Original Research Article

A cross-sectional study of clinicopathological patterns in leprosy patients in a tertiary care centre

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Abstract

Introduction: Mycobacterium leprae is the causative agent of leprosy, a persistent infectious granulomatous disease. 53.6% of newly reported cases worldwide each year still originate in India. The skin and peripheral nerves are the primary areas affected by leprosy. It can manifest in a variety of clinical and histological ways, contingent upon the host's cellular immunological response. Accurate leprosy diagnosis and type depend on histopathological analysis and the presence of lepra bacilli.
Aim: The objective is to evaluate the clinicopathological association between leprosy lesions.
Materials and Methods: Twenty skin biopsy specimens from patients with a clinical diagnosis of leprosy were the subject of a three-month cross-sectional investigation at the Pathology Department of SBKS Medical College and Research Institute, Piparia, Vadodara. Clinicohistopathological correlation was performed after skin biopsies were collected, processed, and stained with H&E stain and Fite-faraco stain to identify histopathological forms of leprosy.
Results: The age range of 41–60 years old accounted for the majority of cases in this study (45%). The ratio of men to women was 1.5:1. The most prevalent kind was borderline tuberculoid leprosy (8 cases, 40%), which was followed by lepromatous leprosy (4 instances, 20%). All instances of lepromatous leprosy (LL), borderline lepromatous leprosy (BL), and histoid leprosy tested positive for Fite-faraco. 55% of instances showed clinico-pathological concordance.
Conclusion: Fite-faraco staining and histopathological analysis are advised in all clinically suspected leprosy cases in order to aid in precise leprosy subtyping and diagnosis.

Keywords: Leprosy, Clinico-pathological, Fite-faraco stain, Skin biopsy.

1. Introduction

Leprosy is a chronic infectious granulomatous disease caused by Mycobacterium leprae.[1] In India, leprosy has been declared eliminated (prevalence rate <1/10,000 population) on January 1, 2003. Still cases are being reported with varying prevalence from many areas of the country.[2] India continues to account for 53.6% of newly reported cases per year across the globe, warranting a sustainable effort to reduce the disease burden.[3]

Leprosy mainly affects the skin causing lesions and anesthesia along with peripheral nerve thickening. It also involves muscles, eyes, bones, testis and internal organs.[4] It presents with various clinical and Histopathological forms depending on the Host cellular immune response.[5]

It is divided into 5 groups based on the Ridley-Jopling classification: Lepromatous (LL), Mid-borderline (BB), Tuberculoid (TT), Borderline Tuberculoid (BT), and Borderline Lepromatous (BL).[6] Types that don't fall into any of these five types are known as indeterminate forms. A rare form of LL known as histoid leprosy causes nodules or plaques to appear on otherwise healthy skin.[7]

2. Aim

To evaluate the clinicopathological association between leprosy lesions.

3. Objectives

1. To assess leprosy cases based on clinical appearance,

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age, and sex.

2. To use the Ridley-Jopling classification to evaluate the agreement between the clinical and histological diagnosis of leprosy.
3. To determine how common Fite-faraco positive is across the leprosy spectrum.

4. Materials and Methods

Over the course of three months, the Pathology Department at SBKS Medical College in Piparia, Vadodara conducted a cross-sectional investigation on skin biopsy specimens from twenty clinically diagnosed leprosy cases.

Leprosy cases with a clinical diagnosis and the willingness to provide written informed consent were considered for inclusion.

Biopsies that were inadequate or badly maintained were not included. Cases that were clinically suspected but not verified by biopsies were not included.

4.1. Methodology

After being preserved in 10% formalin, skin samples were sent to the pathology department for standard tissue processing and paraffin embedding. Haematoxylin & Eosin (H&E) and the Modified Fite-faraco method were used to stain many sections of 4-5 microns in order to analyse histomorphology and show Acid Fast Bacilli, respectively. Cases were categorised using the Ridley-Jopling criteria after the leprosy diagnosis was confirmed, and a comparison between the clinical and histological diagnoses was made.

4.2. Statistical Analysis

After gathering the data and entering it into Microsoft Excel, statistical analysis was performed using proportions and percentages.

5. Results

The current study includes twenty skin samples taken from leprosy patients. The patients ranged in age from 18 to 59. Patients between the ages of 41 and 60 made up the majority (45%), followed by those between the ages of 21 and 40. The male to female ratio was 1.5:1, with 12 (60%) of the 20 cases being male and 8 (40%) being female. A hypopigmented patch was the most common clinical presentation (45%), followed by erythematous lesions (25%).(**Table 1**, **Figure 1**)

Two instances (10%) each of TT, BL, and histoid leprosy, one case (5%) of indeterminate leprosy, and BT leprosy (10 cases, 50%) were the most common clinical diagnoses. LL leprosy followed with three cases (15%).(**Table 2**)

Table 1: Age and sex wise distribution of leprosy cases

Age in years	Number of cases, n (%)	Male, n (%)	Female, n (%)
0-20	3 (15%)	3 (15%)	0 (0%)
21-40	8 (40%)	4 (20%)	4 (20%)
41-60	9 (45%)	5 (25%)	4 (20%)
Total	**20 (100%)**	**12 (60%)**	**8 (40%)**

Table 2: Clinico-Histopathological correlation

Clinical diagnosis	Histopathological diagnosis							Total
	TT	BT	BB	BL	LL	HL	IL	
TT	1	1	0	0	0	0	0	**2**
BT	1	5	1	0	1	0	2	**10**
BB	0	0	0	0	0	0	0	**0**
BL	0	1	0	1	0	0	0	**2**
LL	0	1	0	0	2	0	0	**3**
HL	0	0	0	0	1	1	0	**2**
IL	0	0	0	0	0	0	1	**1**
Total	2	8	1	1	4	1	3	20
Agreement %	50%	62.5%	0%	100%	50%	100%	33.3%	55%

Table 3: Distribution of cases according to Type and Fite-faraco positivity

Type of leprosy	Number of cases, n (%)	Number of Fite-faraco positive cases, n (%)
TT	2 (10%)	1 (50%)
BT	8 (40%)	2 (25%)
BB	1 (5%)	0 (0%)
BL	1 (5%)	1 (100%)
LL	4 (20%)	4 (100%)
HL	1 (5%)	1 (100%)
IL	3 (15%)	0 (0%)
Total	20 (100%)	9 (45%)

**Table 4:** Comparison of spectrum of leprosy in different studies

Type	Present study	Roy et al[11]	Vahini G et al[9]	Shivani et al[16]	Tilva KK et al[13]
TT	10%	16.0%	5.5%	19.5%	10.3%
BT	40%	36.0%	38.9%	14.6%	9.5%
BB	5%	0.0%	0.0%	4.9%	11.1%
BL	5%	12.0%	5.5%	4.9%	12.7%
LL	20%	8.0%	11.1%	17.7%	40.5%
IL	15%	8.0%	27.7%	9.8%	0.0%
LL + ENL	0%	8.0%	11.1%	17.1%	5.6%
HL	5%	12.0%	0.0%	4.9%	10.3%

**Table 5:** Comparison of clinico-pathological agreement of different studies

Study	Year of study	Clinico-pathological correlation (%)
Mohan N et al[14]	2013	56.5%
Kumar A et al.,[17]	2014	62.9%
Semwal S et al.,[18]	2018	62%
Damle et al[10]	2021	69%
Tilva KK et al[13]	2022	71%
Present study	2024	55%

According to histopathological analysis, lepromatous leprosy (4 cases, 20%) and borderline tuberculoid leprosy (8 cases, 40%) were the most prevalent types. One case each of BB, BL, and histoid leprosy, two instances (10%) of tuberculoid leprosy, and three cases (15%) of undetermined leprosy were reported. There were 11 cases (55%) in this study where the histopathological and clinical diagnoses agreed overall. The highest clinico-pathological concordance was observed in BL leprosy (100%) and histoid leprosy (100%) followed by BT leprosy (62.5%), TT leprosy (50%) and LL (50%) and indeterminate leprosy (33.3%).(**Table 2**, **Table 3**) Various types are shown in **Figure 3**-**Figure 6**.
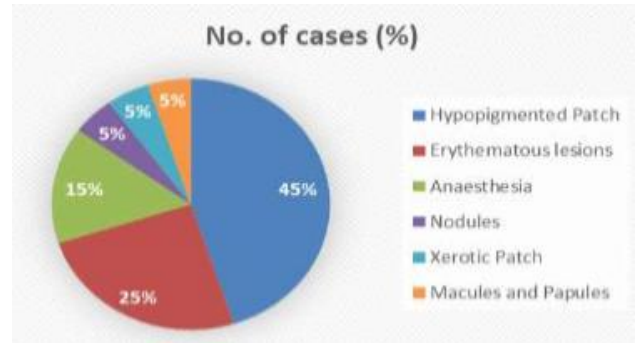
Lepromatous leprosy (100%), BL leprosy (100%), and histoid leprosy (100%) had the greatest Fite-faraco positive in the current investigation. Lepra bacilli were found in two cases of BT leprosy (25%) and one case of TT leprosy (50%) but not in any of the cases of BB leprosy or undetermined leprosy.(**Table 3**, **Figure 2**)
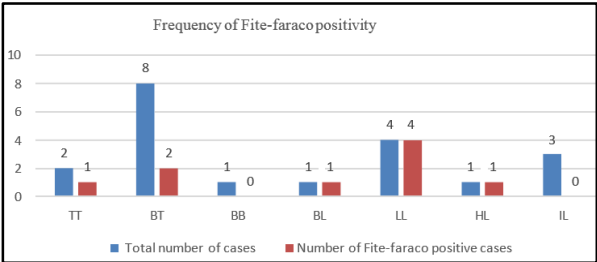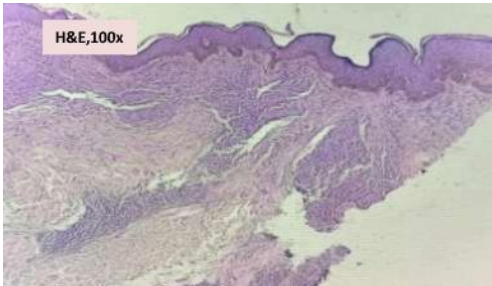

Figure 2: Distribution of cases according to type and fite-faraco positivity
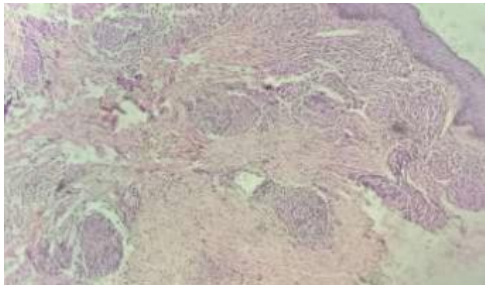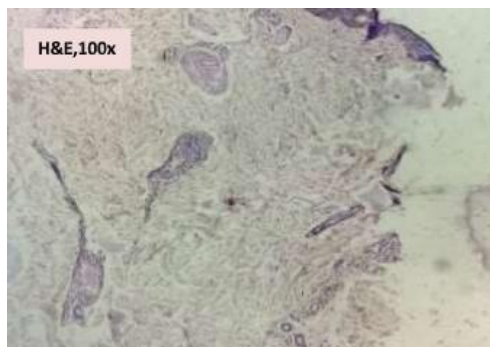

Figure 3: Tuberculoid leprosy showing dense lymphohistiocytic collections forming non-caseating epitheloid granulomas.
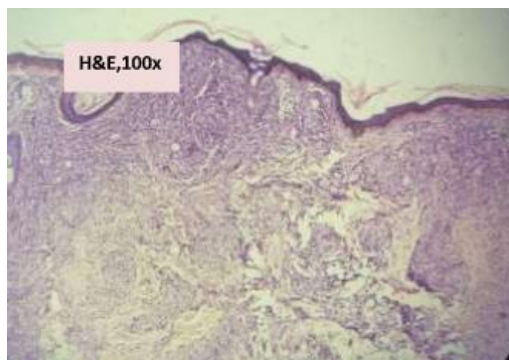

Figure 4: BT leprosy showing ill-defined granuloma formation.

**Figure 1:** Distribution of cases according to clinical presentation

Figure 5: Lepromatous leprosy showing Epidermal atrophy, characteristic subepidermal grenz zone and diffuse inflammatory infiltrate and foamy macrophages in the dermis.

Figure 6: BL leprosy showing perivascular and periadnexal histiocytic collections.
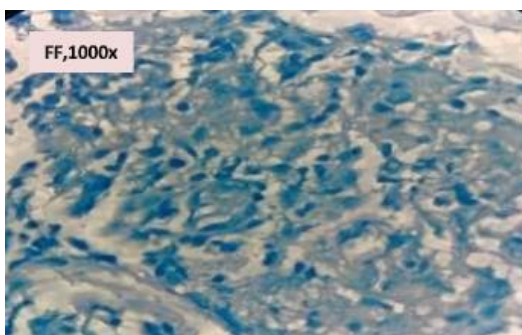
Figure 7: Fite-faraco stain is negative for lepra bacilli.
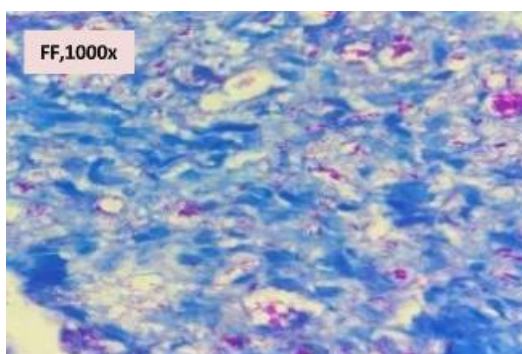
Figure 8: Fite-faraco stain showing numerous lepra bacilli (globi appearance)

6. Discussion

The majority of cases in our study (mean age: 45 years) occurred in the 41-60 years age range, which is similar to Van Brakel WH et al.[8] Middle-aged people are frequently impacted, which may be because leprosy has a long and varied incubation time.

Our study's M:F ratio of 1.5:1 and 60% male predominance were comparable to those of Vahini G et al.[9] Urbanization, industrialization, and increased opportunities for male engagement could be the cause. The most frequent place was the arm and forearm area, and the most prevalent clinical characteristic was a hypopigmented patch (45%), which is similar to Vahini G et al.[9]

In line with Damle et al.,[10] Roy et al.,[11] and Vahini G et al.,[9] histo-pathologically, BT leprosy was the most prevalent kind. Fite-faraco staining, which is comparable to Patel et al.[12] & Tilva KK et al.,[13] revealed the highest percentage of positive in lepromatous leprosy (LL) and histoid leprosy.(**Table 5**)

According to Mohan N et al.,[14] clinico-pathological concordance was observed in 55% of the cases in this investigation. Histoid leprosy had the highest clinicopathological association (100%) and was equivalent to Sindhushree et al.[15] (57.14%). Furthermore, BT leprosy congruence between clinical and histological diagnosis was found in 5 out of 8 cases (62.5%), which is comparable to Damle et al., [10] (82%).(**Table 5**)

7. Conclusion

Leprosy is still common in many parts of India, despite the fact that it is thought to be eradicated there. Due to its varied clinical appearance, leprosy can be challenging to diagnose early based just on clinical symptoms. Fite-faraco staining and histopathological analysis are advised in all clinically suspected leprosy patients. This will aid in precise diagnosis, leprosy subtyping, and patient care.

8. Conflicts of Interest

None declared.

9. Source of Funding

None.

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