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CLINICO-HISTOPATHOLOGICAL CORRELATION OF GRANULOMATOUS LESIONS OF SKIN – WITH SPECIAL EMPHASIS ON LEPROSY

Histopathology

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ABSTRACT

Background: Granulomatous inflammation is a distinct form of chronic inflammation and diagnosing them is challenging due to their diverse clinical presentations and similar histological features. Leprosy, a significant cause of granulomatous skin lesions, leads to various forms based on the host's immune response. This study aims to evaluate skin biopsies for granulomatous skin lesions, with a special emphasis on leprosy, and to correlate these findings with clinical presentations. **Methods:** This prospective, descriptive study was conducted at J.L.N (Jawahar Lal Nehru) Hospital & Research Centre, Bhilai, for 18 months, involving 197 skin biopsies. Histopathological examinations were performed using Hematoxylin and Eosin (H&E) staining and special stains like Modified Fite Faraco, Acid Fast Stain (AFB), and Periodic Acid-Schiff (PAS) stain. Clinical data were collected, correlated with histopathological findings and statistically analysed was using SPSS version 22, with significance tested at $p < 0.05$ at a 95% confidence limit. **Results:** Of 197 biopsies, 47 (23.85%) were diagnosed as granulomatous lesions. Among these, 24 (12.18%) were non-lepromatous and 23 (11.67%) were lepromatous. Out of 47 cases, infectious granulomatous lesions were predominant with 63.82%. Among these, leprosy is the most common with 76.66%, followed by cutaneous tuberculosis 23.33% cases. Non-infectious granulomatous lesions were 36.17% of the total 47 cases which included foreign body granulomatous reactions 64.70%, erythema nodosum 17.64%, sarcoidosis 11.76% and granuloma annulare 5.88% cases. **Conclusion:** This study underscores the importance of clinico-histopathological correlation in diagnosing and managing these lesions. Leprosy emerged as the most common cause of granulomatous skin lesions, highlighting the need for continued public health efforts to control this disease. Accurate histopathological examination is essential for effective diagnosis and treatment.

KEYWORDS

Granuloma Leprosy Skin Diseases Tuberculosis, Cutaneous Histopathology Erythema Nodosum

INTRODUCTION:

Granulomatous inflammation represents a distinctive pattern of chronic inflammation characterized by granulomas which are localized aggregates of histiocytes, epithelioid cells, multinucleated giant cells, and inflammatory cells.[1,2] Granulomas form in response to agents resistant to degradation by neutrophils and macrophages. This transformation is mediated by CD4+ T cells secreting various cytokines, including Interleukin-4, Interferon (IFN)-gamma, Tumor necrosis factor (TNF), and lymphotoxin. [3]

Diagnosing granulomatous dermatoses is challenging due to their diverse clinical presentations and similar histological features.[4] Among these, leprosy, caused by Mycobacterium leprae, is a significant cause of granulomatous skin lesions and physical disabilities, particularly in developing countries. [5] Leprosy affects cooler body regions, including the skin, peripheral nerves, muscles, eyes, bones, testis, and internal organs, manifesting in various forms based on the host's immune status. [5,6]

Ridley and Jopling have proposed the classification of leprosy into Tuberculoid (TT), Borderline Tuberculoid (BT), Mid Borderline (BB), Borderline Lepromatous (BL), and Lepromatous (LL); based on immunopathological data. [7,8] The Fite-Faraco method of staining acid-fast bacilli to detect lepra bacilli is crucial for diagnosing and determining the infectious status of leprosy.[9] Given the clinical and histopathological disparities in diagnosing leprosy, this study aims to correlate these aspects to improve diagnosis and treatment.

MATERIALS AND METHODS:

A) Study Site And Population:

The study was conducted at J.L.N Hospital & Research Centre, Bhilai, an 860-bed multidisciplinary tertiary care and referral hospital. The study population comprised patients from Bhilai and surrounding areas attending the skin outpatient department (OPD) at the hospital.

b) Study Design:

This was a prospective, descriptive, and observational study.

c) Sample Size:

The study's sample size was determined based on the literature review and previous studies (**Table-1**). For example, Sumit Grover et al. conducted a study in Mumbai with 1872 skin biopsies over two years, diagnosing 273 cases (14.58%) as granulomatous dermatoses. Using Cochran's sample size formula, the minimum sample size was calculated to be 191 skin biopsies.

Minimum Sample Size=$N = 1.9^2 \times P \times Q/e^2$

P= proportion of granulomatous lesion in skin biopsy= 14.58%

Q = 1-P= 1-0.1458 = 0.8542

1.96 = Z value for 5% confidence interval

e = precision = 0.05

On calculation

$N = 1.96^2 \times 14.58 \times 0.85/0.05^2 = 191$

A pilot study in the Department of Pathology at J.L.N Hospital revealed that 413 skin biopsies were received in three years, with 28 (18.9%) diagnosed as granulomatous lesions. Based on these findings, a sample size of 197 cases was selected.

Table-1: Comparison Of Various Author Studies With Total Skin Biopsies

Study (year)	Period (years)	No. of skin Biopsies	Granulomatous Lesions
Gautam K.et al (2007-2008)	2	1590	106
Grover et al (2009-2011)	2	1872	273
Thapa et al (2008-2012)	4	71	71
Deepti A.et al (2012-2015)	3	180	35
Veena S.et al (2006-2008)	2	200	200
Total	**13**	**3,913**	**685**

D) Study Period:

The study was conducted from June 1, 2016, to December 31, 2017 (18 months).

E) Inclusion Criteria:

- All skin biopsies were submitted to the Department of Pathology at J.L.N Hospital during the study period with complete clinical data.

F) Exclusion Criteria:

- Cases not histologically diagnosed as granulomatous skin lesions.
- Cases lacking complete clinical data.

G) Methodology:

Ethical Clearance:

The study was approved by the Ethical and Research Committee at Jawaharlal Nehru Hospital & Research Centre, Bhilai. Informed consent was obtained from all patients fulfilling the selection criteria.

Data Collection:
A total of 197 skin biopsies and excised cutaneous lesions were obtained from patients and subjected to histopathological study. An incisional or punch biopsy was taken after informed consent, fixed in 10% formalin, and processed for histopathological examination. Sections were stained with routine stains like Hematoxylin and Eosin (H&E) and special stains like Modified Fite Faraco for lepra bacilli, Acid Fast Stain (AFB) for Mycobacterium tuberculosis, and PAS (Periodic Acid-Schiff) stain for fungus/parasite.

H) Statistical Analysis:
Data was coded, entered in Microsoft Excel, and analyzed using SPSS version 22. Continuous data was summarized as mean and standard deviation, with significance tested using the t-test. Categorical data was analyzed using the chi-square test and Fisher exact test, with a p-value < 0.05 considered statistically significant.

RESULTS:
This study aimed to identify and categorize various granulomatous skin lesions, focusing on the correlation between clinical and histopathological findings, with a special emphasis on leprosy.

Out of 197 skin biopsies, 47 (23.85%) were diagnosed histologically as granulomatous lesions (**Table-2**). Of these, 24 (12.18%) were non-lepromatous and 23 (11.67%) were lepromatous. Infectious granulomatous lesions constituted 30 (15.22% of total) cases, with leprosy being the most common cause in 23 (11.67%) cases, followed by cutaneous tuberculosis in 7 (3.55%) cases. Non-infectious granulomatous lesions accounted for 17 (8.62%) cases, with foreign body granulomatous reaction being the most common 11 (5.58%) cases, followed by erythema nodosum 3 (1.52%) cases.

Table-2: Distribution Of 47 Cases Of Granulomatous Skin Lesions

Cases	Number of Cases	Total %
Infectious		
BT	15	50
IL	4	13.33
BL	1	3.33
HL	1	3.33
Type 1 LR	2	6.66
LV	5	10.6
Scrofuloderma	2	16.66
Total	**30**	**63.82**
Non-Infectious		
FB GR	11	64.70
EN	3	17.64
Sarcoidosis	2	11.76
GA	1	5.88
Total	**17**	**36.17**

A. Age Distribution:
Patients examined ranged from 9 to 78 years old, with no cases in the 11-20 age group. The sixth decade (51-60 years) had the highest number of cases of lepromatous leprosy. The least affected was the first decade (0-10 years) with 1 case of non-lepromatous.

B. Gender Distribution:
Gender distribution showed a slight male predominance (55.31% male, 44.68% female), with a male-to-female ratio of 1.2:1.

C. Clinical Features:
1. Number of sites and anatomical distribution of the lesion:
Lesions were observed at single or multiple sites. Borderline tuberculoid (BT) and Tuberculoid lesions were more common at single sites while indeterminate lepromatous lesions were mostly found at various sites (**Table-3).** Among the 47 cases, the most common site of lesions was the upper extremity (24%). In leprosy, the upper extremity was predominantly involved, and in Non-Leprosy, the head, neck, and face were most commonly involved (**Table-4**).

Table-3: Number Of Sites Of The Lesion

	SINGLE SITE	MULTIPLE SITE	Total
BT	10	5	**15**
IL	1	3	**4**
BL	0	1	**1**
HL	0	1	**1**
Type 1 LR	1	1	**2**
FB GR	11	0	**11**
LV	3	2	**5**
EN	1	2	**3**
SARCOIDOSIS	2	0	**2**
SCROFULODERMA	2	0	**2**
GA	1	0	**1**

Table-4: Anatomical Distribution Of Granulomatous Skin Lesions

Name of lesions	Single lesion site				Multiple lesion Site			
	Head, Neck & Face	Upper Limb	Lower Limb	Trunk & Back	Head, Neck & Face	Upper Limb	Lower Limb	Trunk & Back
BT	2	8	0	0	2	3	3	4
IL	0	1	0	0	1	3	2	1
BL	0	0	0	0	0	1	0	1
HL	0	0	0	0	1	0	1	1
Type 1 LR	0	1	0	0	0	0	1	1
FB GR	5	3	1	2	0	0	0	0
LV	2	0	0	1	1	2	1	0
EN	0	0	1	0	1	0	2	2
SARCOIDOSIS	1	0	0	1	0	0	0	0
SCROFULODERMA	1	1	0	0	0	0	0	0
GA	0	1	0	0	0	0	0	0
Total	11	15	2	4	6	9	10	10

2. Nature and Color of Lesions:
Plaque-type lesions were the most common in 36.17% of cases, followed by nodules and soft tissue swelling in 40.42%. Leprosy lesions were predominantly plaques in 56.52%, followed by macules in 17.40% of cases (**Table-5**). Erythematous lesions were most frequent in 51.06% of cases, followed by hypo-pigmented in 17.8% of cases, and a combination of erythematous and hypo-pigmented lesions in 4.25% of cases (**Table-6**).

Table-5: Nature of lesion

TYPE OF LESION	BT	IL	BL	HL	Type 1 LR	FBGR	LV	EN	SARCOID	SCROFULODERMA	GA	**Total**
MACULE	1	3	0	0	0	0	0	0	0	0	0	**4**
PATCH	3	0	0	0	0	0	1	0	0	0	0	**4**
PAPULE	1	1	0	0	0	0	0	0	1	0	0	**3**
PLAQUE	11	0	0	0	2	0	2	1	1	0	1	**17**
NODULE	0	0	1	1	0	0	2	2	0	0	0	**6**
SWELLINGG	0	0	0	0	0	11	0	0	0	2	0	**13**

Table-6: Color Of The Lesion

INFECTIOUS	Erythematous	Hypo pigmented	Both	Blue	Normal
BT	10	5	2	0	0
IL	1	3	0	0	0
BL	0	0	0	0	1
HL	1	0	0	0	0
Type 1 LR	2	0	0	0	0
LV	4	0	0	1	0
SCROFULODERMA	1	0	0	1	0
NON-INFECTIOUS					
FB GR	0	0	0	0	11
EN	3	0	0	0	0
SARCOIDOSIS	1	0	0	1	0
GA	1	0	0	0	0
Total	**24**	**8**	**2**	**3**	**12**

3. Sensation in Leprosy Lesions:
Sensation was impaired in 19 (82.60%) of the 23 leprosy cases. Hypo-anesthesia was noted in 16 (69.56%) cases, anesthesia in 3 (13.04%)

cases, and normal sensation in 4 (17.39%) cases.

D. Histopathological Features:

Epidermal changes included atrophy in 4 (8.5%) cases, acanthosis in 9 (19.1%) cases, hyperkeratosis and spongiosis each in 6 (12.7%) cases, and parakeratosis in 3 (6.3%) cases (**Table-7**). The dermal changes comprised granulomas in 28 (59.57%) cases, caseation in 3 (6.38%) cases, and necrotic debris in 5 (10.63%) cases. (**Table-8**). Dermal infiltrates were predominantly lymphocytic in 33 (70.21%) cases, followed by giant cells in 29 (61.70%) cases, and epitheloid cells in 28 (59.57%) cases.

Table-7: Epidermal Changes

	Atrophy	Hyper-Keratosis	Acanthosis	Spongiosis	Parakeratosis	Ulceration	Unremarkable	Inflamm-ation	Others
BT	2	1	3	0	0	0	9	-	
IL	0	0	1	1	0	0	2	-	
BL	1	0	0	0	0	0	0	-	
HL	0	0	0	0	0	0	1	-	
Type 1-BT	1	0	0	0	0	0	0	-	
Type 1 BL	0	0	0	1	0	0	0	-	vesicle
FB GR	0	0		0	0	0	11	-	
LV	0	3	3	3	2	0	0	Neutrophils	-
EN	0	0	1	1	0	0	1	Neutrophils	-
Sarcoidosis	0	0	0	0	0	0	2	-	
Scrofuloderma	0	2	1	0	0	1	0	-	
GA	0	0	0	0	1	0	0	-	
Total	**4**	**6**	**9**	**6**	**3**	**1**	**26**		

Table-8: Dermal Changes

	Epithelioid Cells	Lymphocytes	Giant Cells	Neutrophils	Macrophages	Histiocytes	Plasma Cells	Granulomas	Caseation	Spindle Cells	Necrotic Debris	Periadnexal	Perivascular	Nerve fiber	EIC	Grenz Zone	AFB(BI)	PAS
BT	15	12	9	1	1	-	-	15	1	0	-	18	2	12	-	-	-	-
IL	-	4	-	-	-	-	-	-	-	0	-	5	2	2	-	-	-	-
BL	1	1	-	-	1	-	-	1	-	0	-	1	1	-	-	-	+2	-
HL	-	-	-	-	1	+	-	-	-	1	-	1	-	-	-	1	+4	-
Type 1 LR-BT	1	1	-	1	1	-	-	1	-	0	-	2	-	1	-	-	-	-
Type 1 LR-BL	1	1	-	1	1	-	-	-	-	0	-	2	-	1	-	-	+3	-
FBGR	1	5	11	3	5	-	4	2	-	0	4	-	-	-	11	-	-	-
LV	5	2	5	-	-	-	-	5	-	0	-	2	1	1	-	-	-	-
EN	-	3	-	2	-	1	-	-	-	0	-	1	2	-	-	-	-	-
Sarcoidosis	2	2	2	-	-	-	-	2	-	0	-	-	-	-	-	-	-	-
Scrofuloderma	2	1	2	-	1	-	-	2	2	0	1	1	1	-	-	-	-	-
GA	-	1	-	-	1	-	-	-	-	0	-	-	-	-	-	-	-	-
Total	**28**	**33**	**29**	**8**	**11**	**1**	**4**	**28**	**3**	**1**	**5**	**33**	**9**	**17**	**11**	**1**	**3**	**0**

Special Stains-

a) **Modified Fite Faraco:** Out of 23 cases of leprosy, the stain demonstrated Lepra bacilli in only 3 (13.04%) cases and negative in 20 (86.95%) cases. So, the paucibacillary cases were 20 (86.95%) and multibacillary were 3(13.04%). A bacteriological index (BI) of +2 in BL, +3 in Downgrading type 1 LR (BL) and +4 in HL was seen.

b) **AFB:** In our study, 7 out of 24 cases were diagnosed as tuberculosis (LV and scrofuloderma), in none of these cases we were able to demonstrate AFB.

c) **PAS:** No fungi or parasites were found in our biopsies.

When clinical diagnosis and histopathological diagnosis were correlated, among the 24 cases of leprosy or leprosy as one of the differentials, 19 (79.16%) cases showed a good correlation between clinical and histopathological diagnosis (**Table-9**). Correlation was 100% in BT and HL, 50% in BL, and in Type 1 LR. A 91% correlation was seen in cases of suspected Hansen's as 7 cases of BT, 3 of IL, and 1 of LV. A 100% correlation was observed in cases of relapse. No cases of TT, BB, IL, and pure neural were diagnosed histologically.

Among the 23 cases of non-lepromatous skin lesions (**Table-10**) correlation was 100% in the sebaceous cyst, 100% in LV, 100% in EN, 100% in scrofuloderma, 100% in GA, and 100% in D/D of LV & sarcoidosis. No case of sarcoidosis was clinically diagnosed.

The total correlation of all granulomatous skin lesions was found to be 85.1% (**Table-11**). The correlation of leprosy cases was found to be 79.16% and of non-leprosy was 91.3%.

Table-9: Leprosy Cases

Clinical Diagnosis	No. of Patients	Histopathological Diagnosis									Correlation (%)
		TT	BT	BB	BL	LL (HL)	IL	Type 1 LR(BT)	Type 1 LR(BL)	Other than Hansen's	
TT	0	0	0	0	0	0	0	0	0	0	-
BT	5	0	5	0	0	0	0	0	0	0	5/5 (100%)
BB	0	0	0	0	0	0	0	0	0	0	-
BL	2	0	1	0	1	0	0	0	0	0	1/2 (50%)
LL(HL)	1	0	0	0	0	1	0	0	0	0	1/1 (100%)
IL	0	0	0	0	0	0	0	0	0	0	-
Pure neural	0	0	0	0	0	0	0	0	0	0	-
Type 1 LR	2	0	0	0	0	0	1	1	0	0	1/2 (50%)
Type 2 LR (ENL)	2	0	1	0	0	0	0	0	1	0	0/2
Suspected Hansen's	11	0	7	0	0	0	3	0	0	LV-1	10/11-91%
Relapse	1	0	1	0	0	0	0	0	0	0	1/1 (100%)
Total	**24**	**0**	**15**	**0**	**1**	**1**	**4**	**1**	**1**	**1**	**19/24 (79.16 %)**

Table-10: Non-Leprosy Cases

Clinical Diagnosis	No. of Patients	Histopathological Diagnosis						Correlation (%)
		FB GR	LV	EN	Sarcoidosis	Scrofuloderma	GA	
Sebaceous Cyst	11	11	0	0	0	0	0	100%
LV	2	0	2	0	0	0	0	100%
EN	3	0	0	3	0	0	0	100%
Sarcoidosis	0	0	0	0	0	0	0	-
Scrofuloderma	1	0	0	0	0	1	0	100%
GA	1	0	0	0	0	0	1	100%
D/D- LV & Sarcoidosis	3	0	2	0	1	0	0	100%
Mucous Retention	1	0	0	0	1	0	0	0/1

cyst								
Chronic dermatitis	1	0	0	0	0	1	0	0/1
Total	**23**	**11**	**4**	**3**	**2**	**2**	**1**	**21/23(91.3%)**

Table 11: Correlation Of Granulomatous Skin Lesions

HPE Diagnosis	Number of cases	Correlation (%)
Leprosy	19/24	79.16%
Non-Leprosy	21/23	91.3%
Total	**40/47**	**85.1%**

DISCUSSION:

Granulomatous inflammation, characterized as a chronic inflammatory process and a type 4 hypersensitivity reaction, manifests in various forms across different regions. In the eastern part of India, where this study was conducted, granulomatous dermatoses are notably prevalent. [10] This study aimed to correlate clinical and histological findings in various granulomatous skin lesions, providing a comprehensive analysis of 47 cases diagnosed histologically as granulomatous skin lesions. Among these, 23 (48.93%) were leprosy, while 24 (51.06%) were diagnosed with other granulomatous skin lesions (non-leprosy). The following discussion elaborates on the findings and compares them with existing literature and the same is tabulated (**Table-12**).

Table-12: Comparison of various granulomatous skin lesions with different studies

Author Name Number of granulomatous cases	Sumit G. et al. (273 cases)	Bal et al. (586 cases)	Gautam et al. (106 cases)	Jayawardhana et al. (128 cases)	Deepti A. et al. (35 cases)	Chakrabarti et al. (186 cases)	Present study (47 cases)
Leprosy	**77.28%**	**72.4%**	**79.7 %**	**39.8 %**	**65.71 %**	**57.52 %**	**48.93%**
BT	30.33%	55.2%	47.6%	4.7%	11.42%	57.94%	65.21%
TT	21.33%	7.2%	-	33.5 %	20%	13.08%	-
IL	-	-	12.7		-	0.93%	17.39%
LL	10.90%	17.9%	-	-	17.14 %	12.14%	4.34%
Cutaneous tuberculosis	**9.52%**	**23.1**	**7.6%**	**13.3 %**	**34.28 %**	**24.73 %**	**14.89%**
LV	53.85%	50.4%	33.3%	100%	84.28 %	63.04%	71.42%
Scrofuloderma	15.38%	38.6%	-	-	-	23.91%	28.57%
TB cutis	11.54%	-	33.3%	-	41.67 %	13.04%	-
Foreign body Granuloma	**-**	-	**18.9 %**	**1.6%**	**-**	**6.45%**	**23.4%**
Epidermal inclusion cyst	-	**-**	-	-	-	58.33%	100%

Table-13: Comparison of Clinico-Histopathological Correlation in different studies

Author name(year)	Total leprosy cases	TT	BT	BB	BL	LL	Overall Concordance
Mathur et al. (2011)	156	73.2%	89.74 %	64.7%	72.4 %	**95.2%**	80.4%
Gautam et al. (2011)	63	33%	72.20 %	**100%**	0	50%	96.8%
Thapa et al. (2013)	71	**66.6 %**	42.9%	0	0	16.7%	-
Manandhar et al. (2013)	72	24%	**63.15 %**	0	57.14%	57.14%	45.33%
Sumit G. et al (2016)	211	**72.7 %**	56.6%	33.3%	30.7 %	35.2%	-
Anusha et al. (2016)	49	53.84	57.14 %	50%	50%	**80%**	55.10%
Current study	24	0	100%	0	50%	100%	79.16%.

Being a tertiary care center the disease is recognized at an earlier stage. With treatment the leprosy shifts towards the tuberculoid pole (BT stage), and without treatment moves towards the Lepromatous pole (BL stage). Bhilai is a cosmopolitan and urban center and most of the patient input has been from Bhilai Steel Plant (BSP). Patients are aware of leprosy and sensitive to the signs and symptoms relative to the disease. Hence, they present early to the physician.

A. Age Distribution:

The age distribution in this study showed that the most common age group affected was 51-60 years (27.65%), followed by 61-70 years (27.65%). The least affected age group was 0-20 years (2.12%). This distribution aligns with regional demographic trends, as Bhilai has a significant elderly population due to the presence of the Bhilai Steel Plant and its associated retirement.

Comparative studies reveal varying age distributions. For instance, Deepti Agrawal et al. [11] found the highest number of cases in the 21-30 years age group. Similarly, Gautam et al. [1] observed a higher prevalence in the fourth and fifth decades of life. **S Chakrabarti et al.** [10] reported a peak in the 11-20 and 21-30 age groups. These variations may be attributed to regional differences and varying population demographics in the studied areas.

B. Gender Distribution:

In the current study, there was a slight male predominance, with males comprising 55.31% and females 44.68%, giving a male-to-female ratio of 1.23:1. This finding is consistent with other studies, such as those by S Chakrabarti et al.[10] and Deepti Agrawal et al. [11], which also reported male predominance in granulomatous skin lesions. The male predominance could be related to occupational exposure or other gender-specific factors prevalent in the study population. Our findings were comparable to the above-mentioned studies.

C. Clinical Features:

1. Number and Anatomical distribution of lesions:

The study found that lesions towards the lepromatous pole were more numerous compared to those towards the tuberculoid pole. The most common site for lesions was the upper extremities (24%), followed by the head, neck, and face (17%). These findings are consistent with Gautam et al. [1], who also reported the upper extremity as the most common site, particularly for tuberculoid leprosy. Jayawardhana et al. [12] similarly found extremities to be the most common site involved. The findings highlight the importance of considering anatomical site variations when diagnosing and managing granulomatous skin lesions.

2. Nature of Lesion:

This study's predominant type of skin lesion was plaque (36.17%), followed by nodular and soft tissue swelling (27.65%). This aligns with the findings of Manandhar et al., [13] who also found plaques to be the most common skin lesion in leprosy. In contrast, Jayawardhana et al. [12] reported nodules or papules as the most common lesions. These differences could be attributed to regional variations in disease presentation and the diverse etiological spectrum of granulomatous lesions.

3. Color Of Lesion:

In this study, erythematous lesions were the most common (51.06%), with hypo-pigmented lesions being less prevalent (17.08%). This contrasts with Veena S. et al. [5] who found hypo-pigmented lesions to be more common in leprosy cases. The higher proportion of erythematous lesions in our study could be related to the relatively higher number of borderline tuberculoid (BT) cases, which often present with erythematous lesions.

4. Sensation:

Sensory impairment was noted only in leprosy cases, with 69.56% of patients experiencing hypoesthesia and 13.04% complete anesthesia. Nerve tenderness was observed in 13.3% of cases. This finding is consistent with Veena S. et al. [5], who reported a high prevalence of anesthesia and nerve thickening in leprosy patients. The stage and type of leprosy might influence the variation in sensory impairment.

D. Histopathological Features:

1. Epidermal changes:
The study observed that atrophic epidermis was prevalent in leprosy cases, while reactive changes like acanthosis, hyperkeratosis, and spongiosis were more common in non-leprosy granulomas. This is in line with findings from Veena S. et al. [5] and Thapa et al. [14], who reported higher frequencies of atrophic epidermis in leprosy cases. Reactive epidermal changes were less commonly reported in the current study, suggesting a variation in the histopathological presentation of granulomas based on regional factors and case selection.

2. Dermal changes:
Grenz zone was present in only one case of histiocytic leprosy, contrasting with studies by Veena S. et al. [5] and Thapa et al. [14], where it was more commonly observed in lepromatous leprosy cases. The variation in the presence of the Grenz zone could be due to the differences in the proportion of lepromatous versus tuberculoid leprosy cases in the study populations. Granulomas were observed in 57.44% of cases, with lymphocytes and epitheloid cells being the predominant components of dermal infiltrates, aligning with findings from Thapa et al. [14]

3: Special Stains:
a) Modified Fite Faraco:
This study demonstrated lepra bacilli in only 13.04% of leprosy cases, which is lower than in other studies such as Harish S. Permi et al. [15], where lepra bacilli were detected in 25.72% of cases. The lower detection rate in our study may be due to the higher proportion of borderline tuberculoid cases, which often have fewer detectable bacilli.

b) AFB (Acid-Fast Bacilli):
AFB staining did not reveal tubercle bacilli in our study's tuberculosis cases. This finding contrasts with studies by Harish S. Permi et al. [15] and Gautam et al. [1], where AFB was detected in a notable percentage of cases. The absence of AFB in our study could be attributed to the patients being on anti-tubercular treatment, which might have reduced the bacillary load below detectable levels.

c) PAS (Periodic Acid-Schiff):
No fungal or parasitic organisms were detected in our biopsies. In contrast, other studies such as Harish S. Permi et al. [1] and Deepti Agrawal et al. [11] have reported the presence of fungi and parasites. This discrepancy might be due to differences in the local prevalence of fungal and parasitic infections or differences in the types of cases referred for biopsy.

Histopathological Diagnosis And Correlation:
Of the 197 skin biopsies received, 47 (23.85%) were diagnosed as granulomatous. Among these, leprosy constituted 23 (11.67%) cases and cutaneous tuberculosis 7 (3.55%) cases. These findings are consistent with Deepti Agrawal et al. [11], who also found leprosy to be the most common granulomatous skin disease, followed by cutaneous tuberculosis. The prevalence of non-infectious granulomas, such as foreign body granulomas, was also consistent with other studies, though the proportion varied.

The correlation between clinical and histopathological diagnoses was highest for borderline tuberculoid leprosy (100%) and lowest for borderline lepromatous leprosy. This variation in correlation rates could be due to differences in the clinical presentation and histopathological features of leprosy and non-leprosy granulomas. (Table-13) provides a comparison of clinicohistopathological correlation in different studies.

However, this study has a few limitations, as it was a hospital-based study and the sample size was smaller. So, a more extensive population-based study is needed to establish the prevalence of leprosy in the area.

CONCLUSION:
The study provides valuable insights into the clinical and histological features of granulomatous skin lesions in eastern India. The findings align with existing studies but highlight significant regional variations in disease presentation and histopathological features. This underscores the importance of considering local epidemiological factors and disease patterns when diagnosing and managing granulomatous skin diseases. The observed variations in age, gender, lesion characteristics, and histopathological findings emphasize the need for region-specific diagnostic and therapeutic approaches.

Abbreviations:
H&E --Hematoxylin and Eosin
AFB --Acid Fast Stain
PAS --Periodic Acid-Schiff
SPSS --Statistical Package for Social Sciences
CD4 --Clusture Dependent
IFN --Interferon
TNF --Tumor necrosis factor

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