Chinese Journal of Evidence-Based Medicine

A HISTOPATHLOGICAL STUDY OF LEPROSY ON SKIN AND PERIPHERAL NERVES WITH CLINICALCORRELATION

[1] Thilak Kumar P, [2*] Dr. Gudeli Vahini, [3] V M K Yaswant

[1] Third year MBBS, Alluri Sitarama Raju Academy of Medical Sciences, Eluru

[2] Professor & HOD, Department of Pathology, Alluri Sitarama Raju Academy of Medical Sciences, Eluru

[3] Third year MBBS, Alluri Sitarama Raju Academy of Medical Sciences, Eluru

DOI: https://doie.org/10.0924/Cjebm.2024267615

ABSTRACT

Background: Leprosy, caused by the bacterium Mycobacterium leprae, was once a major health threat but has become less deadly due to advances in treatment. Despite this progress, leprosy remains a significant issue in tropical regions, particularly in India, where it continues to affect many people each year. The disease varies in severity and is classified into different types based on symptoms, immune response and histopathology. Accurate diagnosis and treatment are challenging due to limited studies and resources, particularly in India. This study was conducted to address the gap in histopathological research on leprosy, aiming to improve early diagnosis, enhance treatment strategies, and reduce leprosy-related disability.

Aim: To study the histopathological classification of Leprosy in a tertiary care hospital (ASRAM Hospital, Eluru) and to clinically correlate and analyse the distribution of the Leprosy cases in various aspects.

Materials and methods: This was a hospital based retrospective study of 40 clinically diagnosed cases of leprosy. The reports of samples stained by H&E stain were analysed to classify the disease and compared with clinical parameters presented by the patients.

Results: Out of 40 cases studied, both male and female has equal predominance. Majority of the cases 27.5% belonged to the age group 31 – 40 years. Borderline tuberculoid leprosy was the most common 27.5%, in this study. About 45% of the cases had lesions all over the body.

Conclusion: Histopathology is the gold standard technique used to diagnose and classify leprosy.

1. Introduction

Leprosy is one of the most threatening and endemic disease. It was one of the deadliest disease in the mid 1850's, till 1950. The bacteria were discovered by Hansen in 1837. It is an important public health menace, being prevalent throughout many areas in India and still carrying a social stigma for the patients affected. It is a granulomatous diseaseprimarily affecting the skin and peripheral nerves. It can also involve muscles, eyes, bone, testis and internal organs to a varying extent. Leprosy is a chronic infectious disease caused by bacillus Mycobacterium leprae. While organism is readily transmitted from person to person by inhaling droplets or direct contact with the infected individuals. It does not usually produce clinical disease because of intrinsic human resistance to infectious agent

in majority of people. Its spectrum of manifestations varies from tuberculoid to lepramatous leprosy, dependingon cellular immune status of the patient [1]. The Ridley-Jopling classification is the mostwidely used and divides the disease into tuberculoid (TT), borderline tuberculoid (BT), mid-borderline (BB), borderline lepramatous (BL) and lepramatous leprosy (LL), based on clinical, immunological and histomorphological factors. Histoid leprosy is an uncommon type of LL that shows nodules or plaques over apparently normal skin. Diagnosis is based on clinical features with lepromin test along with histopathology.

Highest rates of leprosy are in the tropical countries, especially in Asia and Africa. Even today 105 countries qualify as endemic for this disease. These are mostly South East Asia, north and South America, Africa and eastern seaboard Pacific Ocean and western Mediterranean coast. Primarily source is lepramatous patients who are not being treated.

Leprosy has been declared eliminated (prevalence rate<1/10,000. population) as an important public health problem in our country on January 1, 2006, still cases arebeing reported with varying prevalence throughout many areas in India. India has succeeded in bringing down the prevalence rate to 0.66/10,000 in 2016, despite the above successes, the fact remains that India continues to account for 60% of new casesreportedly globally each year and is among the 22 “global priority countries” that contribute 95% of world numbers of leprosy warranting a sustained effort to bring the numbers down. Current prevalence of leprosy is 0.34 per 10,000. Over 2,00,000 new cases have been reported annually in recent years [2].

Leprosy incidence in children under 15 years of age is one of the primary monitoring indices of endemicity. Because leprosy in these cases are result of recent transmission from an active case, with high endemicity in the area. Factors which contribute to late diagnosis is include lack of general information about early symptoms, curability of leprosy and lack of accessible and specific treatment. It is important to diagnose the disease early and accurately for typing and and treatment, which can be done with clinicopathological correlation. Histopathological diagnosis remains the gold standardin the diagnosis of leprosy.

Histopathological study of leprosy has not much explored in our country. The available resources are insufficient to draw conclusions. It causes irreversible neuropathy in large proportion of causes. Therefore, it is a leading cause of preventable disability in India. Although we have some grasp of the extent of leprosy disability problems in India, it is difficult to establish the burden of it accurately.

2. Materials and methods

The study was done to study the histopathological types of leprosy and to clinically correlate them in 40 clinically diagnosed patients in the Department of Pathology in a tertiary care hospital over a period of January 2018 to July 2022 after the approval from institutional ethics committee. Materials of study included the reports and case records of the skin biopsies received by the Department of Pathology.

All clinically diagnosed cases of leprosy and those who consented, were included in the study

irrespective of age, sex, religion and socioeconomic status. Inadequate biopsies were excluded from the study.

2.1 Technique

The samples were analysed and reported based on the H&E staining. The signs and symptoms of the clinically diagnosed cases of leprosy were collected from case records. The information collected were entered in Microsoft Excel 2010 and tabulated on various criterias like age, gender, histopathological type and region involved.

3. Observation and Results

Table 1: Distribution of 40 clinically diagnosed cases of leprosy

S. NO.	CLINICAL DIAGNOSIS	NO. OF CASES	PERCENTAGE
1	Erythema nodosum leprosum	8	20%
2	Borderline Tuberculoid Hansens	12	30%
3	Borderline lepramatous leprosy	5	12.5%
4	Hansen disease	2	5%
5	Indeterminate leprosy	4	10%
6	Erythema Nodosum Leprosum with severe panniculitis	2	5%
7	Lepramatous leprosy	1	2.5%
8	Histoid leprosy	1	2.5%
9	Others	5	12.5%

Clinically, out of 40 cases, 12 cases (30%) were Borderline Tuberculoid Hansens, 8 cases (20%) were Erythema Nodosum Leprosum, 5 cases (12.5%) of Borderline Lepramatous Hansens, 5 cases (10%)of Indeterminate Leprosy, 2 cases (5%) of Hansens, 1 case(2.5%) of histoid Leprosy and 5 other cases(12.5%) were found.

Table 2: Distribution of 40 histopathological diagnosed cases of leprosy

S. NO.	HISTOPATHOLOGICAL DIAGNOSIS	NO. OF CASES	PERCENTAGE
1	Indeterminate leprosy	4	10%
2	Borderline tuberculoid leprosy	11	27.5%
3	Lepramatous leprosy	6	15%
4	Erythema nodosum leprosum	8	20%
5	Borderline lepramatous leprosy	5	12.5%
6	Erythema Nodosum Leprosum with lepramatous leprosy	1	2.5%
7	Erythema nodusum Leprosum with panniculitis	3	7.5%
8	Tuberculoid leprosy	2	5%

Histopathologically, out of 40 cases, 11 cases (27.5%) were Borderline Tuberculoid leprosy, 8 cases (20%), were Erythema Nodosum Leprosum, 6 cases (15%) were Lepramatous Leprosy, 5 cases (12.5%) were Borderline Lepramatous leprosy, 4 cases (10%) were Indeterminate leprosy, 3 cases (7.5%) were Erythema nodosum leprosum with severe panniculitis, 2 cases (5%) were Tuberculoid leprosy and 1 cases (2.5%) was Erythema Nodosum Leprosum with Lepramatous leprosy.

Table 3: Age wise distribution of leprosy cases

	BT	BL	LL	IND	ENL	ENLP	ENLLL	TT	TYPE 1	TYPE 2	Total percentage
0-10 YR				1							2.5%
11-20YR	3			1	1		1				15%
21-30YR	2	1	1	1	1	1			1		20%
31-40 YR	2	2	2		3	1		1			27.5%

41-50 YR	2	1		1	2	2				1	22.5%
51-60 YR	1							1			5%
61-70YR			1		1						5%
71-80 YR	1										2.5%

On an analytical approach the major number of cases were found to be in between the age group 31-40 having 11 cases (27.5%) followed by 41-50 having 9cases (22.5%) each followed by 8 cases (20%) in 21-30 years, 6 cases (15%) in 11-20 years, 2 cases (5%) each in 51-60 and 61-70 years. The least number of cases were reported in the age group 0-10 and 71-80 years having 1 case (2.5%) each.

Table 4: Gender wise distribution of Leprosy cases

	Male	Female
Leprosy	20	20
Percentage	50%	50%

This study shows an equal predominance of leprosy among males and females each having 20 cases (50%).

Table 5: Site wise distribution of leprosy cases

Part of body	**Region**	**Cases**	**Percentage**
Head	Face	2	5%
Upper trunk	Chest	1	2.5%
	Abdomen	3	7.5%
Upper limb	Hand	3	7.5%

	Arm and forearm	7	17.5%
Lower limb	Legs	4	10%
	Foot	2	5%
All over the body		18	45%

On segregation of cases, 2 cases (5%) were found to be in head region, 4 cases (10%) in the upper trunk, 10 cases (25%) in the upper limb, 6 cases (15%) in the lower limb. Major number of cases were found all over the body having 18 cases (45%).

Table 6: Showing correlation between clinical and histopathology

Clinical type	No. of cases	Histopathological type								% of parity
		BT	BL	TT	LL	ENL	ENLP	IND	ENLLL	
BT	12	11		1						99
BL	5		5							100%
TT	-									0%
LL	1				1					100%
ENL	10					8	2			80
IND	4	1						3		75
Hansen	2					2			-	0
Others	6			1		1	3		1	0

Vol. 20, No. 1. (2024)
E ISSN: 1672-2531

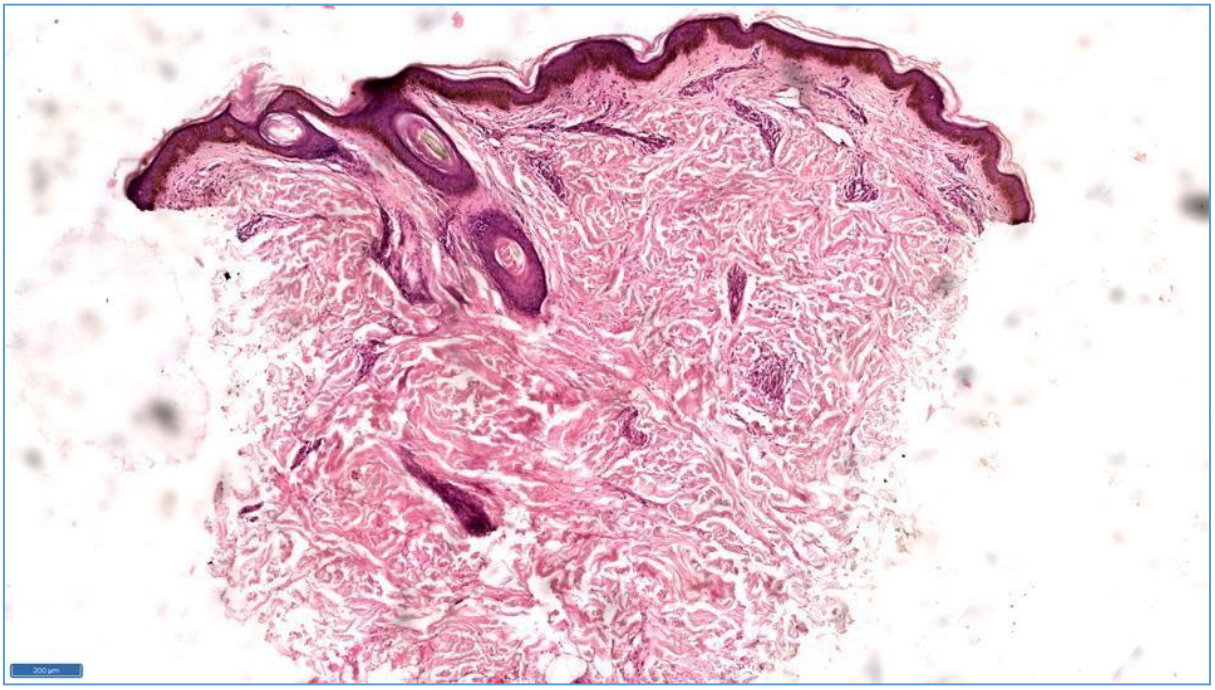

Fig.1 : HPE Indeterminate Leprosy

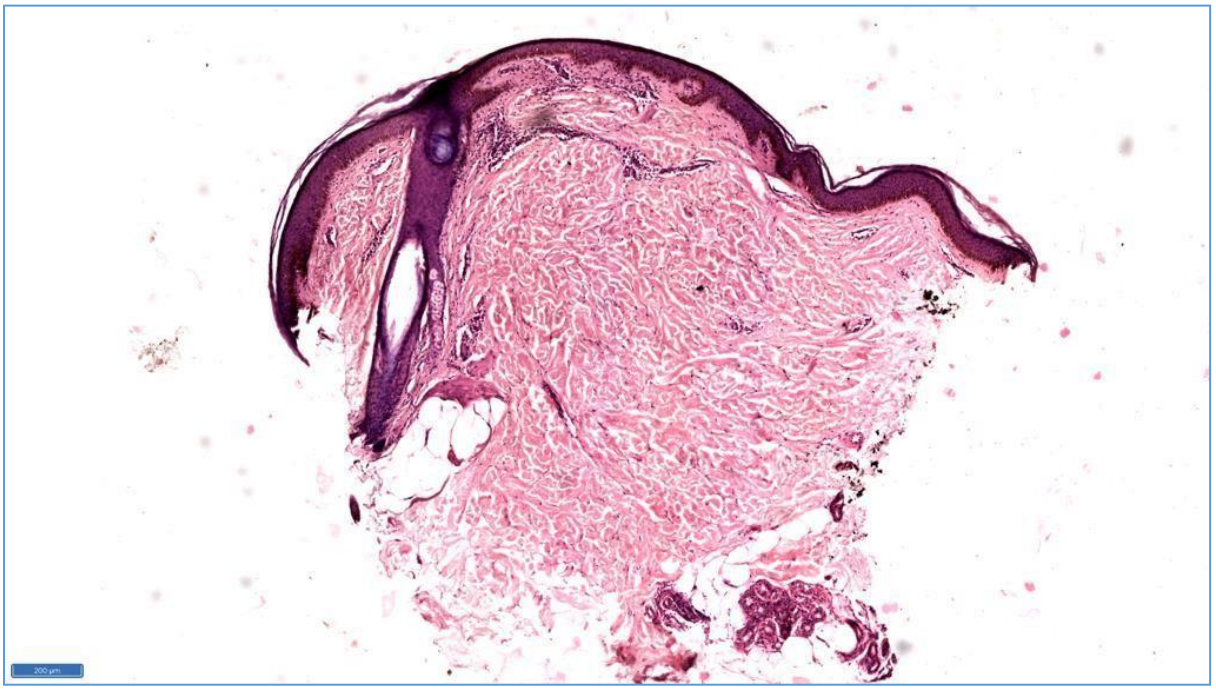

Fig.2 : HPE Borderline Lepramatous Leprosy

Vol. 20, No. 1. (2024)
E ISSN: 1672-2531

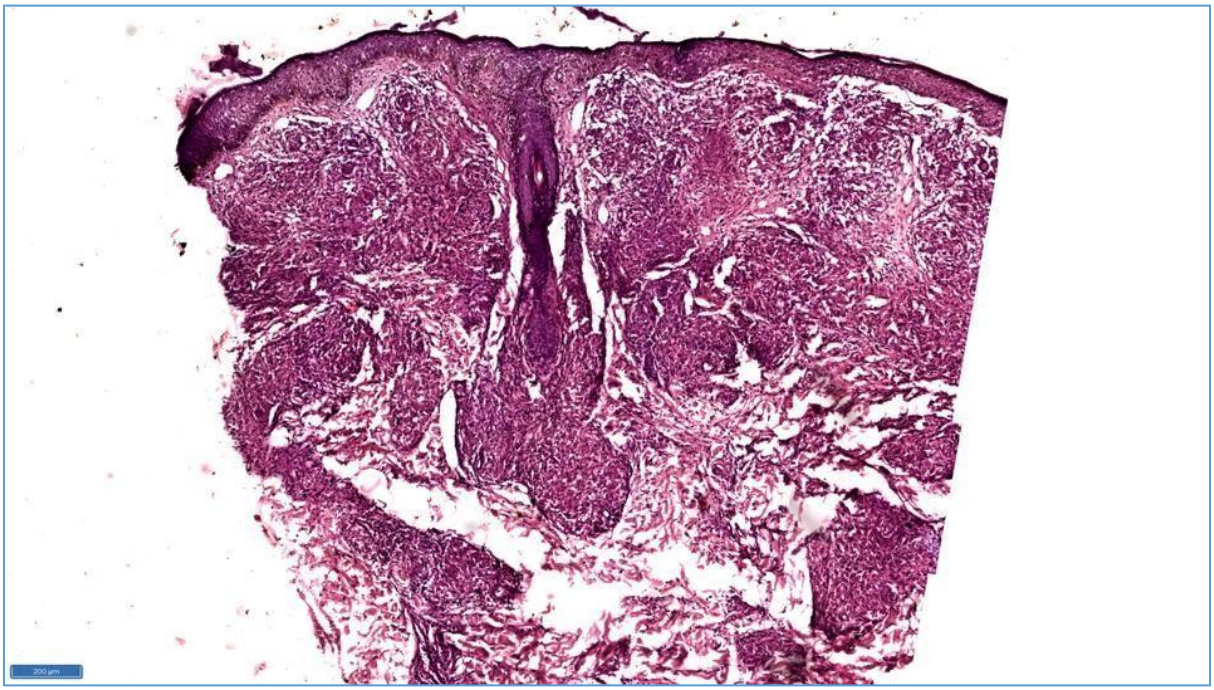

Fig.3 : HPE Borderline Tuberculoid Leprosy H & E: Epitheliod granulomas, Necrosis, Lymphoid infiltrate

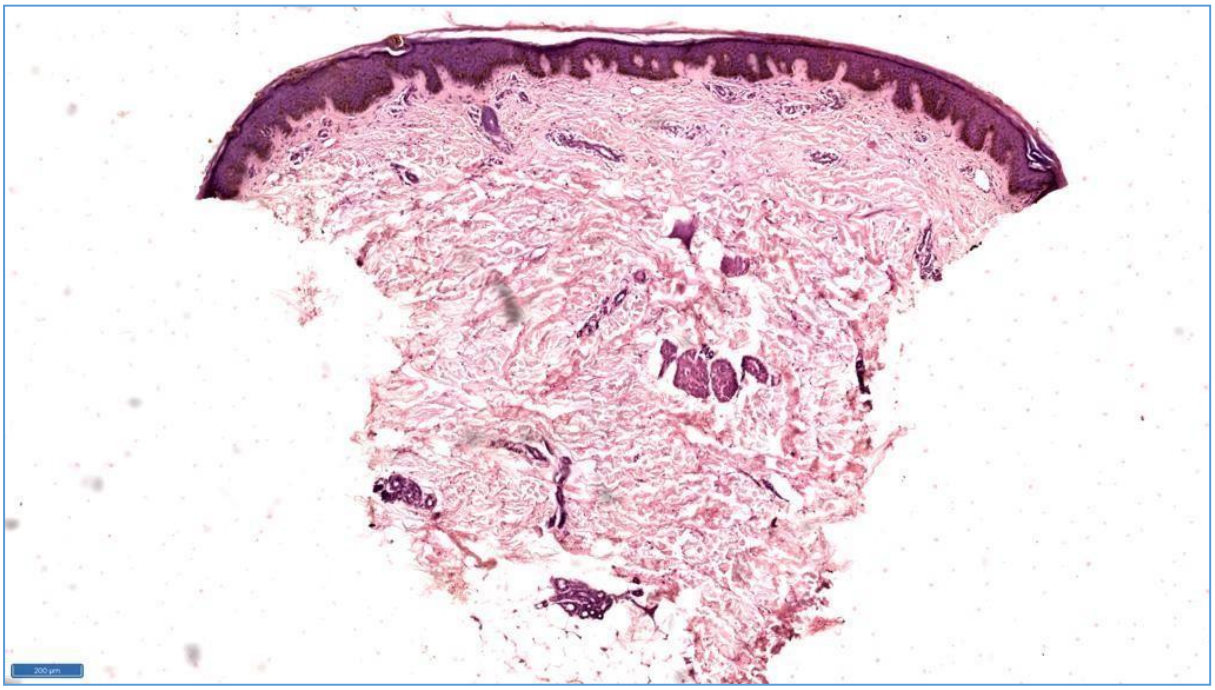

Fig.4 : HPE Indeterminate Leprosy

Vol. 20, No. 1. (2024)
E ISSN: 1672-2531

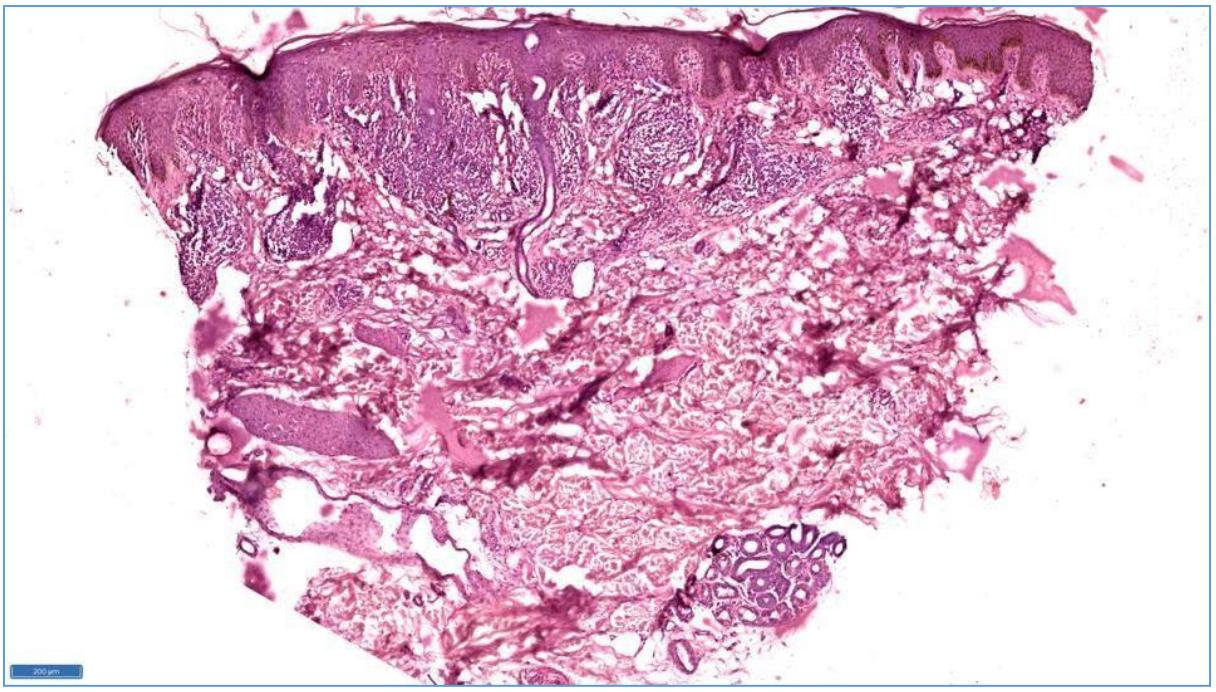

Fig.5 : HPE Erythema Nodosum Leprosum with Panniculitis

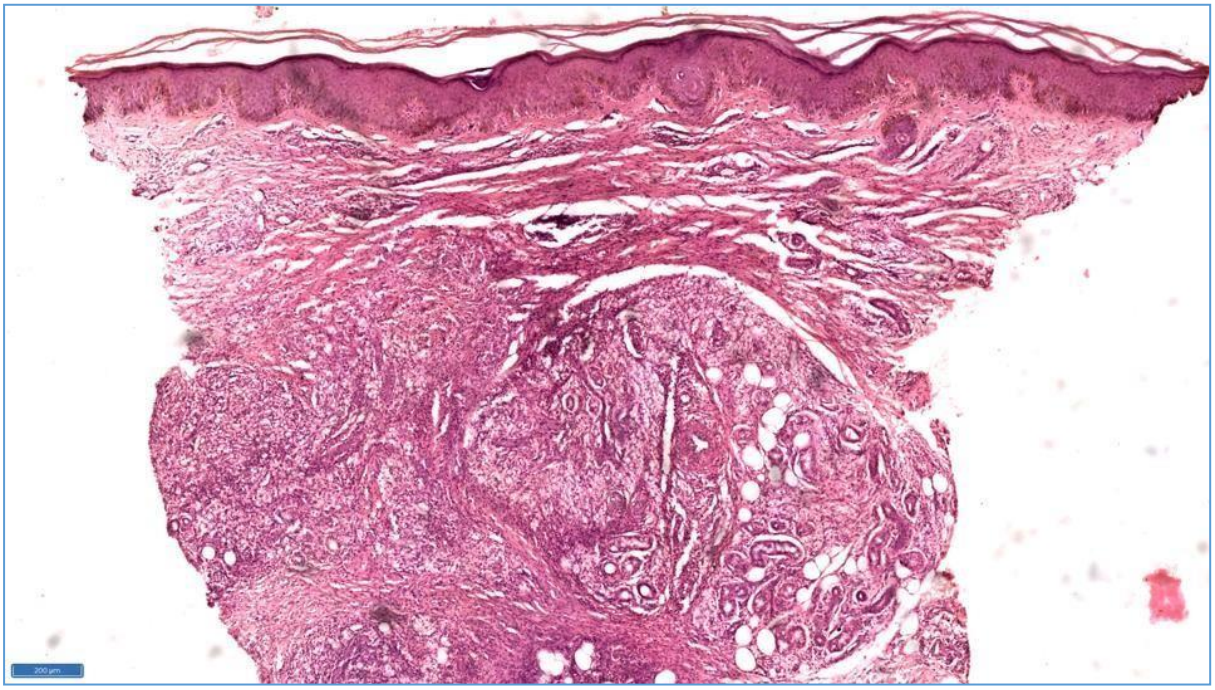

Fig. 6 : HPE Erythema nodosum leprosum H & E X10 sweat glands

Vol. 20, No. 1. (2024)
E ISSN: 1672-2531

ABBERIVATIONS

BT - Borderline Tuberculoid Leprosy
TT - Tuberculoid Leprosy
IL - Indeterminate Leprosy
LL - Lepramatous Leprosy
BL - Borderline Lepramatous Leprosy
ENL - Erythema Nodosum Leprosum
ENLP - Erythema Nodosum Leprosum with Panniculitis
ENLLL- Erythema Nodosum Leprosum in Lepramatous Leprosy

4. Discussion

Leprosy is a chronic granulomatous disease caused due to infection by Mycobacterium Leprae. Depending upon the immune status of the host, leprosy can have varied clinico-pathological presentations. Accurate diagnosis and classification are important for correct timely treatment, management and prevention of disabilities. The most widely used Ridley-Jopling classification is based on clinical, bacteriological, pathological andimmunological parameters. Indeterminate and histoid subtypes of leprosy were also included in present study. Histopathological examination of skin lesions remains the gold standard.

This was a retrospective study of 40 skin biopsies diagnosed as leprosy on histopathological examination in a tertiary care hospital ASRAMS Eluru.

Table 7: Comparison of Histopathological spectrum of Leprosy between present and previous studies

Histological classification	Kaur I et al., [3]	Gudeli Vahini et al., [4]	Ruchi Sinha et al., [5]	Saara Neeha et al.,[6]	Dr Prerona Roy et al., [7]	Kallol Banerjee et al.,[8]	Present Study (2018-22)
BT	14	5	23	8	18	28	11
BL	43	0	86	4	4	12	5
TT	0	2	8	5	8	13	2
LL	51	3	23	9	6	11	6
IL	0	5	11	7	4	4	4
ENL	0	2	7	2	6	0	11

Various studies had revealed that Borderline Tuberculoid and Lepramatous leprosy were most common among the other types. This study has got equal dominance of Borderline Tuberculoid and Erythema Nodosum leprosum. Histopathologically, out of40 cases, 11

Vol. 20, No. 1. (2024)
E ISSN: 1672-2531

cases (27.5%) were Borderline Tuberculoid leprosy, 8 cases (20%), were Erythema Nodosum Leprosum, 6 cases (15%) were Lepramatous Leprosy, 5 cases (12.5%) were Borderline Lepramatous leprosy, 4 cases (10%) were Indeterminate leprosy, 3 cases (7.5%) were Erythema nodosum leprosum with severe panniculitis, 2 cases (5%) were Tuberculoid leprosy and 1 cases (2.5%) was Erythema Nodosum Leprosum with Lepramatous leprosy.

Patients with good immune status usually exhibit tuberculoid types and those with poor immunity usually tend to show lepromatous type lesions. IL type represents those casesthat have histopathological and clinical features of leprosy but do not fit into the RidleyJopling classification. This is an early, transitory lesion seen in patients with variable immunological status.

Table 8: Comparison of Age distribution between present and previous studies

Age Distribution	Ruchi Sinha et al., [5]	Gudeli Vahini et al., [4]	Dr Prerona Roy et al., [7]	Kallol Banerjee et al.,[8]	Saara Neeha et al.,[6]	Present Study (2018-22)
0-10 YR	4	1	0	0	0	1
11-20 YR	37	2	6	10	7	6
21-30 YR	53	3	14	30	12	8
31-40 YR	36	5	10	0	5	11
41-50 YR	32	8	10	0	0	9
51-60 YR	18	0	4	20	0	2
61-70 YR	11	1	6	0	0	2
71-80 YR	2	0	0	10	0	1

Leprosy can occur at all ages. The patients in this study were between 10 and 80 years.On an analytical approach the major number of cases were found to be in between the age group 31-40 having 11 cases (27.5%) followed by 41-50 having 9cases (22.5%) each followed by 8 cases (20%) in 21-30 years, 6 cases (15%) in 11-20 years, 2 cases (5%) each in 51-60 and 61-70 years. The least number of cases were reported in the agegroup 0-10 and 71-80 years having 1 case (2.5%) each. Most of the cases occurred in the 3rd decade, similar to other studies as well.

Vol. 20, No. 1. (2024)
E ISSN: 1672-2531

Table 9: Comparison of Gender ratio between present and previous studies

Gender Distribution	MALE	FEMALE	Ratio
Dr Prerona Roy et al., [3]	41	9	4:1
Gudeli Vahini et al., [4]	11	7	1.8:1
Kallol Banerjee et al., [11]	56	14	4:1
Saara Neeha et al., [8]	24	12	2:1
Present study (2018-22)	20	20	1:1

This Study showed equal preponderance in both males and females each having 20 cases (50%). Vasaikar et al [21] have noted a slightly higher number of females in their study, with male to female ratio being 0.8:1. Most of the studies shown male preponderance. This showed both genders are being equally affected in the Eluru locality.

Table 10: Comparison of site distribution between present and previous studies

Site Distribution	Dr Prerona Roy et al.,[3]	Sindhushree N [9]	Present study (2018-22)
Head	6	2	5
Trunk	10	2	10
Extremities	54	4	25

Most common site involved are extremities similar to the other studies. A hypo pigmented patch over skin with loss of temperature sense and numbness is a characteristic feature seen in leprosy. On segregation of cases, 2 cases (5%) were foundto be in head region, 4 cases (10%) in the upper trunk, 10 cases (25%) in the upper limb,6 cases (15%) in the lower limb. Major number of cases were found all over the body having 18 cases (45%).

5. Conclusion

The Histopathological analysis of skin lesions is an important method and the gold standard for accurate detection of the Hansen Disease. Leprosy is curable with multidrug therapy. It is a very useful method as it helps in identification of an early/ borderline/ indeterminate/ histoid cases which have over lapping signs and characteristics, and an appropriate lines of treatment.

- In the present study, the most common affected age group was 31- 40 years withequal gender predominance is a cause of concern as they are the economically active and productive group.
- Borderline Lepramatous Leprosy displayed good (100%) parity between clinical and Histopathological Diagnosis.
- Apart from all over the body (45%), the maximum side lesions were found to be extremities (25%).
- Borderline tuberculoid Leprosy was found to be the major among the Histopathologically analysed cases.

Biopsy is a minimally invasive and easy method as well. Thus, Histopathology and demonstration of Acid Fast Lepra Bacilly is recommended for all cases of Leprosy foran accurate clinicopathological correlation and diagnostic accuracy, which would helpin early prognosis and appropriate lines of treatment of the patient.

6. Conflict of Interest

The authors declare no conflict of interest.

References

1. Douglas S. Walsh, Wayne M. Meyers. Leprosy. Tropical Infectious Diseases.2011;3:253
2. Dr. Liji Thomas. Leprosy Epidemiology. News Medical Life Sciences.2019
3. I Kaur , S Dogra, D De, U N Saikia. Histoid Leprosy – a retrospective study of 40 cases from India. Br J Dermatol. 2009 Feb;160(2):305-10
4. Dr.Gudeli Vahini, Dr. C.Swathi, Dr.P. Uma Rani, Dr.G. Mary Niharika, Dr.T. Asha. A Histopathological Study Of Leprosy Along With Clinical Correlation. Indian Journal Of Applied Research. 2020; Volume 10: 16-19
5. Ruchi Sinha, Mamta Kumari, Punam Prasad Bhadani. Histopathological Panorama of Leprosy in a Tertiary Care Hospital of Bihar. Journal of Clinical and Diagnostic Research. 2019 Apr; Vol-13(4): 12-15
6. Saara Neeha, Syeda Heena Kauser, Pratima S Sambrani, Zeenath Begum. Histopathological study of leprosy along with Clinicopathological correlation at a tertiary care center. International Journal of Health and Clinical Research. 2021;4(12):137-140.
7. Dr Prerona Roy1 , Dr Reeta Dhar2 , Dr Prabhakar Patro3 , Dr Hoogar M.B3 , Dr Shilpi Sahu. Histopathological Study of Leprosy Patients in a Tertiary Care Hospital in Navi Mumbai. International Journal of Health Sciences and

Research.2019; Vol 9, Issue 2:6-12
8. Kallol Banerjee, S. Srikanth. Clinicopathological correlation of Hansen's disease – A study of 75 cases. Scholars Journal of Applied Medical Sciences. 2016; 4(12A):4249-4253
20. I Kaur , S Dogra, D De, U N Saikia. Histoid Leprosy – a retrospective study of 40 cases from India. Br J Dermatol. 2009 Feb;160(2)