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EVALUATION OF HISTOPATHOLOGICAL EXAMINATION OF SKIN BIOPSY IN DIAGNOSIS OF LEPROSY WITH CLINICAL CORRELATION

Histopathology

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ABSTRACT

Background: Leprosy is a chronic granulomatous infection caused by M. leprae (also known as Hansen disease) predominantly affects the skin and peripheral nerves. It is difficult to diagnose leprosy clinically due to its clinical diversity and ability to mimic other skin diseases. Histopathological examination of skin biopsies plays an important role in early diagnosis, categorization, and treatment to prevent permanent nerve damage. It has different types of histopathological types depending on the immunity of the patient. The present study was done to analyze the importance of histopathological examination in leprosy cases as an important diagnostic tool. **Objectives:** To evaluate histopathological examination of skin biopsy in diagnosis of leprosy, categorization and clinicopathological correlation. **Materials And Methods:** A descriptive observational study of total 150 cases diagnosed as leprosy was conducted for duration of 3 years from September 2021 to August 2023 at Shri M.P.Shah Gov. Medical college, Jamnagar. Skin biopsies were received, processed and stained by H & E stain to classify histopathological types of leprosy. Fite-faraco stain was done to demonstrate lepra bacilli for bacillary Index. **Result:** A total 88 cases were studied of which male and female were 59(67%) and 29(33%) respectively. Maximum cases were from 31-40 years age group (22.8%). Borderline Lepromatous Leprosy (BL) was diagnosed in maximum 29 cases(33%). 100% agreement was seen in Tuberculoid leprosy (TT), Midborderline leprosy (BB) and Histoid leprosy (HL) cases followed by Lepromatous Leprosy (LL) (81.8%), Borderline Lepromatous Leprosy (BL) (69%), Borderline Tuberculoid leprosy (BT) (45%) and Indeterminate Leprosy (IL) (23.5%). **Conclusion:** Histopathological examination of skin lesions is a crucial method that is highly recommended in all cases of leprosy for diagnostic accuracy and clinicopathological correlation, which lead to better prognosis and early proper treatment of the patient.

KEYWORDS

Leprosy, Skin biopsy, Lepromatous, Tuberculoid

INTRODUCTION

Leprosy is a chronic granulomatous infection caused by *M. leprae (*also known as Hansen disease) predominantly affects the skin and peripheral nerves, mucosa of the upper respiratory tract, and the eyes. The mechanism is probably inhalation of bacilli which get excreted from the nasal passage or possibly implanted from organisms in the soil.[1] Leprosy is curable and treatment in the early stages can prevent disability. Apart from the physical deformity, leprosy can also lead to face stigmatization and discrimination. [2] The causative agent of leprosy, M. leprae was discovered by Armauer Hansen in 1873.[3]

Leprosy has been declared eliminated (prevalence rate<1/10,000 population) in India on January 1, 2006. The Government of India has launched National Strategic Plan (NSP) & Road map for Leprosy (2023-27) on 30th January, 2023 to achieve zero transmission of leprosy by 2027. With various intervention introduced under NLEP in the last few years, number of new leprosy cases detected have come down to 75,394 in 2021-22 from 1,25,785 in 2014-15, accounting for 53.6% of global new leprosy cases. [4]

It is difficult to diagnose leprosy clinically due to its clinical diversity and ability to mimic other skin diseases.[5] Thus, histopathological examination of skin biopsies plays an important role in early diagnosis, categorization, and treatment to prevent permanent nerve damage. It has different histopathological types depending on the immunity of the patient.[6]

The Ridley-Jopling classification is the most widely used based on clinical immunological and histomorphological factors. In this classification, leprosy has been divided into five groups as Tuberculoid(TT), Borderline tuberculoid(BT), Mid-bordrline (BB), Borderline Lepromatous (BL), and Lepromatous (LL).[7] Indeterminate is an early type that is not included into any of the five categories. Histoid leprosy is an uncommon type of LL that has higher bacillary load and shows nodules or plaques.[8] The present study was done to analyze the importance of histopathological examination in leprosy cases as an important diagnostic tool.

Table-1.Clinical aspects of Ridley-Jopling Classification of Leprosy[9]

Observation or test	Type of leprosy				
	TT	BT	BB	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 (not face)	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)
AFB in nasal scraping or in nose blows	Nil	NIL	Nil	Usually nil	Very many (plus globi)
Lepromin test	Strongly positive (+++)	Weakly positive (+ or ++)	Negative	Negative	Negative

MATERIAL AND METHOD

This observational retrospective study for duration of 3 years (September 2020 to August 2023) was conducted in the Department of Pathology in at Shri M.P.Shah Gov. medical college, Jamnagar after ethical approval of the institute.

Inclusion Criteria:

All cases diagnosed as leprosy in histopathology examination in the department of Pathology were included in the study.

Exclusion Criteria:

Clinically suspected as leprosy cases but not confirmed on biopsy were excluded.

All skin biopsies were fixed with 10% formalin. All the tissues were

processed and embedded in paraffin blocks. Sections of 4µm thickness were cut, stained with hematoxylin and eosin (H and E) and by modified Fite-Faraco (FF) for Lepra bacilli. Slides were examined and reported using Ridley-Jopling classification and Bacillary index was recorded by expert pathologists. Histopathological diagnosis and categorization were given according to following morphological findings.

Table-2. Histopathological features of types of Leprosy[9]

Types parameter	IL	TT	BT	BB	BL	LL
Granuloma	Absent	Epitheloid cells	Epithe loid cells	Mixed cellular	Macrop hages	Macrop hages
T-lymphocytes	4+	4+	3+	2+	2+	1+
Epitheloid cells	Absent	4+	3+	2+	1+	Absent
Giant cells	Absent	3+	4+	Absent	Absent	Absent
Macrophage	Absent	Absent	1+	2+	3+	4+
Bacterial index	Negative	Negative	1+	2-3+	3-4+	5-6+

The Case records of skin biopsy diagnosed as leprosy with issued reports were collected from the Department. Data of clinical information and histopathological findings were recorded. Statistical analysis was done after primary data collection, entered in Microsoft excel and analysis was done in the form of percentages and represented in tables.

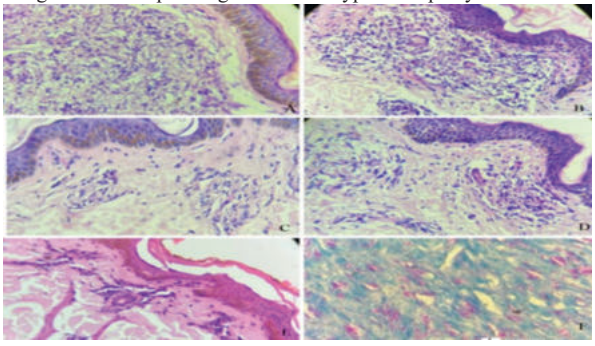
RESULT

Total 88 cases of leprosy were studied of which male and female cases were 59(67%) and 29(33%) respectively. M:F ratio is 2:1. Maximum cases were from 31-40 years age group (22.8%). Borderline Lepromatous Leprosy (BL) was diagnosed in maximum cases 29 (33%) as given in Table-3.

Table-3. Age and gender wise distribution of different types of leprosy

Types of Leprosy	TT		BT		BB		BL		LL		IL		HL		Total		Total (%)
Age (years)	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
1-10	0	1	1	1	0	0	0	2	0	0	1	0	0	0	2	4	6(6.8 %)
11-20	1	0	0	1	0	0	2	0	2	0	2	2	0	0	7	3	10(11. 4%)
21-30	0	1	2	1	1	0	5	2	2	0	3	0	0	0	13	4	17(19. 3%)
31-40	1	1	1	3	0	0	8	2	1	0	2	1	0	0	13	7	20(22. 8%)
41-50	0	1	5	2	0	0	3	2	1	0	1	2	0	0	10	7	17(19. 3%)
51-60	2	1	2	0	0	0	1	1	4	1	2	1	1	0	12	4	16(18. 2%)
61-70	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	2(2.28 %)
Total	4	5	12	8	1	0	20	9	10	1	11	6	1	0	59	29	88(10 0%)
Total	9(10. 2%)		20(22. 8%)		1(1.1 %)		29(33 %)		11(12 .5%)		17(19 .3%)		1(1. 1%)		67%		33%

Image 1.Microscopic images of various types of Leprosy



A- Lepramatous leprosy (x400, H & E)
B- Tuberculoid Leprosy (x400, H & E)
C- Borderline Lepramatous Leprosy (x400, H & E)
D- Borderline Tuberculoid Leprosy (x400, H & E)
E- Indeterminate Leprosy (x400, H & E)
F- Fite Faraco stain-Positive AFB (x1000, H & E)

As given in table-4, in clinicopathological correlation study, 100% agreement was seen in TT,BB and HL cases followed by LL cases (81.8%), BL (69%), BT(45%). Minimum agreement was seen in cases of IL (23.5%) of which majority were clinically diagnosed as BT. No case of lepra reaction was noted. Hypopigmented and anaesthetic plaque was the common clinical feature followed by erythematous lesions. Most common site of lesions were upper limb followed by trunk, face and lower limb. All of the LL, BL and HL cases showed presence of acid-fast bacilli on Fite faraco stain. All BB, BT and TT cases were negative on Fite faraco stain.

DISCUSSION

In the present study, Out of total 88 cases, maximum are in age group 31-40 years (22.8%) which is in concordance with other studies as Ramesh et al[9], Shivani et al[11]and Tilva et al[13].This study showed M:F ratio = 2:1 which is comparable with Ruchi et al[10], Shivani et al[11],Nadia et al [12] and Tilva et al[13].

Table-4.Clinicopathological Correlation

Clinical Diagnosis	Histopathological diagnosis							Total
	TT	BT	BB	BL	LL	IL	HL	
TT	9	3	0	2	0	0	0	14
BT	0	9	0	2	0	8	0	19
BB	0	0	1	0	0	0	0	1
BL	0	0	0	20	1	4	0	25
LL	0	0	0	1	9	1	0	11
IL	0	8	0	4	1	4	0	17
HL	0	0	0	0	0	0	1	1
Total	9	20	1	29	11	17	1	88
Agreement (%)	100%	45%	100%	69%	81.8%	23.5%	100%	100%

Present study has maximum cases of BL which is in concordance with Ruchi et al[10], followed by BT whereas in Ramesh et al[9] maximum cases were from BT. Cases of LL are comparable with other studies whereas in Tilva et al[13] maximum cases were from LL. Present study has less number of TT cases than Shivani et al[11] as shown in Table-5.

Table-5. Histopathological types of leprosy in other studies

Type	Present study	Ramesh et al[9]	Ruchi et al[10]	Shivani et al[11]	Nadia et al[12]	Tilva et al[13]
TT	10.2%	0.0%	4.0%	19.5%	14.4%	10.3%
BT	22.8%	50%	14.0%	14.6%	34.7%	9.5%
BB	1.1%	0.0%	17.0%	4.9%	16.1%	11.1%
BL	33%	18.18%	43.0%	4.9%	5.9%	12.7%
LL	12.5%	29.54%	11.5%	17.7%	21.1%	40.5%
IL	19.3%	0.0%	5.5%	9.8%	4.2%	0.0%
LL with ENL	0.0%	0.0%	3.5%	17.1%	0.0%	5.6%
HL	1.1%	2.27%	1.5%	4.9%	3.4%	10.3%

Present study showed 81.8% clinicopathological correlation in LL and 69% in BL, which is in concordance with Tilva et al[13] and Moorthy et al.[14]. In IL, clinicopathological correlation is 23.5% which is also consistent with Moorthy et al[14]as given in Table-6.

Table-6: Comparison of clinicopathological correlation.

Studies	TT	BT	BB	BL	LL	IL	HL
Present Study	100%	45%	100%	69%	81.8%	23.5%	100%
Tilva et al[13]	76.9%	66.7%	71.4%	62.5%	77.6%	-	100%
Moorthy et al[14]	46.15%	66.54%	50%	70%	80%	20%	-

CONCLUSION

Histopathological examination of skin lesions is a crucial method for definitive diagnosis and typing of leprosy.[14] Skin biopsy is an easy and minimally invasive procedure. Histopathological examination and demonstration of acid fast lepra bacilli is highly recommended in all cases of leprosy for diagnostic accuracy and clinicopathological correlation, which can lead to better prognosis and early proper treatment of the patient.

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None.

Conflict Of Interest

The authors declare no conflict of interest.

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