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Original Research Article

Clinical and Histopathological Evaluation of Leprosy Patients: A Retrospective Study

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Abstract:

Introduction: Leprosy is a chronic infectious disease affecting the skin and peripheral nerves, manifesting in various clinico-pathological forms based on the host's immune status. This study aimed to analyze the clinical and histopathological features in leprosy patients and assess the correlation between clinical and histopathological diagnoses.

Methods: A retrospective hospital-based study was conducted, involving data collection on detailed clinical history-taking and examination. Clinical assessments included lesion type, number, location, disease type, and neural involvement. Skin biopsies with routine Hematoxylin and Eosin stains were performed on all patients.

Results: 123 clinically suspected leprosy cases were analyzed. The majority were aged 30-45 years, predominantly male. Upper extremities and head & neck were the most common lesion sites. The primary clinical features observed were hypoesthetic patches and erythematous plaques. Borderline Tuberculoid was the most common histopathological type, followed by lepromatous leprosy. Correlation between clinical and histopathological diagnoses for specific leprosy types were as follows: TT (67.20%), BT (69%), BB (49.70%), BL (70.30%), LL (93.20%), and IL (45.90%).

Conclusion: Clinical diagnosis alone remains challenging for leprosy, while histopathological analysis aids in definitive diagnosis. This study highlights a significant correlation between clinical and histopathological findings in skin biopsies for leprosy diagnosis.

Keywords: Borderline, Histopathology, Lepromatous, Leprosy, Tuberculoid.

Introduction

Leprosy, also known as Hansen's disease, is a chronic infectious condition with a lengthy incubation period that primarily affects the skin and peripheral nerves, although it can also involve muscles, eyes, bones, testes, and internal organs. The causative agent is Mycobacterium leprae, a slow-growing bacterium discovered by Hansen in 1837, which interestingly cannot be cultured. The disease manifests in various clinical and pathological forms depending on the host's immune status, with the Ridley-Jopling classification being widely used to categorize leprosy into five groups: Tuberculoid (TT), Borderline tuberculoid (BT), Mid-borderline (BB), Borderline Lepromatous (BL), and Lepromatous (LL) [1-3].

Although leprosy was declared eliminated as a significant public health problem in India in 2006 (prevalence rate < 1/10,000 population), cases continue to be reported across various regions of the country. India has made progress in reducing the prevalence rate to 0.66/10,000 in 2016, yet it remains responsible for 60% of new global cases annually and is classified among the 22 "global priority countries" contributing to 95% of leprosy cases worldwide, emphasizing the need for sustained efforts to further reduce the disease burden [4,5].

Accurate diagnosis of leprosy relies on histopathological examination and the demonstration of acid-fast bacilli (AFB) in tissue sections, with the Modified Fite's procedure being particularly effective in visualizing leprae bacilli. The clinical diversity of leprosy and its potential to mimic other conditions underscore the importance of histopathological examination as a valuable diagnostic tool to confirm the disease, as clinical

classification may not always capture the precise progression and response to treatment [6-9]. The aim of this research is to evaluate both the clinical and histopathological diagnosis of tissue sections from suspected leprosy patients.

Material and Methods

A retrospective observational hospital-based study was conducted at a tertiary care hospital in India. The study enrolled all clinically suspected leprosy patients visiting the outpatient department of during the study period.

The inclusion criteria for this study encompassed patients aged 18 years and older, regardless of gender, who exhibited clinical signs suggestive of leprosy and had furnished written consent to partake in the research. Conversely, individuals whose medical records were incomplete or unavailable, and those with prior exposure to anti-leprosy drugs were excluded from the study. These criteria were established to ensure a homogeneous pool for the investigation into leprosy-related outcomes. Detailed socio-demographic data, clinical history, and examinations were recorded from hospital files. Clinical assessments included lesion type, number, location, disease type, and neural involvement. Skin biopsies were taken from the most active part of the lesions, fixed in 10% formalin, processed, and stained with routine Hematoxylin and Eosin stains. Histopathological evaluation included assessing epidermal invasion, sub-epidermal zone involvement, granuloma type and extent, lymphocytic infiltrate density, epithelioid cells, other cellular elements, nerve involvement, and presence of M. leprae.

Leprosy was categorized on histopathological examination according to the Ridley Jopling classification into Tuberculoid (TT), Borderline Tuberculoid (BT), mid-borderline (BB), Borderline Lepromatous (BL), Lepromatous (LL), and Histoid Hansens (HH) [10].

Statistical analysis was performed using SPSS version 20. Categorical data were presented as proportions and percentages, while discrete data were reported as mean ± SD. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Sociodemographic parameters in study population

Variables	n	%
Age groups		
<30 years	31	25.20
31-45 years	51	41.46
46-60 years	30	24.39
>60 years	11	8.94
Gender		
Female	45	36.59
Male	78	63.41
Educational status		
None	44	35.77
Primary	42	34.15
Secondary	29	23.58
Graduate	8	6.50
Socio-economic status		
Upper	29	23.58
Middle	43	34.96
Lower	51	41.46

Table 2: Histopathological Diagnosis of leprosy cases

Diagnosis	n	%
Tuberculoid (TT)	9	7.32
Borderline Tuberculoid (BT)	54	43.90
Mid-Borderline (BB)	3	2.44
Borderline Lepromatous (BL)	15	12.20
Lepromatous (LL)	25	20.33
Intermediate (IL)	17	13.82

Table 3: Distribution of site of lesion among Leprosy cases

Site of Lesion	n	%
Upper Limb	41	33.33
Head and Neck	26	21.14

Multiple Sites	20	16.26
Lower Limb	18	14.63
Trunk	17	13.82

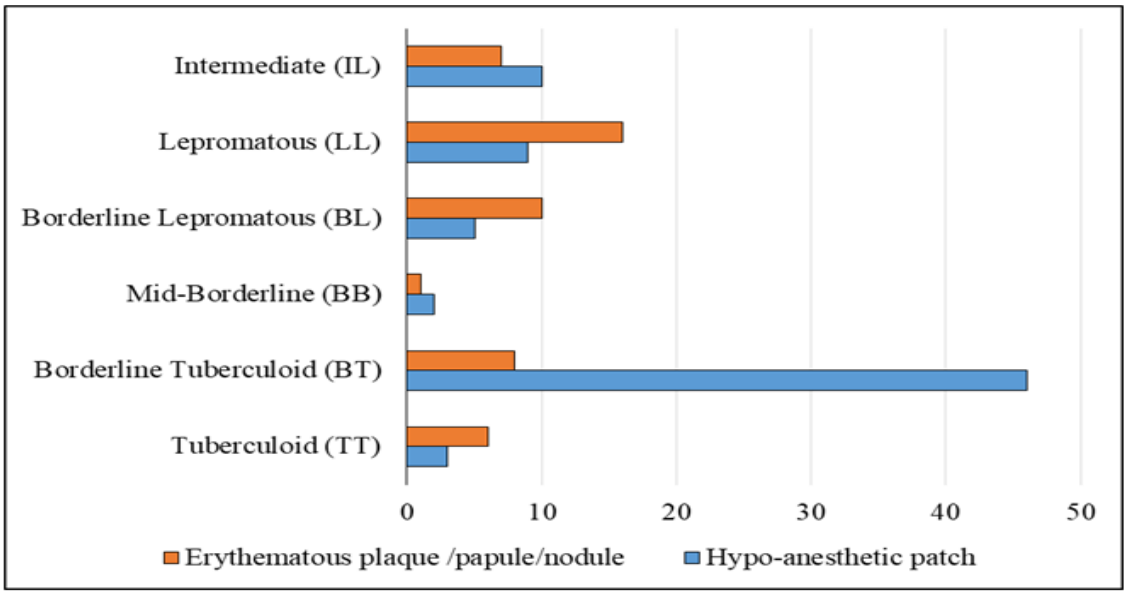

Figure 1: Clinical presentation of Leprosy cases

Table 4: Correlation between clinical and histopathological types of Leprosy

Histopathological Type	Clinical Type						% Concordance
	TT	BT	BB	BL	LL	IL	
Tuberculoid (TT)	6	3	-	-	-	-	67.20
Borderline Tuberculoid (BT)	3	37	-	11	3	-	69.00
Mid-Borderline (BB)	-	2	2	-	-	-	49.70
Borderline Lepromatous (BL)	-	2	-	11	3	-	70.30
Lepromatous (LL)	-	-	-	2	23	-	93.20
Intermediate (IL)	2	6	2	-	-	8	45.90

Discussion

Leprosy, caused by M. leprae, presents with diverse clinical and pathological features depending on the host's immune response. Accurate diagnosis and classification are crucial for effective treatment and disability prevention. The widely used Ridley-Jopling classification encompasses clinical, bacteriological, pathological, and immunological parameters [10].

Our study revealed a predominance of leprosy cases in the 31-45 age group, consistent with some studies [11,12] but differing from others [13] that observed higher incidence in the 11-30 age group. Male predominance, noted in our study, is supported by previous research attributing it to industrialization and urbanization leading to increased exposure risks [14-16].

The upper extremities were the most common sites of leprosy lesions, in line with prior findings [17,18]. Clinical presentations often included hypoanesthetic patches and erythematous plaques/nodules, typical manifestations of skin and nerve involvement by M. leprae [19,20]. Histopathologically, borderline Tuberculoid (BT) and Lepromatous leprosy (LL) were frequently diagnosed in our study, consistent with other reports [21,22]. However, some studies reported LL as the most common type, highlighting variations in disease distribution [23,24]. The strong correlation between clinical and histopathological diagnoses, especially for LL, underscores the gold standard role of histopathology in leprosy diagnosis [25,26].

Overall, our study demonstrated a 60-70% correlation between clinical and histopathological findings, aligning with similar studies [27,28]. These findings emphasize the importance of histopathological examination in accurately diagnosing leprosy, particularly in cases with clinical complexities or variations.

Conclusion

The spectrum of leprosy presentations is extensive, presenting a diagnostic challenge. Histopathology remains the gold standard for early diagnosis and classification. Timely diagnosis and treatment are crucial in preventing deformities and drug

resistance. The prevalence of borderline spectrum and multibacillary leprosy may be attributed to factors such as lower socioeconomic status, inadequate sanitation, overcrowding, and low literacy rates. These study findings could inform policymakers at the state and central levels to devise more effective strategies toward eradicating leprosy.

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