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''A Clinico-Histopathological Study Of Hansen's Disease'': A Retrospective Study In A Tertiary Care Hospital At Rajkot (Gujarat), India

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ABSTRACT

Background: Hansen's disease also known as Leprosy is a chronic infectious communicable disease caused mycobacterium leprae. Leprosy is known, since ancient times as "Kushtaroga", whose clinical manifestations are largely confined to the skin, peripheral nervous system, upper respiratory tract, eyes and testes. The three cardinal sign of the disease are skin lesions, skin anesthesia and enlarged peripheral nerves. This study investigated the clinico-histopathological examination of cases of Hansen's disease at P.D.U Medical College and Hospital, Rajkot, Gujarat.

Objective: To know prevalence of leprosy, to study the histopathological features of clinically suspected cases of leprosy in skin biopsies and categorise from tuberculoid to lepromatous leprosy based on Ridley Jopling classification and examined with Fite Faraco stain to look for positivity.

Materials and Methods: The present study was carried out in the Histo-pathology laboratory, Department of Pathology, P.D.U Medical College and Hospital, Rajkot, Gujarat over a period of 11 months between August 2024 to June 2025. Skin biopsies were obtained for histopathological examination along with properly filled requisition form, including detailed clinical history, after adequate fixation and tissue processing, paraffin embedded serial sections done and sections stained with Haematoxylin & eosin stain and F. F. stain, examined under microscope.

Results: A total of 70 cases of this study, most of cases occurred in age group (21-40) years (58.56%) and showed marked male predominance with M:F ratio=3:2. Lepromatous leprosy (47.2%) was the most common histopathological type of leprosy. Maximum clinicopathological correlation seen in BL (100%), BT (75%) and MB (75%).

Conclusion: Leprosy is one of the leading causes of physical disabilities which contribute to intense social stigma resulting in discrimination of patients and their families,especially in low-economic communities. The clinical manifestations of leprosy are so diverse and can mimic a variety of unrelated diseases. Presentation may vary from an insignificant skin lesion to extensive disease. Lack of accurate diagnosis and treatment of leprosy can cause permanent damage to skin, nerves, limbs and eyes leading to deformities.

Keywords: Leprosy, Histopathology, Skin biopsy, Ridley-Jopling classification.

INTRODUCTION

Hansen's disease or leprosy is a chronic infectious disease caused by Mycobacterium leprae- intracellular, obligate parasite. Untreated Leprosy affected person(human beings) is the only known source, transmitted to a susceptible person through droplets, mainly via respiratory tract. It principally affecting the cooler parts of the body, mainly skin and peripheral nerves; it also involves muscles, eyes, bones, testis and internal organs. Tuberculoid leprosy indicates a high cellular immune response (i.e., T cells and macrophage activation) and few bacilli in tissues; at the opposite pole,

lepromatous leprosy indicates an absent cellular immune response to M. leprae antigens, with no macrophage activation and abundant bacilli in tissues. The spectrum of leprosy is a continuum, and patients may move in either direction according to host response and treatment. The standard delineation follows that of Ridley and Jopling, with categories defined along the spectrum by a combination of clinical, microbiological, histopathological, and immunologic indices: TT (tuberculoid), BT (borderline tuberculoid), MB (mid borderline), BL (borderline lepromatous), and LL (lepromatous). The term borderline is used to denote patterns that share some features of both tuberculoid and lepromatous leprosy.

Table 1: Ridley Jopling Classification of leprosy

Observation	**Type of Leprosy**				
	TT	**BT**	**MB**	**BL**	**LL**
Number of lesions	Single usually	Single or few	Several	Many	Very many
Size of lesions	Variable	Variable	Variable	Variable	Small
Surface of lesions	Very dry, sometimes scaly	Dry	Slightly shiny	Shiny	Shiny
Sensation in lesions	Absent	Moderately or markedly diminished	Slightly or moderately diminished	Slightly diminished	Not affected or minimally affected
Hair growth in lesions	Absent	Markedly diminished	Moderately diminished	Slightly diminished	Not affected
AFB in lesions	Nil	Nil or scanty	Moderate numbers	Many	Very many(plus globi)
Lepromin test	Strongly positive (+++)	Weakly positive(+ or ++)	Negative	Negative	Negative
AFB in nasal scraping or in nose blows	Nil	Nil	Nil	Usually nil	Very many(plus globi)

Today, access to information, diagnosis and treatment with Multi Drug Therapy(MDT) remain key elements in the strategy to eliminate the disease. The National Leprosy Eradication Programme(NLEP) was launched in 1983 with the objective of arresting the disease activity in all known cases of leprosy. Since the disease has a long incubation period it needs a longer period of surveillance.

OBJECTIVE

1) To find out prevalence of leprosy in our institute.
2) To study the histopathological features of clinically suspected cases of leprosy in skin biopsies and categorise from tuberculoid to lepromatous leprosy based on microscopy.
3) To study Fite Faraco stained sections of all diagnosed cases of leprosy to look for positivity.
4) To determine the nature of various leprosy lesions and to ascertain the frequency and distribution of leprosy lesions.

MATERIALS AND METHODS

Histopathological examination was carried out in Histopathology laboratory of Department of Pathology, PDU Government Medical College and Hospital, Rajkot between the August 2024 to June 2025 time period. Skin biopsies for the study were obtained by incisional or punch biopsy which was performed by the Dermatologist. These biopsies were kept in 10% formalin and sent for histopathological examination along with properly filled requisition form, including detailed clinical history, examination findings indicating signs and symptoms of the skin lesions and provisional clinical diagnosis. Following adequate fixation for about 8-12 hours the tissues were submitted into for routine processing, following which the paraffin embedded serial sections of 4-5 microns thickness were obtained, which were stained with Hematoxylin and Eosin for morphological assessment and Wade Fite staining for identifying the bacilli. The procedure followed for Fite Faraco Stain was Wade-Fite method for M. leprae in paraffin section.

sections were observed under oil immersion using ×100 objectives. The bacillary index (BI) was assessed in exactly the same way as the one follow for smear. The entire dermis was observed to assess the logarithmic index bacilli.

RESULTS:

Patient Demographics:

A total of 70 cases of leprosy for histopathological evaluation with its clinical correlation and demonstration of lepra bacilli on F. F. stain were included in the study. In present study, age of the patient ranged from 0-80 years.(TABLE-2) Maximum number of cases 41(58.56%) were seen in the age group 21-40 years followed by 17(24.23%) in 41-60 years.

TABLE 2: Distribution of leprosy cases in different Age group:

Age range(20 years)	No. of Cases	Percentage
0-20	08	11.44%
21-40	41	58.56%
41-60	17	24.23%
61-80	04	5.71%
Total	**70**	**100%**

In present study consisting of 70 cases, 42(60%) were males and 28(40%)were females. Male to female ratio was 3:2 (TABLE- 3)

TABLE 3: Distribution of leprosy cases according to gender

Gender	No. Of Cases	Percentage
Male	42	60%
Female	28	40%
Total	**70**	**100%**

In present study (Table 4)the maximum number of cases 33(47.2%) cases were of lepromatous leprosy followed by 11(15.77%) cases of Borderline Tuberculoid leprosy, 10(14.3%) cases of Borderline Lepromatous , 08(11.44%) cases of Lepromatous leprosy with Erythma Nodosum Leprosum, 05(7.14%) cases of Tuberculoid leprosy, 03(4.29%) cases of Mid Borderline leprosy seen.

TABLE 4: Distribution of various types of leprosy by histopathological examination

Type	No. Of Cases	Percentage
TT	05	7.14%
BT	11	15.77%
MB	03	4.29%
BL	10	14.3%
LL	33	47.2%
LL WITH ENL	08	11.44%
Total	**70**	**100%**

(TT- Tuberculoid leprosy, BT- Borderline Tuberculoid leprosy, MB- Mid Borderline leprosy, BL- Borderline Lepromatous leprosy, LL- Lepromatous Leprosy, LL with ENL- Lepromatous Leprosy with Erythema Nodosum Leprosum)

TABLE 5:Distribution of clinical features in various types of leprosy

Cytological diagnosis	No. Of Cases	Percentage
Hypopigmented lesions	22	31.44%
Erythematous lesions	22	31.44%
Combined lesions(macule and papule)	21	30%
Anesthesia (loss of sensation)	07	10%
Nerve thickening	11	15.77%
Nodules	10	14.23%
Tingling and numbness	36	51.44%

Out of 70 cases of skin biopsies it can be observed(Table 5) that Tingling and numbness seen in 36 cases(51.44%)which was the most common clinical feature, Hypopigmented lesions and Erythematous lesions seen in 22 cases(31.44%)were

2nd most common feature observed followed by Nerve thickening seen in 11 cases(15.77%), Nodules seen in 10 cases(14.23%) and anesthesia(loss of sensation) seen in 07 cases(10%).

TABLE 6: Correlation of clinical and histopathological classification in leprosy cases

Clinical type	Clinically diagnosed cases	TT	BT	MB	BL	LL	LL WITH ENL	Percentage
TT	07	05	02	00	00	00	00	71.42%
BT	08	00	06	00	01	00	01	75%
MB	04	00	01	03	00	00	00	75%
BL	03	00	00	00	03	00	00	100%
LL	43	00	02	00	03	33	05	76.74%
LL WITH ENL	05	00	00	00	03	00	02	40%
Total	70	05	11	03	10	33	08	72.32%

(TT- Tuberculoid leprosy, BT- Borderline Tuberculoid leprosy, MB- Mid Borderline leprosy, BL- Borderline Lepromatous leprosy, LL- Lepromatous Leprosy, LL with ENL- Lepromatous Leprosy with Erythema Nodosum Leprosum)

From Table 6 it can be observed that the overall concordance between clinical and histopathological classification was 72.32%. Maximum concordance was seen in Borderline lepromatous leprosy which was 100% followed by 75% in BT, 75% MB, 76.74% in LL, 71.42% in TT.

TABLE 7: Percentage distribution of F F Stain positivity among various histologic types of leprosy

Type of leprosy	Total no of cases	No of positive cases	Percentage
TT	05	04	80%
BT	11	06	54.54%
MB	03	02	66.66%
BL	10	09	87.5%
LL	33	33	100%
LL WITH ENL	08	08	100%
Total	70	62	88.57%

(TT- Tuberculoid leprosy, BT- Borderline Tuberculoid leprosy, MB- Mid Borderline leprosy, BL- Borderline Lepromatous leprosy, LL- Lepromatous Leprosy, LL with ENL- Lepromatous Leprosy with Erythema Nodosum Leprosum)

From above table 7 it can be said that out of 70 cases which were diagnosed by Histopathological examination into different form of leprosy , 62 cases (88.57%)were F. F. Positive. Out of these positive cases, maximum cases of LL were found. Low positivity was seen in BT and MB.
Bacillary index was highest in HL, LL and BL having grade 5+, 6+ while it was lower in other types of leprosy ranging from 1+ to 4+

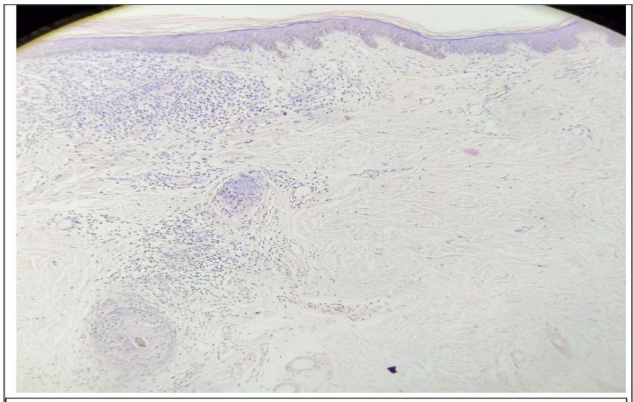

Figure 1: TUBERCULOID LEPROSY (H & E stain 10x) showing granuloma of epitheloid cells with lymphocytes infiltration

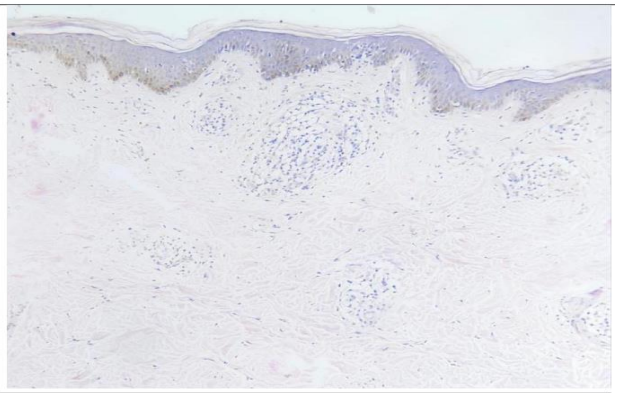

Figure 2: BORDERLINE TUBERCULOID LEPROSY (H & E stain 10x) showing poorly formed granuloma of epithelioid cells with lymphocytes infiltration

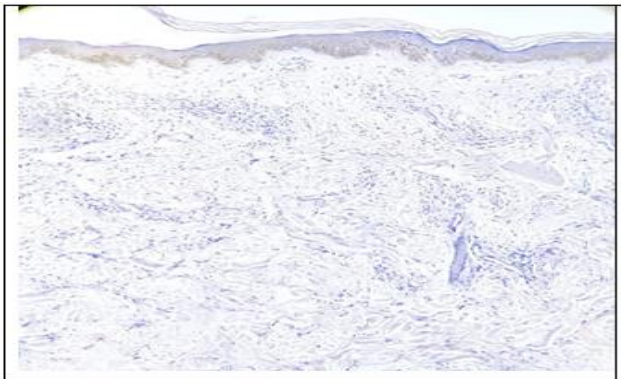

Figure 3: LEPROMATOUS LEPROSY (H & E stain 10x) shows epidermal atrophy with mass of foamy macrophages in dermis(no granuloma formation), leaving a clear grenz zone under the epidermis

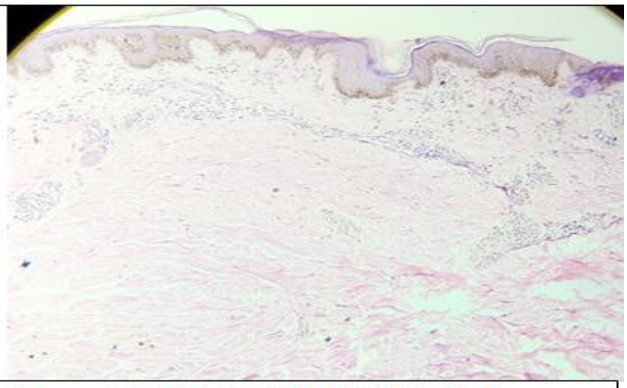

Figure 4: BORDERLINE LEPROMATOUS LEPROSY(H & E stain 10x) showing epidermal atrophy, foamy macrophages and lymphocytic infiltrate

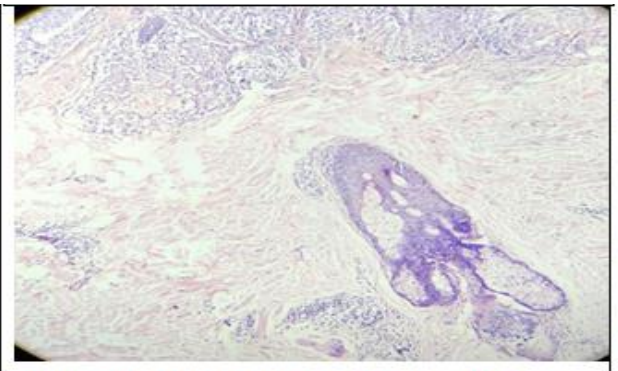

Figure 5: MID BORDERLINE LEPROSY(H & E stain 10x)

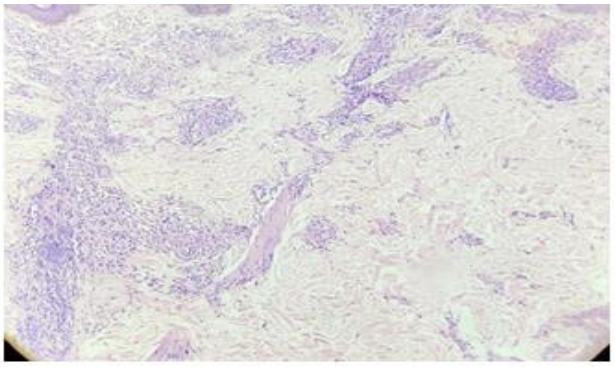

Figure 6: LEPROMATOUS LEPROSY WITH ERYTHEMA NODOSUM LEPROSUM(H & E stain 10x) showing numerous neutrophilic infiltrate

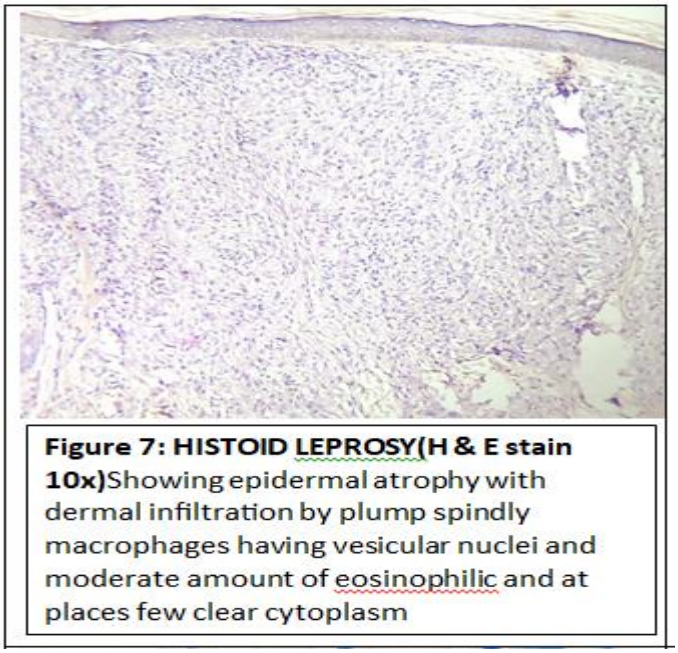

Figure 7: HISTOID LEPROSY(H & E stain 10x) Showing epidermal atrophy with dermal infiltration by plump spindly macrophages having vesicular nuclei and moderate amount of eosinophilic and at places few clear cytoplasm

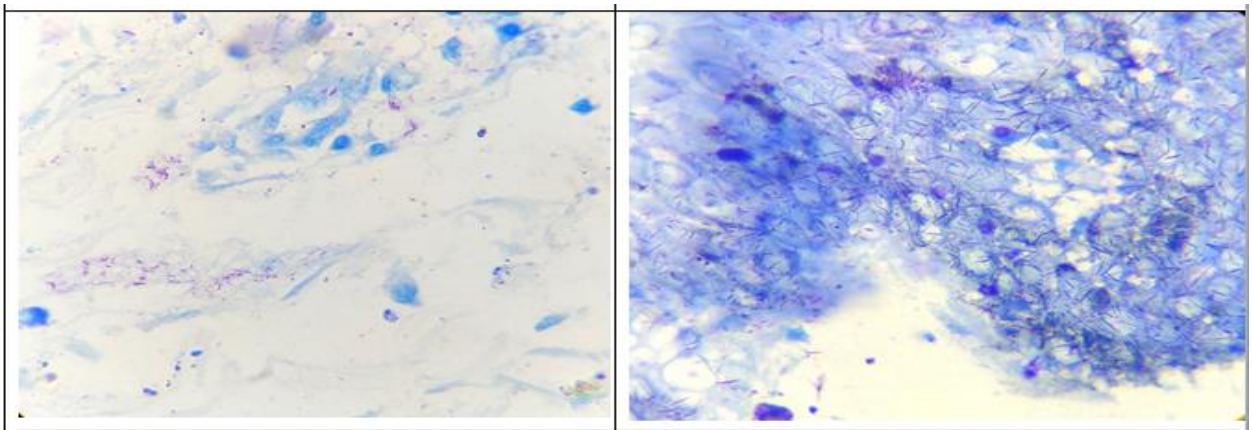

Figure 8 & 9: LEPROMATOUS LEPROSY (Fite Faraco stain 10x) showing macrophages and endothelial cells of the capillary contain solid acid-fast bacilli

DISCUSSION

The present study demonstrated the clinico-histopathological examination of total 70 cases of leprosy of August 2024 to July 2025(11 months) was carried out in the Department of Pathology, P.D.U. Government Medical College & Hospital, Rajkot. Accurate diagnosis is of fundamental importance to all aspects of leprosy epidemiology, management and prevention of disability. Under diagnosis will lead to continued transmission of disease and much needless sufferings. The attitude of society, methods of case detection, type of personnel carrying out survey, method and frequency of examination, the criteria adopted for diagnosis, type of classification of disease, are some variables that affect the description of the condition. Histopathological examination continues to be an important tool in accurate diagnosis and classification of leprosy and still remains the gold standard.

Table 8: Comparison of gender distribution in leprosy cases with various study

	Present study	**Tiwari et al (2015)**	**Mathur et al (2011)**	**Nadia et al (2015)**
No of cases	70	53	156	118
MALE	42	31	84	76
FEMALE	28	22	72	42

From above table-8 it can be observed that male preponderance observed in present study(60%) is comparable to all other studies which reported M:F ratio from 1.5, 1.4, 1.1, 1.8.

Table 9: Comparison of spectrum of leprosy of present study with various study

TYPE OF LEPROSY	Present study	Tiwari et al(2015)	Mathur et al(2011)	Nadia et al(2015)
TT	05	04	43	17
BT	11	22	39	41
MB	03	03	07	19
BL	10	22	30	12
LL	32	02	21	29
LL WITH ENL	08	00	00	00
NO EVIDENCE OF LEPROSY	00	00	16	00
TOTAL	70	53	156	118

(TT- Tuberculoid leprosy, BT- Borderline Tuberculoid leprosy, MB- Mid Borderline leprosy, BL- Borderline Lepromatous leprosy, LL- Lepromatous Leprosy, LL with ENL- Lepromatous Leprosy with Erythema Nodosum Leprosum)

From above table-9 it is observed that In present study most common type of leprosy was the lepromatous leprosy , 33 cases(47.2%) followed by borderline tuberculoid leprosy is comparable to all other studies which suggest that no. Of infective cases (LL) are more common in Gujarat state as in present study.

Table 10: Comprison of clinicopathological correlation

Studies	TT	BT	MB	BL	LL	HL
Present study	71.42%	75%	75%	100%	72.5%	00%
Sindhushree et al[21]	25%	37.89%	8.30%	12.50%	33.30%	57.14%
Kalla et al[22]	76.70%	44.20%	37%	43.70%	75.60%	-

(TT- Tuberculoid leprosy, BT- Borderline Tuberculoid leprosy, MB- Mid Borderline leprosy, BL- Borderline Lepromatous leprosy, LL- Lepromatous Leprosy, HL- Histoid Leprosy)

Different studies showed variable clinicopathological correlation. In present study, maximum clinicopathological correlation seen in cases of Borderline Lepromatous leprosy (100%) while in Sindhushree et al study maximum correlation seen in Histoid leprosy (57.14%) and in Kalla et al maximum clinicopathological seen in cases of TT (76.70%).[21,22]

Out of 70 patient, which were diagnosed by Histopathological examination into different forms of leprosy, Modified fite faraco stain positivity was in 88.57% was somewhat higher to the study of Deepa sowkur Anandarma aligra and Surekha B Hippargi 2 in 2016. It may be due to more cases of LL in present study.

CONCLUSION

Leprosy is one of the leading causes of physical disabilities which contribute to intense social stigma resulting in discrimination of patients and their families,especially in low-economic communities.The clinical manifestations of leprosy are so diverse and can mimic a variety of unrelated diseases. Presentation may vary from an insignificant skin lesion to extensive disease. Lack of accurate diagnosis and treatment of leprosy can cause permanent damage to skin, nerves, limbs and eyes leading to deformities.

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