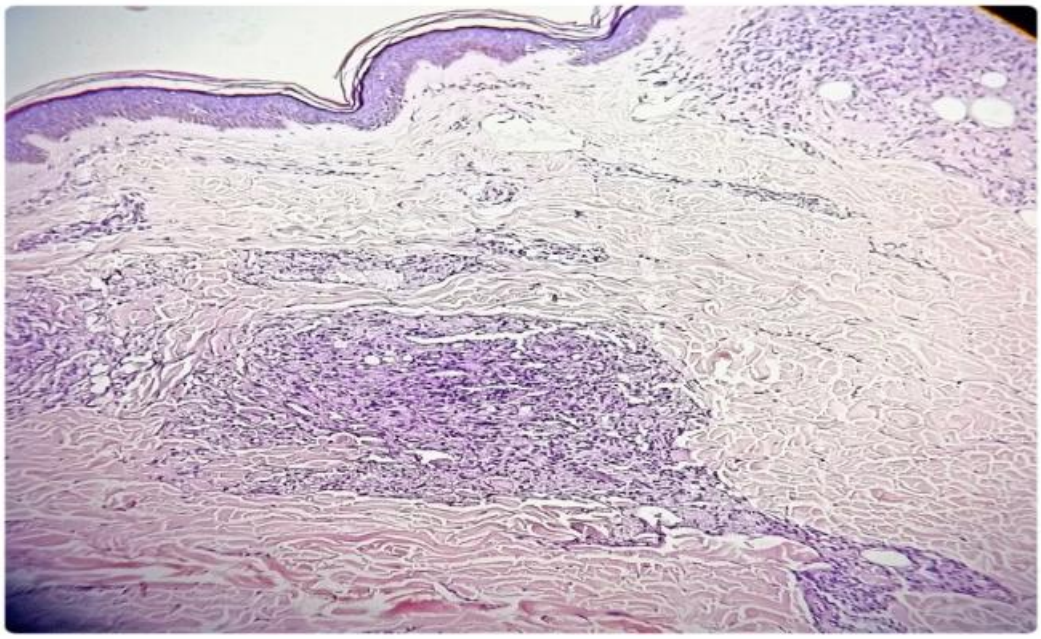

Figure No.2: ***LL: Epidermis is thin and atrophy. Rete ridges are completely flattened. There is clear subepidermal zone. Dermis shows macrophage granuloma (H & E stain- 10x)***

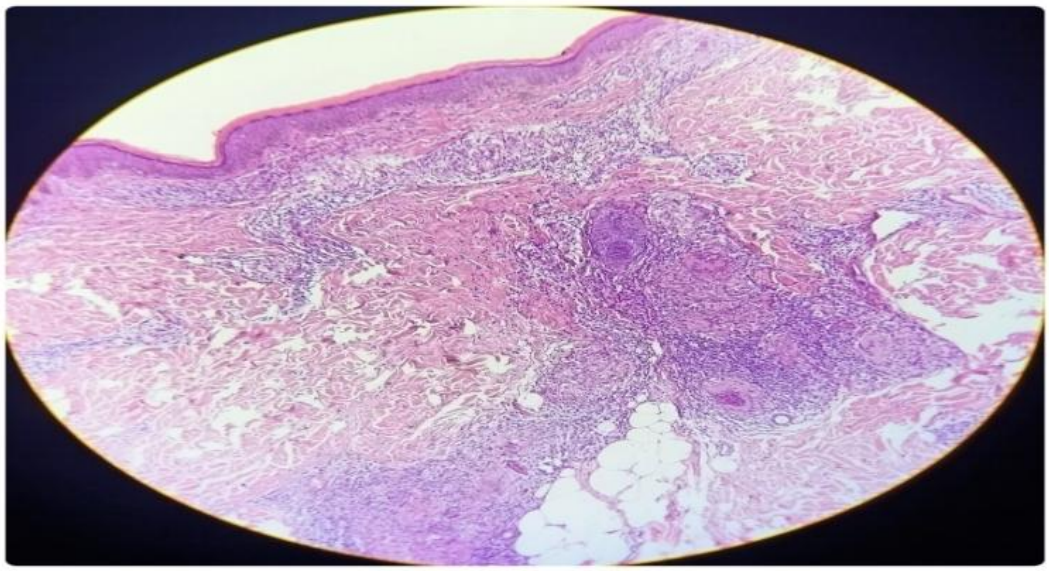

Figure No.3: ***Tuberculoid leprosy: Well-formed epithelioid cell granuloma with Giant cell (H & E stain- 10x)***

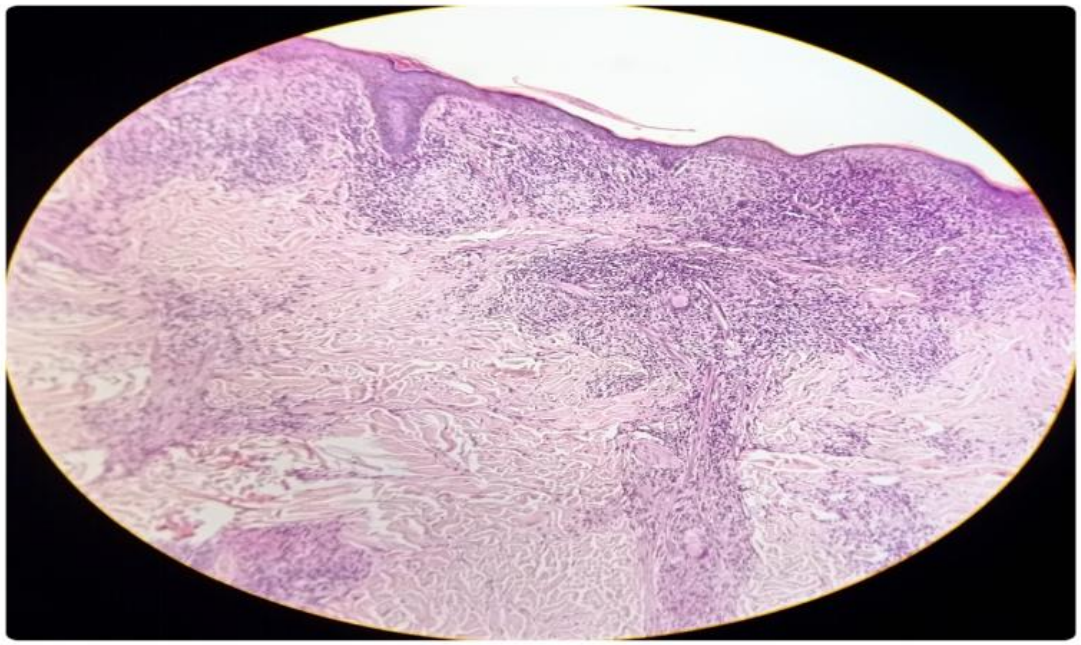

Figure No.4: ***Borderline tuberculoid leprosy: Granulomas are poorly formed and composed of collection of epitheloid cells, Langhan's giant cells and lymphocytes. (H & E stain - 10x)***

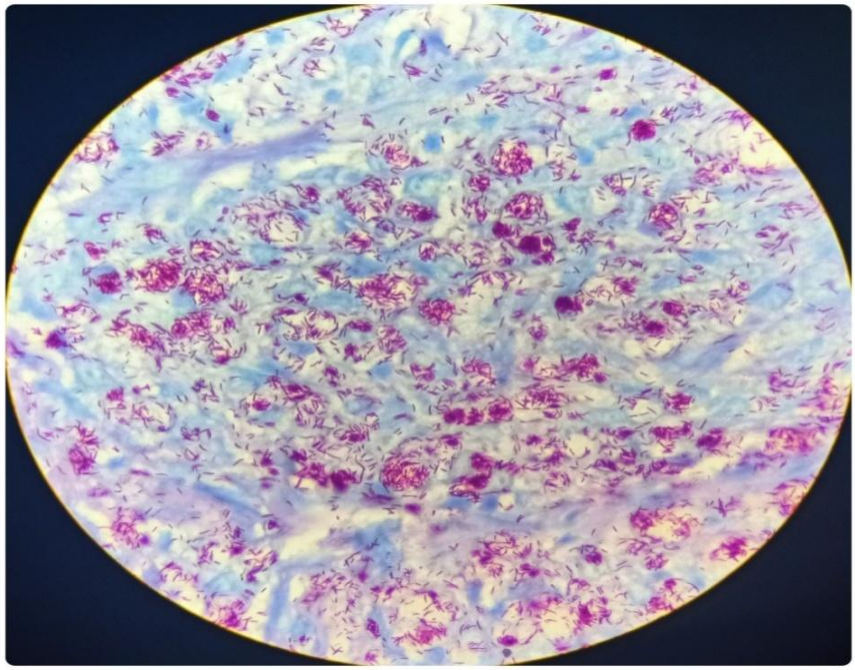

Figure No. 5: ***Plenty of bacilli with small globi and clusters of bacilli BI is 6+ (Fite faraco stain - 100x)***

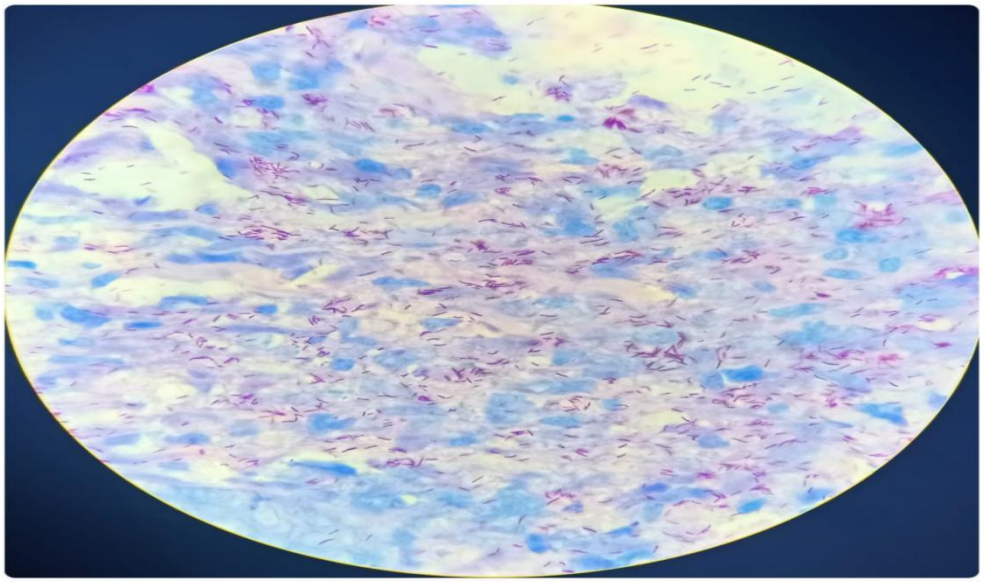

Figure No.6: ***BI is 5+: Over 100 bacilli but less than 1,000 in an average microscopic field (Fite faraco stain- 100x)***

DISCUSSION

The present study found that individuals with leprosy of type LL had a 72.22% parity rate while those with BL had 35.71% and those with BB did not reproduce but those with BT had a 31.25% parity rate and people with TT had a 33.33% rate. In a study done by Jitendra singh et al [1], LL (83.3%), BL (36.3%), BB (0%), BT (53.3%), TT (66.7%). According to researchers the correlation likely performs better at stable poles LL and TT while the disease shows both clinical and histological stability as the main reason [7].

The study showed that LL cases made up 30% of each clinical and histopathological examination group while BL cases followed at 26.65%. The observed bacterial index (+5) through (+6) in both LL and BL type cases matched well with study findings from chatura et al, Giridhar et al as and Veena et al [8-11].

The leading clinical manifestations among these features comprised erythematous areas together with nerve enlargement. The analysis between clinical findings and pathology reports matched in 30 cases (50%) mainly in lesions involving the LL followed by lesions in the BL stage. The least agreement was observed when studying TT and BT.

The highest level of disagreement emerged between physicians when evaluating cases at the border between leprosy types. The borderline category presents immunological instability because of which these cases may shift toward either pole in the borderline spectrum. The disease state of patients shifts to the tuberculoid pole with treatment yet evolves toward lepromatous pole without treatment. When diagnosis occurs at an early stage of infection the biopsy sample will show BT stage but a delayed diagnosis may result in the identification of BL stage [8].

CONCLUSION

The chronic infectious disease leprosy arises from Mycobacterium leprae transmission and displays multiple clinical and histopathological patterns because of the immune condition of the host. High bacillar index scores 5+ to 6+ occurred in patients with LL or BL type while BT type, TT and IL having low BI scores of 1+ became negative for bacilli with BI-0. The obligatory intracellular parasite uses macrophages as its primary host cell. M. leprae. Lepromatous leprosy causes massive impairment of macrophage functionalities. The characteristic symptomatology in lepromatous

leprosy comes from the unworking macrophages and dysfunctional immune response of patients.

The correct leprosy classification depends on skin lesion examination through histological assessment. All leprosy patients require biopsy testing for early lesion diagnosis because clinical assessments prove challenging for practitioners to detect early symptoms properly. Determining leprosy type requires the combination of clinical and histopathological features with bacteriological index readings instead of using one factor exclusively. Medical care and patient treatments improve through the use of these methods for the clinician. The method provides clues regarding medical condition improvements or deteriorations in patients receiving treatment.

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