Section: DVL

Original Research Article

A STUDY ON EVALUATION OF CLINICO-HISTOLOGICAL CORRELATION OF LEPROSY SUBTYPES IN PATIENTS PRESENTING TO TERTIARY CARE CENTRE

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ABSTRACT

Background: Leprosy, or Hansen's disease, is a chronic infection caused by *Mycobacterium leprae*, presenting with skin and nerve damage, and classified based on clinical and histopathological features. Despite efforts in India through the National Leprosy Eradication Program and multi-drug therapy, the country still records over 100,000 new cases annually, highlighting the need for improved diagnostics and treatment strategies. This study was done to evaluate the correlation between clinical and histological diagnosis of leprosy subtype.

Materials and Methods: This prospective study, conducted from March 2022 to February 2024, involved 50 leprosy patients diagnosed through clinical symptoms such as skin lesions and nerve involvement. Each patient underwent detailed clinical and histopathological evaluations, with cases categorized into subtypes using the Ridley-Jopling scale.

Results: This study examined 50 untreated leprosy patients, with 74% of participants aged between 21-40 years and a male-to-female ratio of 1.5:1. Lepromatous leprosy was the most common subtype (48%), primarily affecting the back, followed by tuberculoid leprosy (22%), with clinico-histological discrepancies noted in 14% of lepromatous cases.

Conclusion: The study concludes the need of implementing histological confirmation of the subtype of leprosy before initiating anti-leprosy treatment.

Keywords: Leprosy, Ridley- Jopling classification; Faraco staining; mycobacterium leprae; clinico-histological correlation.

INTRODUCTION

Leprosy, also known as Hansen's disease, is a chronic infectious disease caused by the bacillus *Mycobacterium leprae*. The term "leprosy" is derived from the Greek word "lepra," which refers to scaly or flaky skin, reflecting one of the most visible symptoms of the disease. Historically, leprosy has been documented in various ancient texts, including those from India, where it is believed to have originated around 2000 BC. In ancient Indian literature, the term "Kushtha" was used to describe skin diseases, including leprosy, indicating its long-standing presence in the region.[1-3]

India bears a significant burden of leprosy, accounting for approximately 58.8% of global new cases reported annually. Despite efforts through the National Leprosy Eradication Program (NLEP), which was initiated in 1955 and gained momentum with the introduction of multi-drug therapy (MDT) in 1983, challenges remain. As of recent reports, over 100,000 new cases are detected each year, indicating a stagnation in progress towards eradication.[2,4]

Diagnosis of leprosy primarily involves clinical evaluation based on cardinal signs such as skin lesions and peripheral nerve involvement. Laboratory tests may be employed in ambiguous cases, including slit-skin smears and histological examinations. Histochemical stains like Ziehl-Neelsen stain are utilized to visualize *M. leprae* within tissue samples. These diagnostic tools are crucial for confirming cases and guiding treatment.[5,6]

Clinically, leprosy presents with a spectrum of manifestations ranging from skin lesions to nerve

damage. The disease is classified into several subtypes based on clinical and histopathological features, including tuberculoid leprosy (TT), lepromatous leprosy (LL), and borderline forms. The classification system was initially proposed by Ridley and Jopling in the 1960s, emphasizing the immunological response of the host to the infection. Each subtype exhibits distinct histological characteristics that aid in diagnosis and treatment planning.[7]

The classification of leprosy is crucial, primarily to facilitate communication across various levels. It can only be considered effective if it is easily applicable by different professionals, such as clinicians, pathologists, and immunologists. This study aimed to evaluate the concordance between clinical and histopathological diagnoses in leprosy cases using the Ridley-Jopling scale.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Dermatology over a period of 2 years, i.e. from March 2022 to February 2024. All patients with confirmed clinical diagnosis of leprosy, above 18 years of age with clinical symptoms such as skin lesions, sensory loss, and nerve involvement were included in this study. Patients with coexisting skin diseases or incomplete medical records were excluded from the study. A total of 50 patients diagnosed with leprosy were selected for this study.

Each patient underwent a thorough clinical examination, during which the type and extent of skin lesions, neurological involvement, and any visible deformities were documented. Clinical classification of leprosy was made based on the Ridley-Jopling scale, categorizing patients into one of the five subtypes: tuberculoid, borderline tuberculoid, mid-borderline, borderline lepromatous, and lepromatous. Histopathological examination was conducted on skin biopsies obtained from active lesions. The biopsies were processed using standard hematoxylin and eosin (H&E) staining techniques, and modified Fite-Faraco staining for the detection of acid-fast bacilli. A slide was prepared for each biopsy specimen, and histopathological classification was also made according to the Ridley-Jopling scale.

Ethical Committee approval was taken before commencement of the study. All patients were included in the study only after taking a written informed consent. All patients were assured of confidentiality terms.

RESULTS

50 clinically diagnosed and untreated cases of leprosy were included in the study. The age of study group ranged from 22 years to 69 years, with a mean age of 31.5 years. Most of the patients belonged to the age group of 21- 40 years (76%), followed by 41-50 years (14%).

The males: female ratio in present study was 1.5 with 60% of them being males and the rest 40% were females.

The most common site for sensory lesions was the back (44%), followed by the leg (20%) and the face (12%). Other sites involved were the forearm, neck, trunk, foot and buttocks.

The most common histological subtype observed in present study was lepromatous leprosy (48%), followed by tuberculoid leprosy (22%).

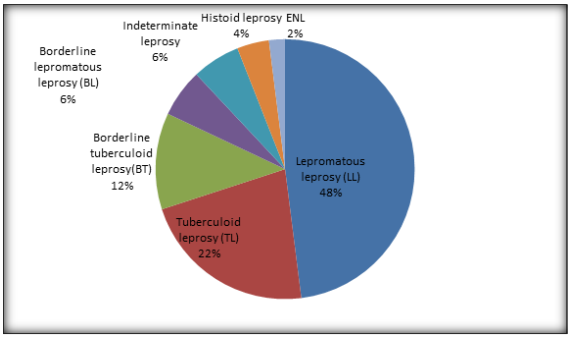

Figure 1: Distribution of various subtypes of leprosy based on histology

Table 1: Age wise distribution of leprosy subtypes

Subtype	%. of patients	21-30 years	31-40 years	41-50 ears	51-60 years	>60 years
Lepromatous leprosy (n = 24)	48%	7 (14%)	10 (20%)	3 (6%)	2 (4%)	2 (4%)
Tuberculoid leprosy (n = 11)	22%	5 (10%)	3 (6%)	2 (4%)	1 (2%)	-
Borderline tuberculoid leprosy (n = 6)	12%	3 (6%)	2 (4%)	1 (2%)	-	-
Borderline lepromatous leprosy (n = 3)	6%	1(2%)	1 (2%)	1 (2%)	-	-
Indeterminate leprosy (n = 3)	6%	1(2%)	1 (2%)	-	-	1(2%)
Histoid leprosy (n = 2)	4%	1 (2%)	1 (2%)	-	-	-
ENL (n = 1)	2%	-	1 (2%)	-	-	-
total	100%	18 (36%)	19 (38%)	7 (14%)	3 (6%)	3 (6%)

Table 2: Gender wise distribution of leprosy subtypes

Subtype	%. of patients	males	females
Lepromatous leprosy (n = 24)	48%	15 (30%)	9 (18%)
Tuberculoid leprosy (n = 11)	22%	7 (14%)	4(8%)
Borderline tuberculoid leprosy (n = 6)	12%	3(6%)	3 (6)%
Borderline lepromatous leprosy (n = 3)	6%	2(4%)	1 (2%)
Indeterminate leprosy (n = 3)	6%	2(4%)	1 (2%)
Histoid leprosy(n = 2)	4%	1 (2%)	1 (2%)
ENL (n = 1)	2%		1 (2%)
total	100%	30 (60%)	20 (40%)

Table 3: Clinico-histological correlation

Clinical diagnosis	%. of patients	Histological diagnosis of leprosy						
		TT	BT	BB	BL	LL	indeterminate	negative
Lepromatous leprosy (n = 24)	48%	1 (2%)	1 (2%)	2 (4%)	4(8%)	15 (30%)	-	1 (2%)
Tuberculoid leprosy (n = 11)	22%	10 (20%)	1 (2%)	-	-	-	1 (2%)	-
Borderline tuberculoid leprosy (n = 6)	12%	1 (2%)	4(8%)	-	-	-	1 (2%)	-
Borderline lepromatous leprosy (n = 3)	6%	-	-	1 (2%)	2 (4%)	-	-	-
Indeterminate leprosy (n = 3)	6%	1 (2%)	1 (2%)				1 (2%)	
Total		13(26%)	7 (14%)	3 (6%)	6 (12%)	15 (30%)	3 (6%)	1 (2%)

All the 50 samples were stained with the modified Fite-Faraco stain and evalued for AFB to confirm the clinical diagnosis histologically. Out of the 48% of clinical LL type, only 30% had LL.

DISCUSSION

The clinico-histological correlation observed in the current study is consistent with several recent findings in the field of leprosy research. The predominance of lepromatous leprosy (LL), accounting for 48% of the cases in the present study, echoes the findings of Gupta et al,[8] who reported a similar frequency of LL in endemic regions. The observed clinico-histological discordance in LL (with only 30% of cases confirmed histologically) is also supported by Manandharet al,[9] who emphasized the role of immune modulation in LL patients, contributing to diagnostic challenges between clinical presentation and histopathological findings.

Tuberculoid leprosy (TT), which showed a high correlation in both clinical and histopathological diagnoses (20% of 22% cases confirmed), is in line with the work of Singh et al,[10] who highlighted the relatively stable immune response in TT cases, leading to clearer diagnostic outcomes. Their study underscored the importance of granulomatous reactions and well-defined lesions, as seen in TT, which make it more straightforward to diagnose compared to borderline types.

Borderline subtypes, such as borderline tuberculoid (BT) and borderline lepromatous (BL), which showed mixed clinico-histological concordance, align with recent observations by Rao et al.[11] They discussed the immunological fluidity in borderline cases, leading to shifting clinical manifestations that may not always match histological findings. This is particularly evident in cases where patients transition between the tuberculoid and lepromatous poles, as seen in borderline leprosy.

Additionally, Kumari et al,[12] emphasized the importance of histopathological confirmation, especially in cases where clinical features alone may not provide sufficient diagnostic clarity. Their work also supports the need for adjunctive diagnostic tools, such as immunohistochemistry and molecular studies, to improve diagnostic accuracy in leprosy, particularly in borderline and indeterminate subtypes.

CONCLUSION

In conclusion, this study highlights the predominance of lepromatous leprosy (48%) among untreated cases, with a notable male preponderance (60%). Tuberculoid leprosy accounted for 22%, and histological analysis revealed a 34% clinico-histological concordance for lepromatous leprosy. The back was the most commonly affected site for sensory lesions. These findings underscore the importance of histopathological confirmation, especially in complex cases like borderline leprosy, where immune modulation can cause discrepancies between clinical and histological diagnoses. Further studies should focus on improving diagnostic tools for enhanced clinical correlation.

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Conflicts of Interest: No conflicts of interest declared.

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