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Histopathological Study of Skin Biopsies in Lepra Reaction

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Abstract:
Introduction: *Leprosy is a chronic infectious disease caused by Mycobacterium leprae,mainly involving cooler parts of the body particularly skin and peripheral nerves.it also involves muscles,bones testis and internal organs resulting in deformities. It is the most leading cause of physical disability and social stigma. It is a major problem mainly in the African and South East Asian Regions includingIndia. Its prolonged course is marked by reactions which are major source of morbidity.*
Aim and objectives: *The main objective is to study the spectrum of lepra reaction and theirhistopathology.*
Methods: *A total of 53 cases were studied for a period of 2years in GGH Vijayawada with full clinical details along with skin biopsy.*
Results: *The results were analysed with overall reaction rate about 14%. Type I reaction the most common type of reaction seen in more number of BT patients and among patients who had type II reaction, most of them are found to be lepromatous leprosy patients.*
Conclusion*: Anti-leprosy drugs were found to be the most common precipitating factors contributing to nearly 50% of cases.*
Keywords: *Leprosy, Histopathology, Skin biopsy, Type I & IIlepra reactions.*

I. Introduction

Leprosy is a chronic infectious disease caused by Mycobacterium leprae,principally affecting the cooler parts of the body, mainly skin and peripheral nerves; it also involves muscles, eyes, bones, testis and internal organs resulting in disabling deformities. Leprosy is one of the leading causes of physical disabilities and social stigma. It is a significant problem mainly in the African and South East Asian Regions with a global total of 232,857 new cases reported in 2012. India alone represents around 60% of prevalence of leprosy case load and 75% of new cases worldwide. Most leprosy cases are concentrated in 11 endemic states, including Bihar, Orissa, Chhattisgarh, Jharkhand and Uttar Pradesh where the prevalence rate is high[1]. Although India achieved the target of leprosy elimination (less than 1 case per 10,000 population) in 2005[3] the country still continues to record the highest number of new leprosy cases in the world followed by Brazil and Indonesia [2].However, during its long course complications like reactions may occur. Reactional states are central problems in Hansen's disease .To the patient, they are a major source of morbidity .To the clinician, they are a therapeutic challenge .To the investigators, they are a window of opportunity for the study of immune regulation and perhaps, the mechanisms leading to silent nerve destruction. Thus lepra reactions are emergencies which are unpredictable, progressive,possiblyirreversible yet potentially treatable and are a serious problem in modern leprosy,particularly considering that patients are already under treatment[4]. The incidence ofleprosy in India at present is estimated at 2.4 millionHistopathological study of leprosy is very important in understanding thedisease, its varied manifestation and complications. Hence clinicopathological correlation is extremely important in patient care and management [5]. Since exacttyping of leprosy is sometimes clinically not possible, added to this the poor resultsobtained by slit skin smear will lead to false negative diagnosis. To prevent this,histopathological examination should be done in all suspected cases.

II. Aim And Objectives

AIM

This prospective][work "Histopathological study of skin biopsies in leprareaction" is aimed to study the spectrum of lepra reactions in the period of August2013 to September 2015 at the Department of Pathology, Siddhartha medicalcollege, Vijayawada and to study the histopathological patterns of leprareactions.

OBJECTIVES

1. To evaluate the prevalence of Lepra reactions.
2. To compare histological features of Type 1 and Type 2 lepra reactions.
3. To study variations in histological patterns of Lepra reactions.

4. To correlate the clinical picture with histological appearances.

III. Material And Methods

This is a prospective study carried out over a period from August 2013 to September 2015 at Department of Pathology, Siddhartha Medical CollegeVijayawada. The skin biopsy specimens were received to the Department ofPathology, Siddharthamedical college from Government general hospital,Vijayawada.

METHOD OF COLLECTION OF DATA

Patients of leprosy in reaction belonging to all age groups and both sexes were randomly selected and included in the study after taking their consent. Ineach case detailed history, thorough general physical, local and systemicexamination with reference to clinical features of leprosy reactions. In all casesnecessary investigations and skin biopsy were done for Histopathological study withthe patients consent.

INCLUSION CRITERIA

· Patients of Tuberculoid leprosy (TT) on multidrug therapy.
· Patients of leprosy reactions who are proven cases of leprosy histopathologically were included.
· Patients who came with reactions for first time were also included.

EXCLUSION CRITERIA

· Patients of Leprosy not on multidrug therapy.
· Patients of skin Tuberculosis or other skin infections.

CLINICAL HISTORY

A detailed history was taken with particular reference to past history of similar episodes, the presenting complaints like exacerbation of the skin lesions,appearance of fresh lesions, fever, malaise, muscle pain, pain in the lesions,bone, joints and neuralgia and pain in the testis (in case of males) were noteddown.

An attempt was made to find out the precipitating factors if any like -
1. Concomitant infections / infestations
2. Physical and psychological stress
3. Physiological stress: Menstrual periods
4. Vaccinations / injections
5. Hot foods
6. Extremes of climate
7. Drugs

EXAMINATION

A detailed general examination was carried out in all cases with particular reference to the number of skin lesions, distribution of skin lesions, type of skinlesions, lymph node enlargement, mucous membrane involvement (oral, pharynx,larynx etc.), eye involvement, and oedema of extremities were also noted. Localexamination was carried out methodically in every patient with particular stresslaid on the extent of the skin lesions, type of skin lesions, sensation over thelesions, over the normal skin and over extremities were tested and the changes ifany were carefully noted down. In every patient, the extent of nerve involvementwas noted - whether a single nerve or multiple nerves.All the systems were carefully examined and systemic involvements if anywere noted down.
All the cases that were clinically and provisionally diagnosed as cases ofReactions in leprosy were investigated as follows.

Routine investigations

All the patients diagnosed were investigated routinely like blood Hb%, total WBC count, differential count, ESR, urine for albumin, sugar and microscopy andstool for ova and cyst. Liver function tests and Renal function tests to rule out anyunderlying systemic disorders. Diagnosis of type of leprosy was confirmed as follows -

Slit smear examination:

Slit and scrape smear was done for the demonstration of AFB. Siteschosen were 2 ear lobes, 2 eyebrows and an active lesion.Procedure: The selected sites were cleansed with spirit. The skin was heldfirmly between thumb and index finger and the pressure was maintained untilthe skin became pale. An incision, 5mm long and 3mm deep was made and theblade was turned through 90° and the tissue material was scraped from the

sides and the floor of the incision. This material was then smeared on to theslide and a uniformly thick smear was made. The smear was allowed to dry andfixed by passing the slide over the top of a flame. The fixed smear was stainedwith Ziehl-Nielsen stain.

Procedure of Ziehl - Nielsen Staining:

After placing on the staining rack, the whole slide was covered with carbolfuchsin and heated with a spirit lamp till it caused steam to rise from all parts for20 seconds the slide, but boiling was avoided. The slide was left for 10 minwithout further heating. The plain was tipped away and the slide was held undera gentle stream of tap water. The slides were decolourized by adding 5% ofH_2SO_4 or until the smear became light pink in colour and was again washedwith gentle running water and counter stained with 1% methylene blue for about 1 minute and washed in running water and allowed to dry.

The bacteriological index (BI) and the morphological index (MI) were calculated according to Ridley's scale.

The Bacteriological Index
1+ : 1-10 bacilli in 100 microscopic fields
2+ : 1-10 bacilli in 10 microscopic fields
3+ : 1-10 bacilli in an average microscopic field
4+ : 10-100 bacilli in an average microscopic field
5+ : 100-1000 bacilli in an average microscopic field
6+ : Many clumps of bacilli in an average microscopic field
(over 1000).

The Morphological Index
It is the percentage of solid stained bacilli. This was calculated after examining 200 red staining elements lying singly.

Biopsy:

Specimens from 84 patients were studied for histopathological changes. After local infiltration of 1cc to 2cc of xylocaine to the edge of the lesions, a pieceof skin consisting of both involved and uninvolved skin was taken forhistopathological study. The tissue was preserved in 10% formalin before it was processed for histopathological study at the Pathology department ofSiddhartha Medical College. The sections were stained routinely with theHaematoxylin and Eosin procedure and FiteFaraco stain was done.

HAEMATOXYLIN AND EOSIN STAIN
Haematoxylin and eosin staining for paraffin sections

1. Sections were immersed in first xylene bath for 3 minutes.
2. Then they were transferred to second xylene bath for 2 to 3 minutes and excess solution was drained off.
3. Sections were immersed in first bath of absolute ethyl alcohol for 2 minutesand they were passed very quickly through second bath of absolute alcohol.
4. Then sections were rinsed in water for about 1 minute, and then briefly indistilled water.
5. Sections were stained for 4 to 8 minutes in Harris's haematoxylin.
6. The sections were differentiated dipping three to four times in 1% acidalcohol.
7. They were rinsed in water and ammonium hydroxide for 30 seconds.
8. Bluing was done by keeping them in running tap water.
9. Then sections were rinsed well in water.
10. They were stained with 1% aqueous Eosin- Y for 1 to 2 minutes.
11. Then they were rinsed briefly in water.
12. They were dehydrated by passing through three or four baths of absolute ethanol with agitation for 10 to 20 seconds in each bath.
13. Then they were cleared by passing through two to three baths of xylene,about 15 to 20 seconds in each.
14. The slides were dried and mounted with DPX.

Results

Nuclei and calcium - blue.
Cytoplasm - pale pink.
The histopathological sections were reported according to the findings observed as in the sections. Subsequently sections were subjected to specialstaining.

FITE FARACO STAIN

1. The sections are deparaffinised in 2 changes of xylol-peanut oil 3:1ratio for 7 mins each change.
2. Excess oil is wiped off from back of slide.
3. They are blot gently with fine filter paper for 3 times
4. Then sections are washed in running tap water for 5 min.
5. Then the sections are washed in distilled water.
6. Carbolfuschin is added to the sections for 30 min.
7. Then the sections are washed in running tap water for 2 min.
8. Then the sections are decolorized in 1%acid alcohol to pale pink.
9. Then washed in running tap water for 2 mins.
10. Then the sections are dipped in counter stain 0.15% methylene blue for 5 or6 dips.
11. Then the sections are washed in running tap water until sections become pale blue.
12. Then the sections are dehydrated quickly in absolute alcohol for 3 changes.
13. The sections are cleaned in xylene for 2 changes and mounted in DPX.

Results

Bacilli - red

Nuclei – blue

IV. Observations And Results

The present study comprises of a total of 587 leprosy casesreceived in the Department of Pathology, Siddhartha Medical College andGeneral hospital, Vijayawada, during the study period August 2013 toSeptember 2015 of either sex, of which 84 patients were diagnosed to behaving reactions.The clinical data was collected from the patient & requisitions andrecorded as per the proforma. The details of the specimens and themicroscopic findings were documented.The microscopic and other findings were taken in to proforma andmaster chart was prepared from these details. Overall analysis of resultswas done by using tables, pie diagrams and charts by obtaining data fromthe master chart.

Methodology of study

· Study design: Prospective, Cross sectional and observational

· Study period: August 2013 to September 2015

· Study material: Skin biopsy specimens received in Pathology department,Siddhartha Medical College, Vijayawada during the mentioned study period.

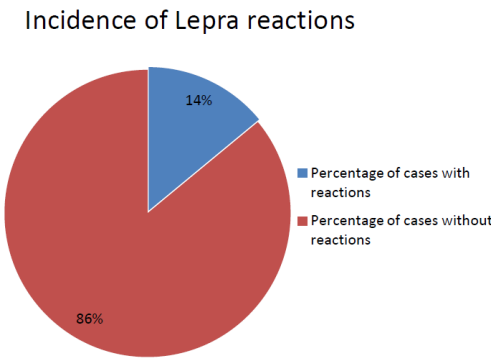
V. Results

Table -1 Incidence Of Lepra Reactions Of Skin Biopsies Insiddhartha Medical College And Hospital

	No of cases	Percentage
No of leprosy cases registered	587	100
No of cases with reactions	84	14
No of cases without reactions	505	86

Pie diagram -1

INCIDENCE OF LEPRA REACTIONS IN SKIN BIOPSIES

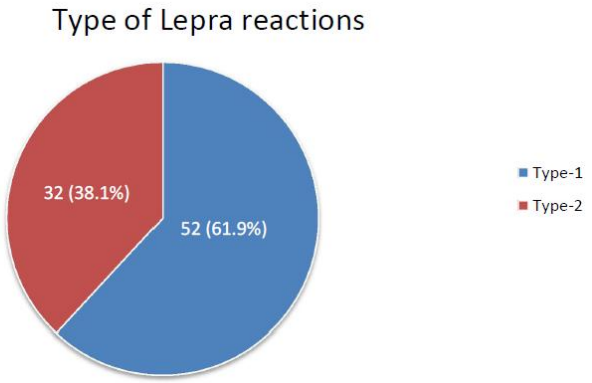


Out of 587 leprosy patients, 84 patients (14%) were found to have reactions

Table-2 Type of Lepra Reactions

Reaction	No of cases	Percentage
Type-1	52	61.9
Type-2	32	38.1
Total	84	

Pie diagram-2
TYPE OF LEPRA REACTIONS

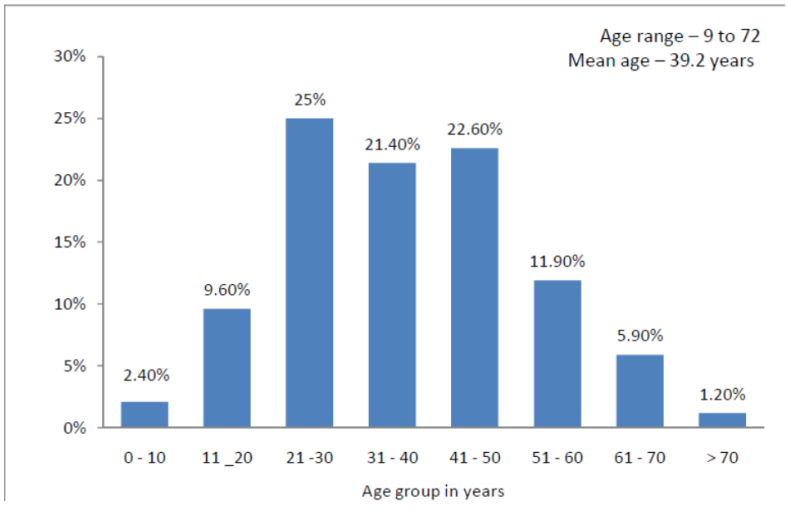


In the present study approximately 2/3rd of patients had type-I reactions i.e61.9% and 1/3rd of patients i.e, 38.1% had type-II reaction.

Table-3 Age wise distribution

AGE GROUP(IN YEARS)	NO.OF CASES	PERCENTAGE (%)
0-10	2	2.4
11-20	8	9.6
21-30	21	25
31-40	18	21.4
41-50	19	22.6
51-60	10	11.9
61-70	5	5.9
>70	1	1.2
Total	84	

Bar diagram- 1
AGE WISE DISTRIBUTION (Age in years)



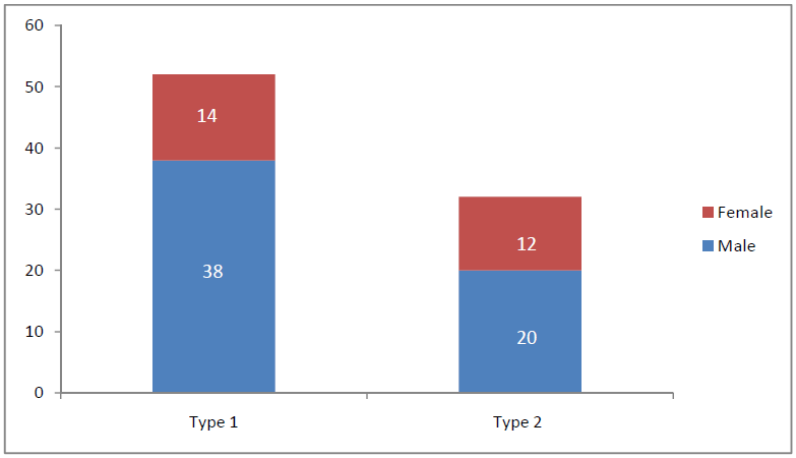
In the present study largest age group is 21- 30 years with 21 patients contributing to 25%.19 patients (22.6%) belong to 41-50 years of age 18 patients (21.4%) belong to 31- 40 and 10 patients (11.9%) belong to 51-60 years of age and 10(12%) patients below 20 years and only 5 patients (5.9%) belong to age 61- 70 years and 1 patient 1.2% > 70 years above.

The youngest patient studied was 9 years of age and the oldest studied was 72 years of age. Both of them were male patients.

Table-4 Sex Wise Incidence

Type of reaction	Males	Females
Type-1(RR)	38	14
Type-2(ENL)	20	12
Total	58	26

Bar diagram-2
SEX WISE INCIDENCE

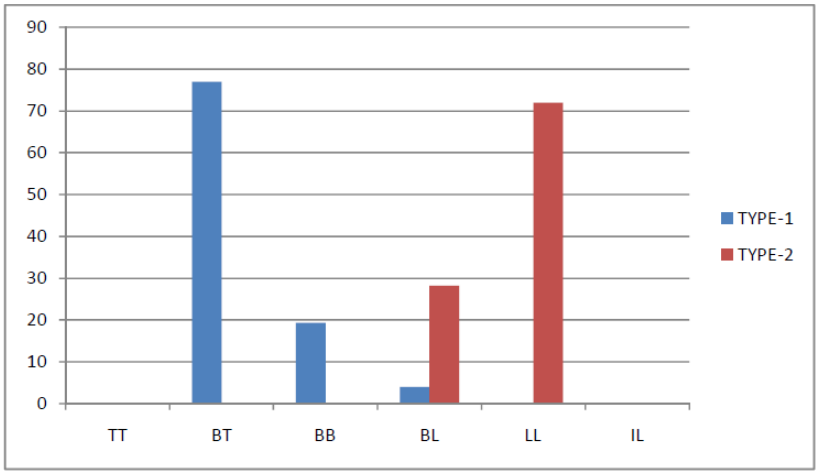


Out of 84 cases studied, 38 cases of type -I reaction, 20 cases of type-IIreaction are males and 14 cases of type-I reaction, 12 cases of type-II reaction arefemales respectively. The overall incidence among males and females is 69.1% and30.9% respectively.

Table-5 Reactions In Different Types Of Leprosy

Type of leprosy	Type-1		Type-2		Total	
	No of cases	Percentage	No of cases	Percentage	No of cases	Percentage
TT	-	-	-	-	-	-
BT	40	76.9	-	-	40	47.6
BB	10	19.2	-	-	10	11.9
BL	2	3.9	9	28.1	11	13.2
LL	-	-	23	71.9	23	27.3
IL	-	-	0	-	-	-
Total	52		32	-	84	

Bar diagram-3
REACTIONS IN DIFFERENT TYPES OF LEPROSY



Among the 52 patients who had type I reaction, 40 patients (76.9%) wereBorderline Tuberculoid, 10 (19.2%) were mid borderline and 2 (3.9%) . Thusborderline Tuberculoid patients had higher incidence of type I reaction. Only 32patients (out of 84) had type II reactions out of which 9 (28.1%) were of borderlinelepromatous leprosy and 23 (71.9%) were of lepromatous leprosy

Table-6 Precipitating Factors

Factor	No of cases	Percentage
Physiological stress	3	3.6
Anti-leprosy drugs	42	50
Physical strain	10	11.9
Psycological stress	7	8.4
Extremes of climate	8	9.5
Concominant infections	10	11.9
Not known	4	4.7
Total	84	

In the present study antileprosy drugs constitute the major risk factor (50%)and physiological stress (menstruation), physical strain, psychological stress,extremes of climate (summer), concomitant infection and idiopathic constitute theother (50%)

Pie diagram-3
PRECIPITATING FACTORS

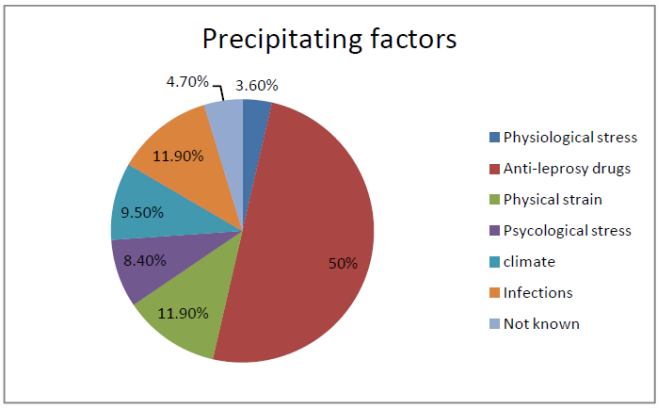
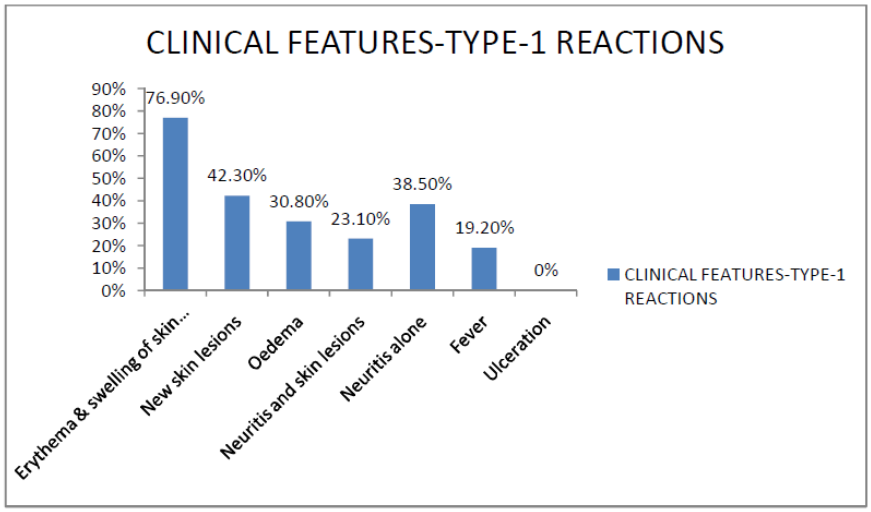


Table-7 Clinical Features Reversal (Type I) Reactions

Features	No of cases	Percentage
Erythema and swelling of skin lesions	40	76.9
New skin lesions	22	42
Oedema	16	30.8
Neuritis and skin lesions	12	23.1
Neuritis alone	20	38.5
Fever	10	19.2
Ulceration	0	0

Bar diagram-4
CLINICAL FEATURES REVERSAL (TYPE I) REACTIONS



In the present study erythema and swelling of the skin lesions were present in 76.9% of the cases, occurrence of new skin lesions in 42.3%, Neuritisin 38.5%, oedema of hands and feet in 30.8% neuritis and skin lesions in 23.1%and fever in 19.2% of the total 52 (100%) of type I reaction cases. No cases of ulceration were noted.

Table-8 Clinical Features Of Type Ii (Enl) Reactions

Features	No of cases	Percentage
Fresh crops of erythematous and tender nodules	32	100
Fever	27	84.3
Joint pain, neuritis, oedema and ulceration	22	68.7
Iritis	6	18.8
Orchitis	10	31.2
Lymphadenopathy	5	15.6
Myalgia	25	78.1

Bar diagram-5
CLINICAL FEATURES REVERSAL (TYPE 2) REACTIONS

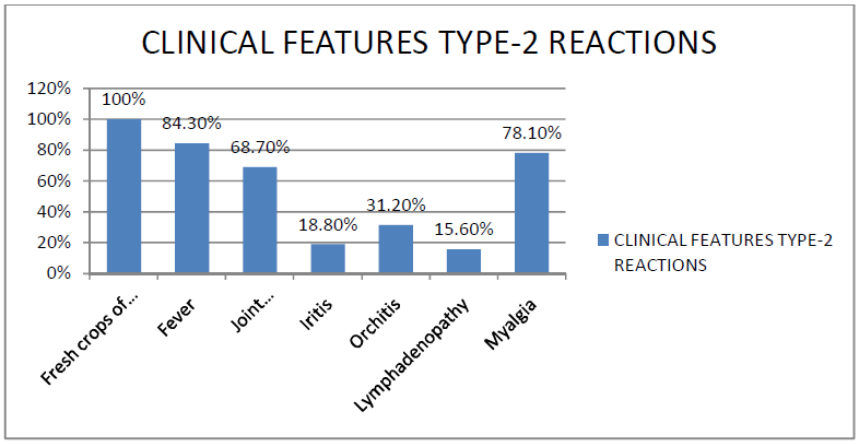
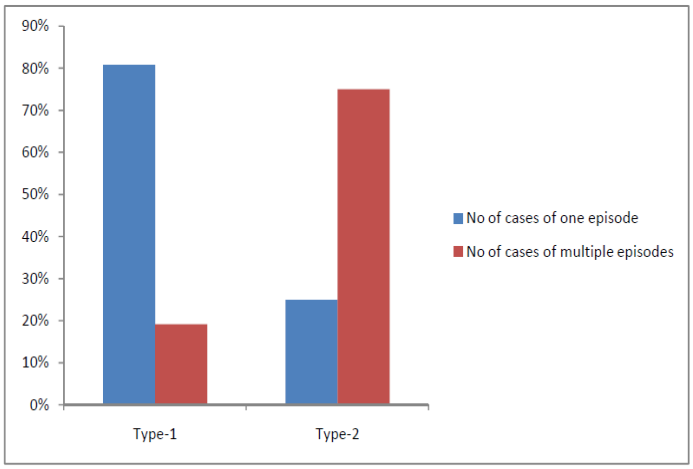


Table-9 Recurrence Of Reactions

	TYPE-1		TYPE-2	
	Cases	Percentage	Cases	Percentage
No of cases of one episode	42	80.8	8	25
No of cases of Multiple episodes	10	19.2	24	75
Total	52	100	32	100

Bar diagram-6
RECURRENCE OF REACTIONS

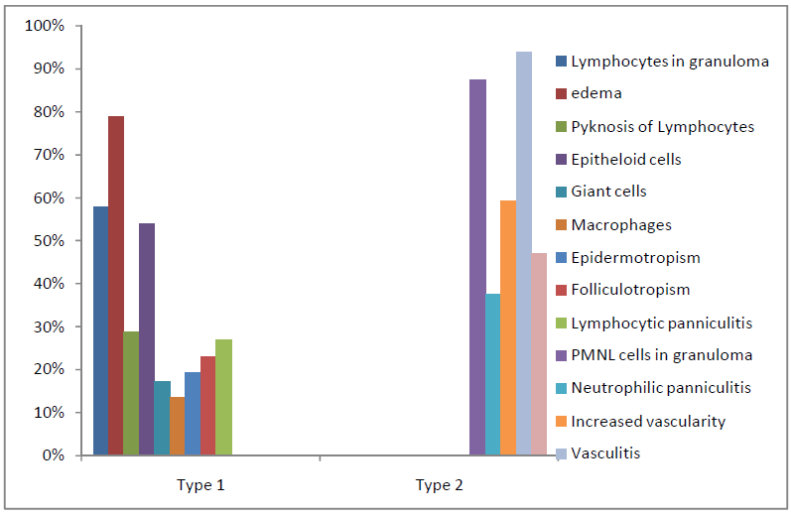


In the present study out of 52 patients with type I reaction 42 (80.8%) had one episode and 10 patients (19.2%) had multiple episodes of type I reaction during the period of 2 years. Among patients who had type II reactions 8 patients (25%) had only one episode and 24 patients (75%) had multiple episodes during the same time.

Table-10 Histopathology

Reactions	Features	No of cases	Percentage
Type-1(52 cases)	Oedema	41	78.8
	Lymphocytes in granuloma	30	57.7
	Pyknosis of Lymphocytes	15	28.8
	Epithelioid cells	28	53.8
	Giant cells	9	17.3
	Macrophages	7	13.5
	Epidermotropism	10	19.2
	Folliculotropism	12	23.1
	Lymphocytic panniculitis	14	27
Type-2(32 cases)	PMNL cells in granuloma	28	87.5
	Oedema	15	46.9
	Neutrophilic panniculitis	12	37.5
	Increased vascularity	19	59.3
	Vasculitis	30	93.8

Bar diagram-7
HISTOPATHOLOGY



In the present study among patients of type I reaction oedema of thedermis, infiltration by lymphocytes and epithelioid cells were more commonly seen. Few specimens showed giant cells, macrophages, epidermotropism, lymphocytic panniculitis and folliculotropism.

Among the specimens taken from patients of type II reaction vasculitis was seen in 93.8% patients, infiltration by PMNL in 87.5%, increased vascularity in 59.3%, oedema in 46.9% and neutrophilicpanniculitis in 37.5%.

Fig:1 Clinical picture showing erythematous edematous plaque over forearm with edema of hand type-1 reaction in BT Hansens

Fig:2 Clinical picture of type-1 reactions presenting with erythematous skin lesions in type-1 reaction In BT Hansens.

Fig-4 Clinical picture showing multiple nodules &plaques in type-2 reaction in LL Hansens

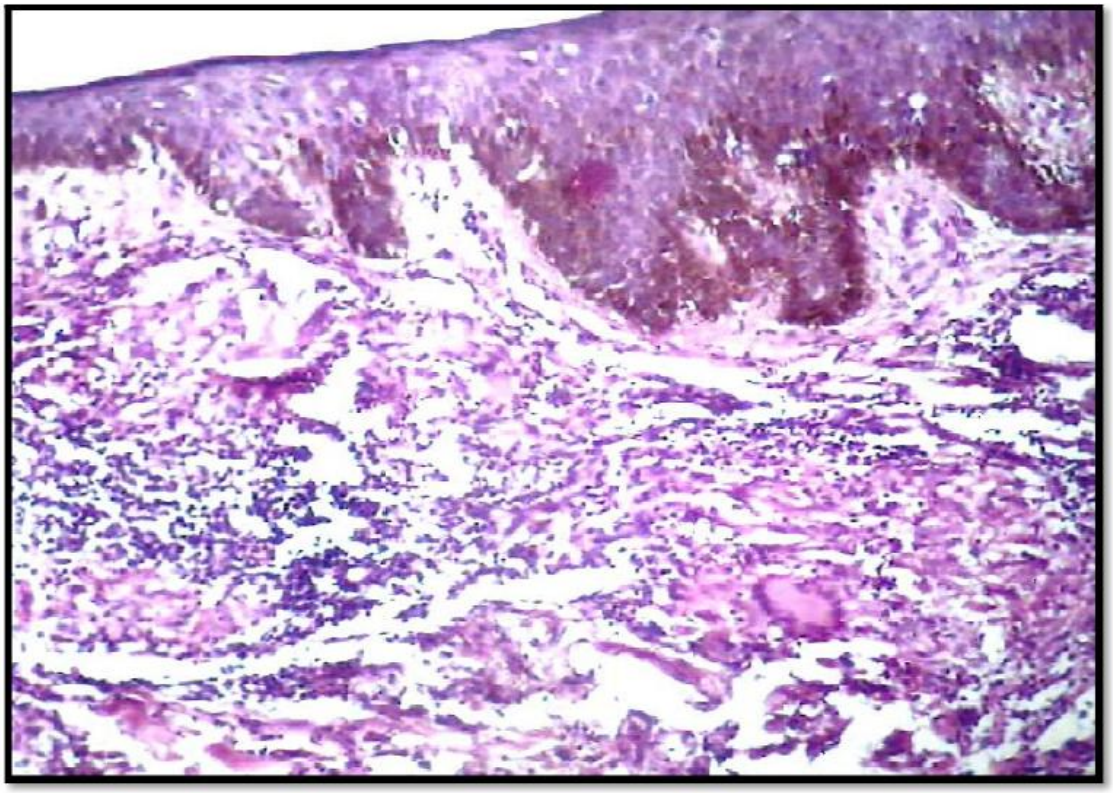


Fig5:showing type-1 reaction with granulomas showing giant cells infiltrated by lymphocytes(H&E 100X)

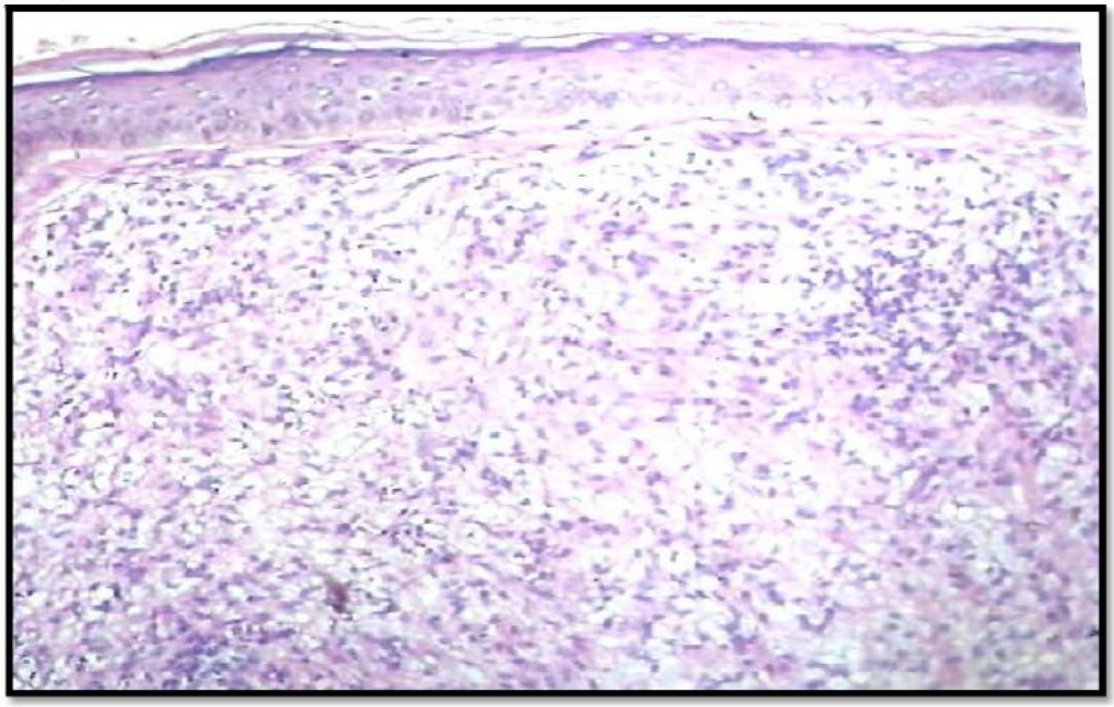


Fig:6 showing oedema in granuloma infiltrated by lymphocytes in type-1 reaction

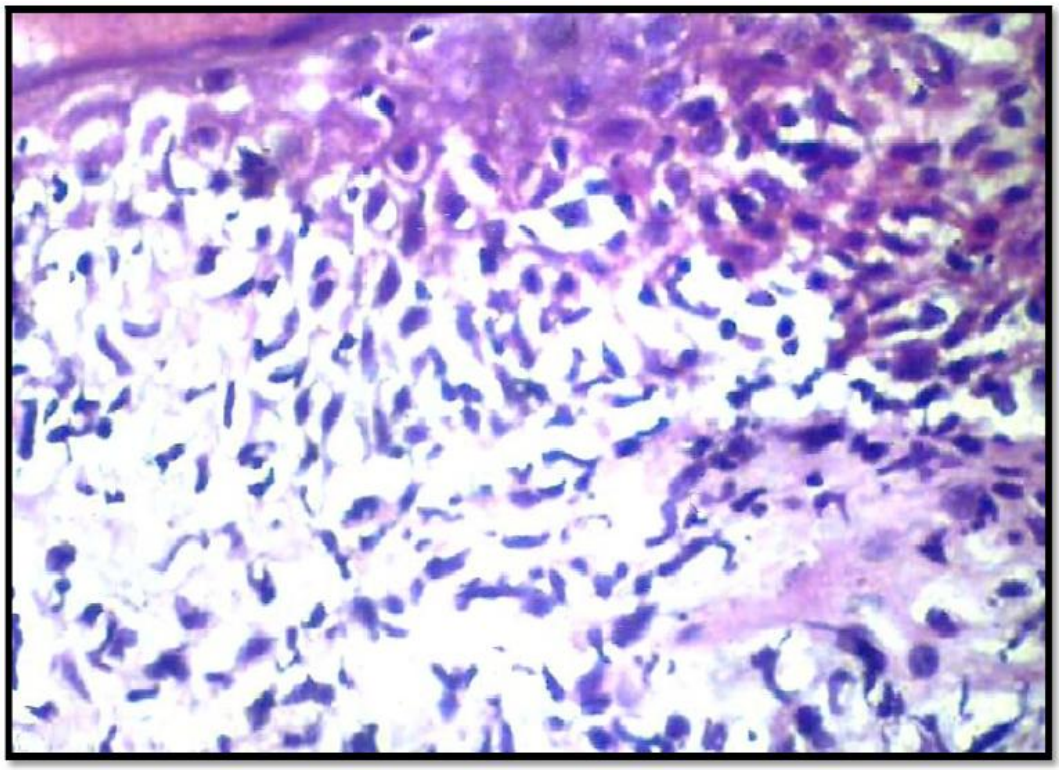


Fig:7 showing epidermal erosion by granuloma in type-1 reaction of BT Hansens (H&E 400X)

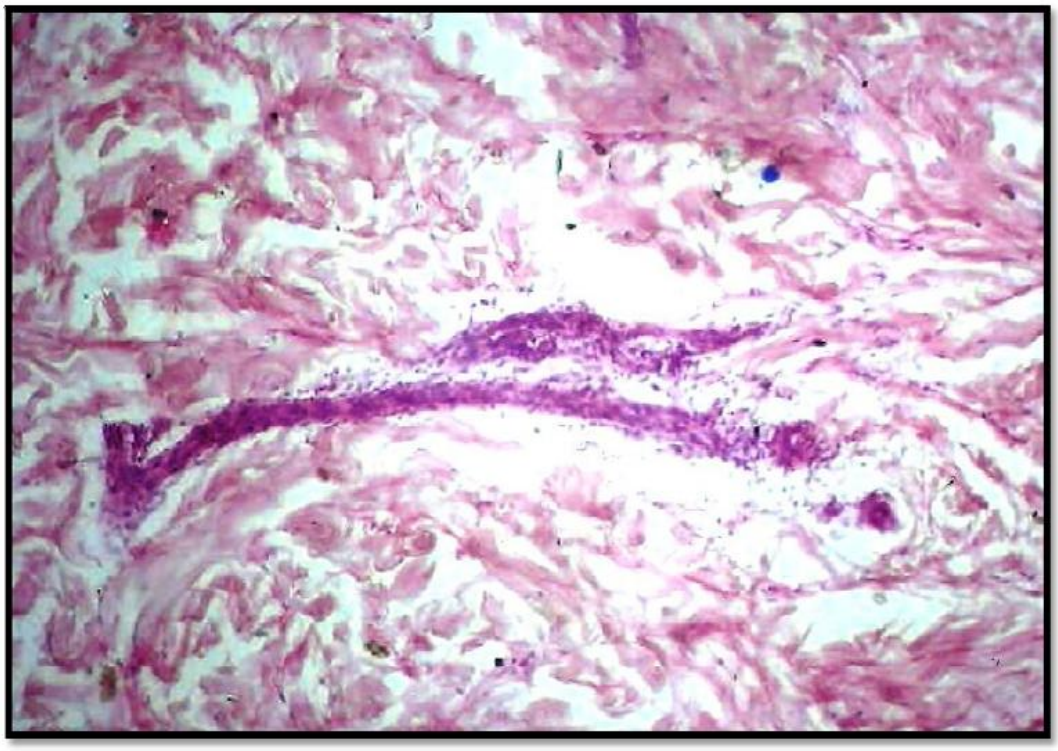


Fig:8 showing dermal edema and involvement of nerve in type -1 reaction in BT Hansen (H&E 400X)

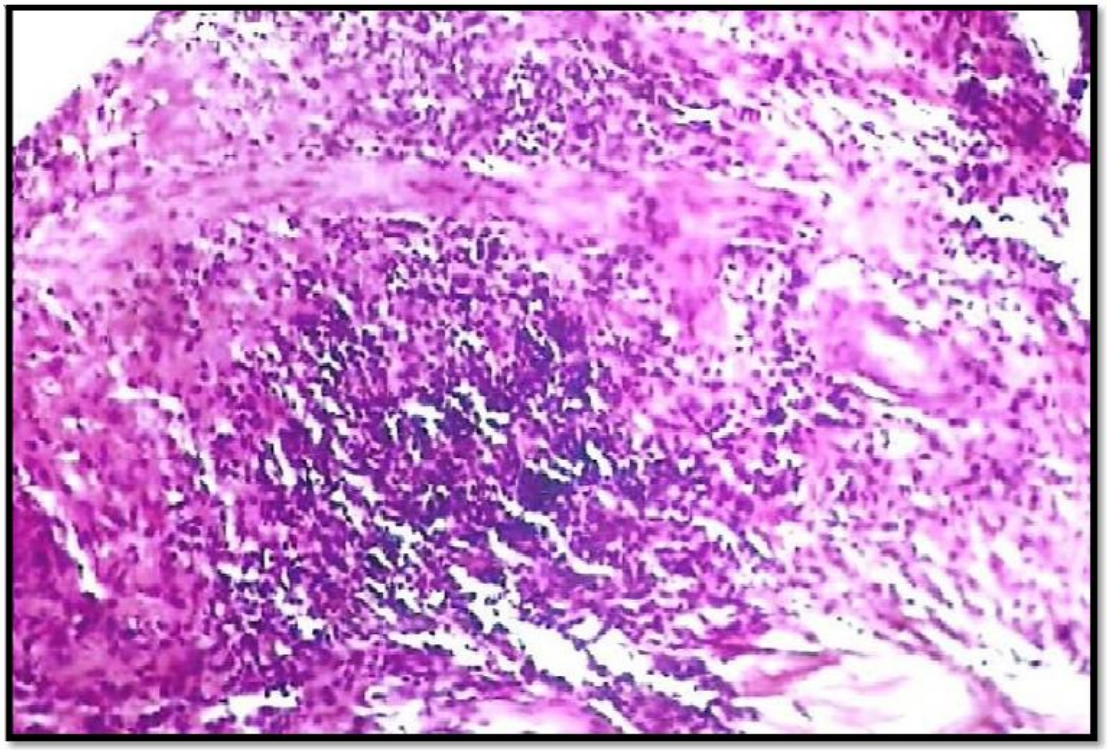


Fig-9 showing inflammatory cells around nerve bundle(H&E 400X)

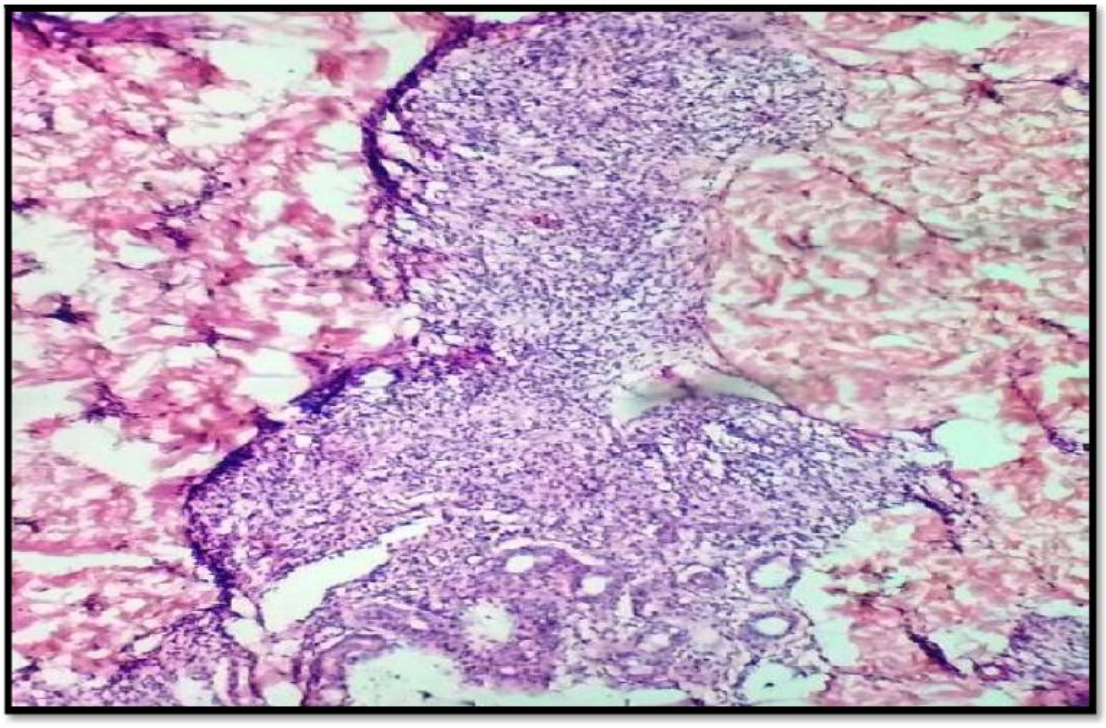


Fig- 10 Type -1 reaction granuloma infiltrated by lymphocytes (H&E 400X)

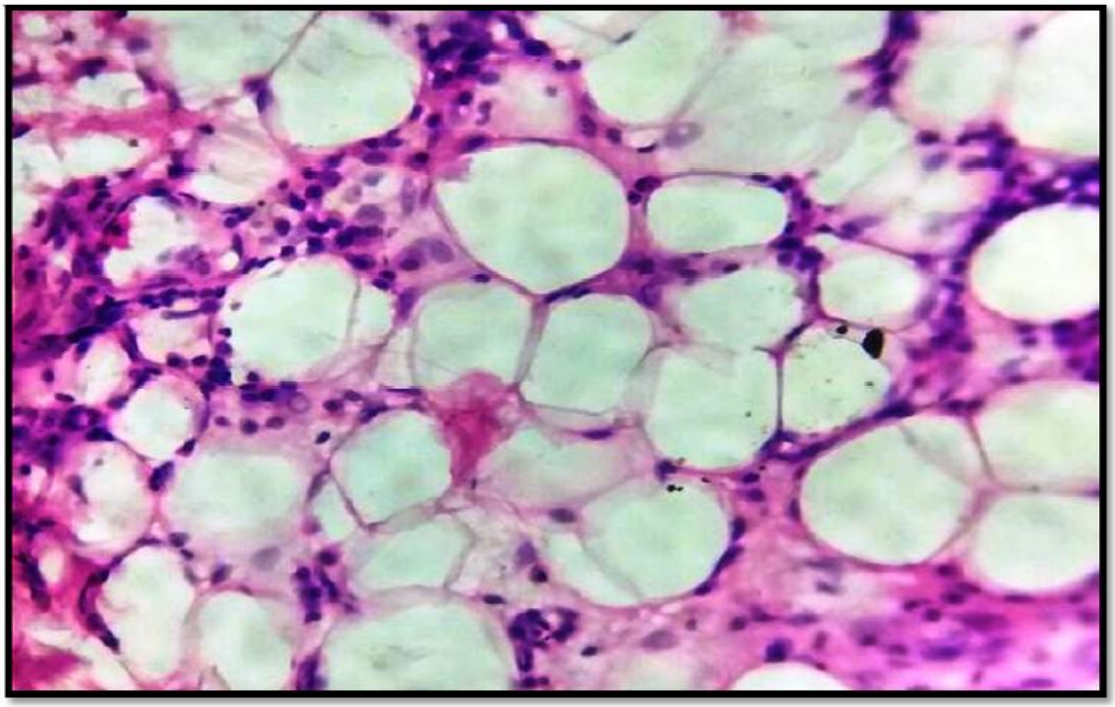


Fig -11 Type-1 reaction showing lymphocytic panniculitis H&E(400X)

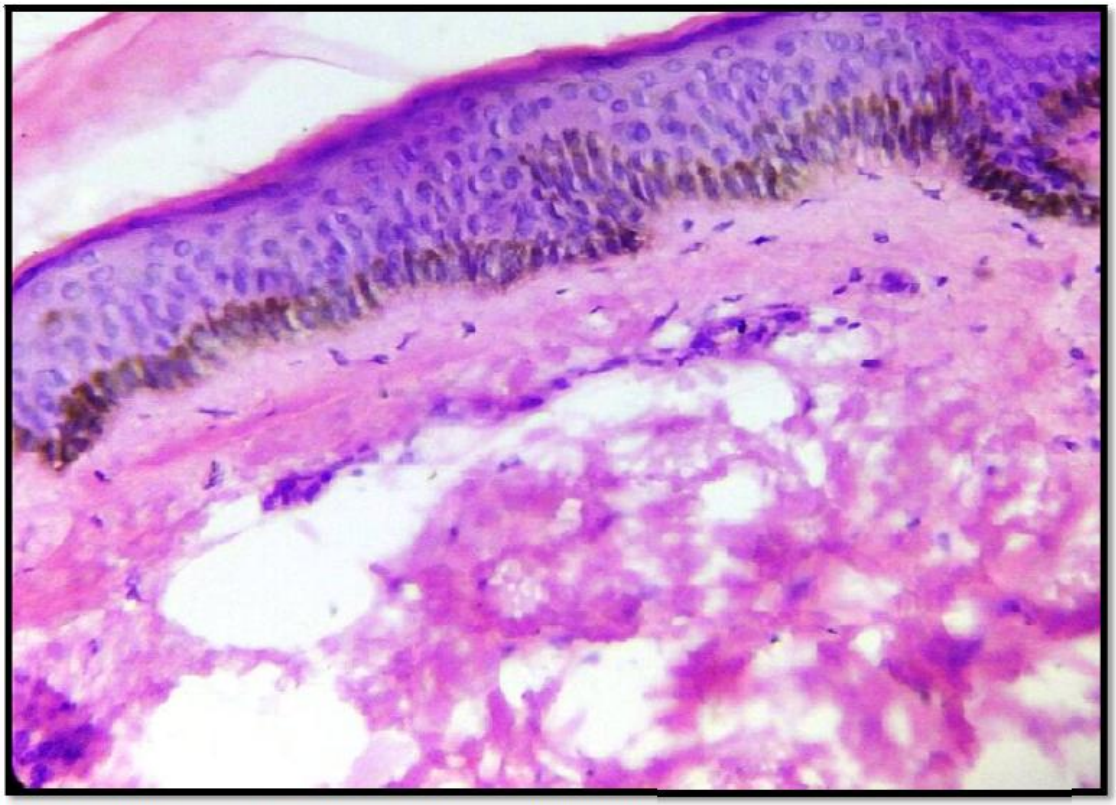


Fig-12 Showing grenz zone in LL type of leprosy H&E(400X)

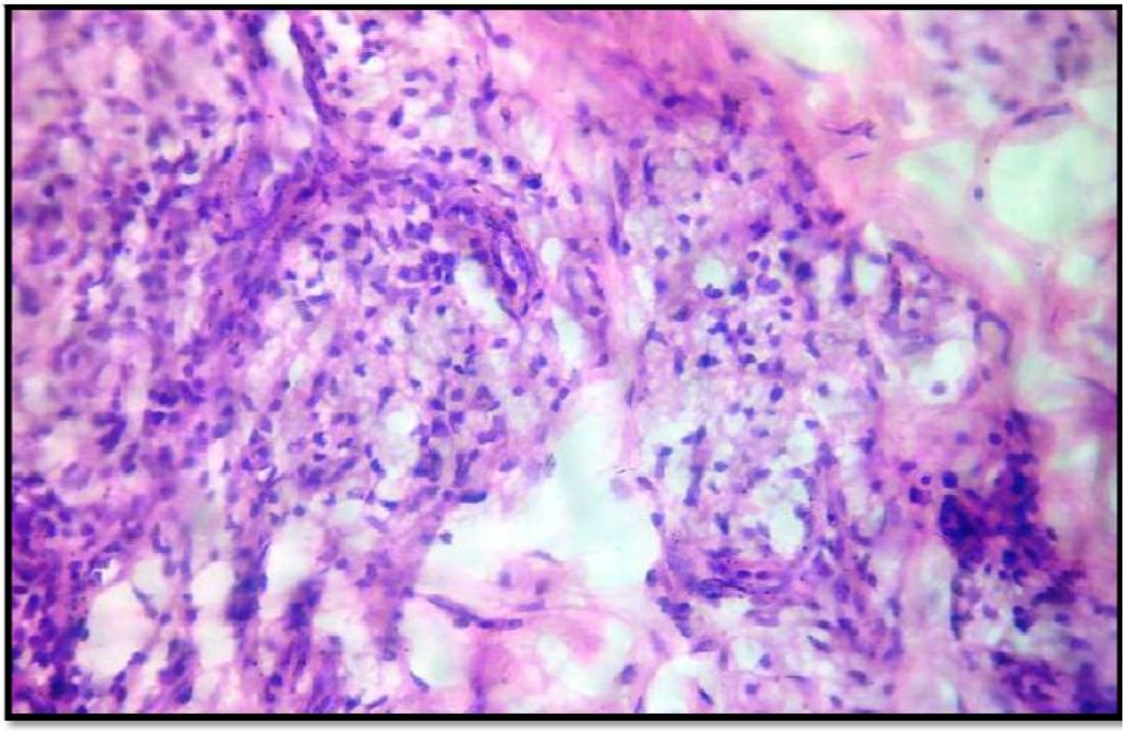


Fig-13 Type- 2 reaction foamy macrophages and neutrophils in LL (H&E 400X)

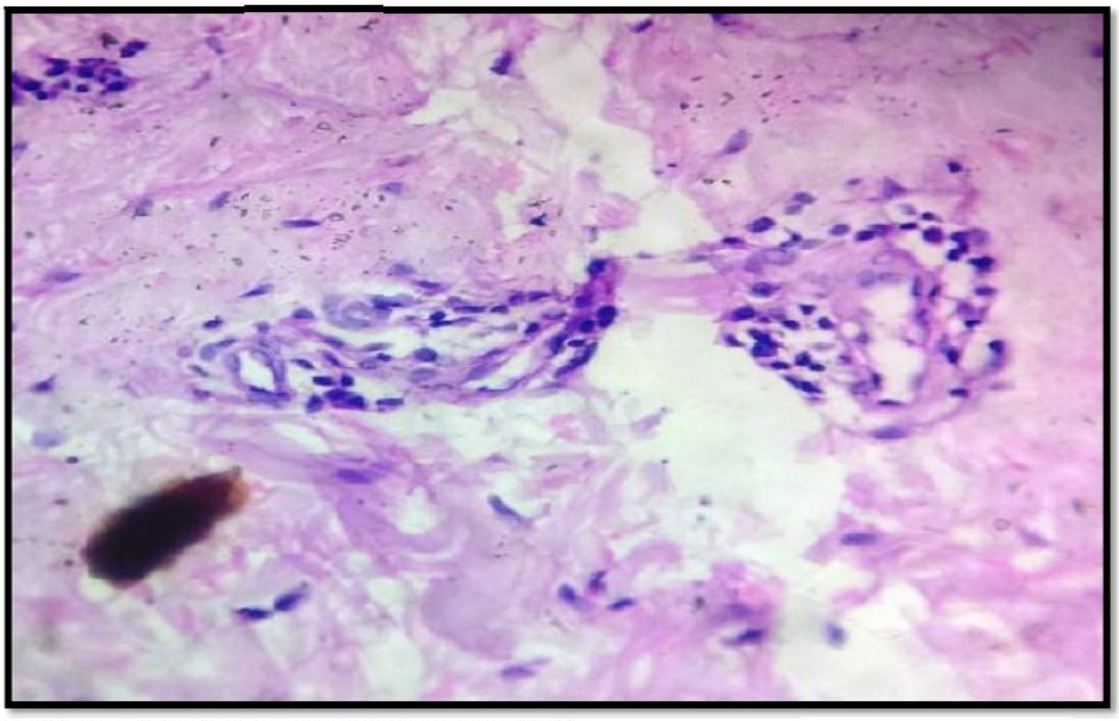


Fig:14 Type-2 reaction showing vasculitis (H&E 400X)

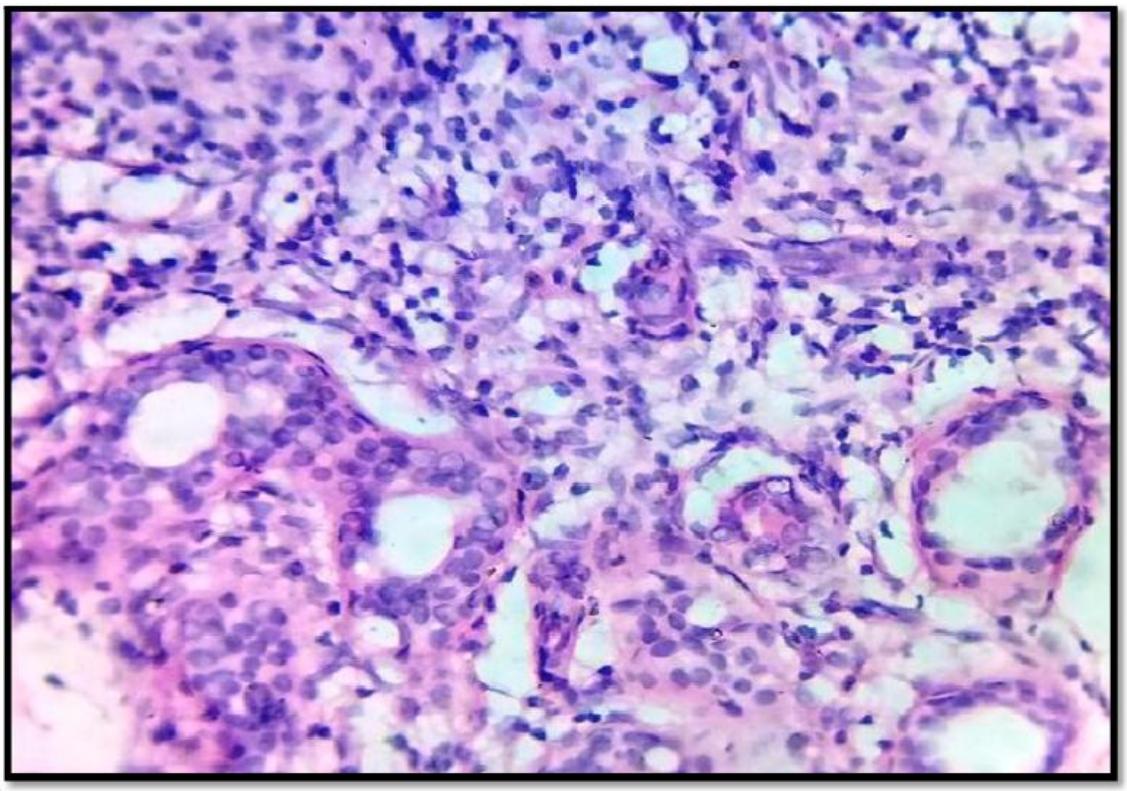


Fig: 14 Type -2 reaction showing polymorphonuclear leukocytes around adnexae(H&E 400X)

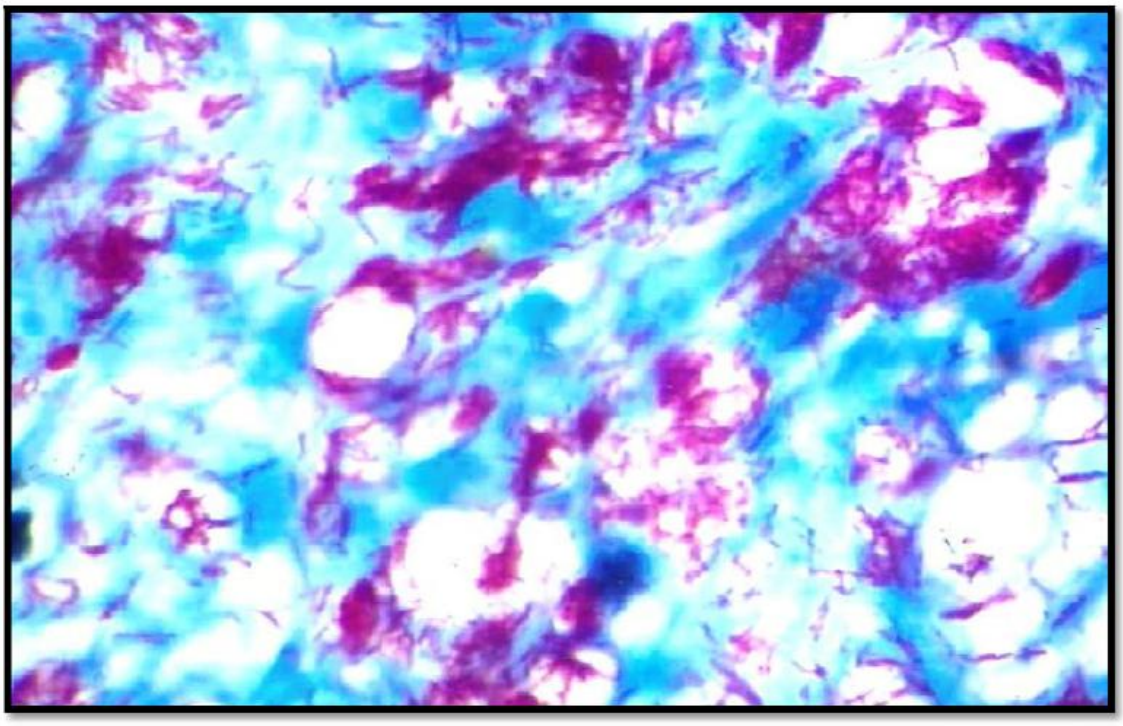


Fig :16 BL –Type lepra bacilli modified fite Faraco stain in oil immersion

VI. VDiscussion

The present study comprises of a total of 587 leprosy cases received inthe Department of Pathology, Siddhartha Medical College and General hospital,Vijayawada, during the study period August 2013 to September 2015 of

either sex, out of which 84 patients were diagnosed to be having reactions.Several studies were available on types of lepra reactions. In this part,salient features of the present study were discussed and compared with the othersimilar recent studies.Out of 84 cases in the study 52 (61.9%) patients presented with type-1reactions and 32 (38.1%) presented with type 2 reaction.These results of incidence were compared with similar other studies. In thestudy of Sharma et al, the incidence of lepra reactions is about 42.8% .In thestudy of Kumar et al[57], overall reported incidence of Type I reactions rangesfrom as low as 2.6% to a much higher figure of 28% and type II reaction rangesfrom as low as 2.1% (BL cases) to 47.4% (LL cases).In the study of B.Debi et al[61] the incidence of lepra reactions is about2.07% but the incidence of lepra reactions in the present study is about 14% which is contrast to the above study. The explanation for this could be that mainreferral centres may report high frequency from the very nature of the patientswho attended there.The incidence of lepra reactions in the present study (14%) is comparedwith the Sharma et al[62] study (42.8%) and Kumar et al [57]study (41.4%).Theexplanation for this could be that main referral centres may report a high frequency from the very nature of the patients who attended there.

Table- 11 Comparison of incidence of lepra reactions in different studies

Authors	Incidence
B.Debi et al[61]	2.07%
Sharma et al[62]	42.8%
Kumar et al[57]	41.4%
Present study	14.0%

AGE:

In the present study largest age group is 21- 30 years with 21 patients contributing to 25%.Ninteen patients (22.6%) belong to 41-50 years of age, 18 patients (21.4%) belong to 31- 40, 10 patients belong to 51-60 years of age, 10(12%) patients below 20 years and only 6 patients (7.1%) belong to age 60 years and above. The youngest patient studied was 9 years of age and the oldest studied was 72years of age. Both of them were male patients. In the study of Sharma et al [62] maximum incidence of reactions was in 21- 30 years age group which constitutes about 42%. Similarly the maximum age incidence in the present study was in 21-30years which constitutes about 25% .The reason may be due to large number of cases in the study of Sharma et al[62]. In the study of Debi and Mohanty[61], 41-60 years is the most common age group affected. In contrast, the commonest age group is 21-30 in the present study.

In the study of Scollard et al[63] out of 118 patients 20 patients (17%) belong to the age group below 20 years and all other patients were 20 years and above. In the study of Scollard et al[63] 81 patients of Type-I reaction found morepatients in the age group of 21 years and above there were 19 patients (23.4%). Thus the age incidence on an average is 20% which is in agreement with theobservations made in the present study.

Table- 12 Comparison of most common age group in different studies

Authors	Age
Debi and Mohanty[61]	41-60 years
Sharma et al[62]	21-30 years
Present study	21-30 years

The present study is in concurrent with Scollard et al and Sharma et alstudies the most common age group is 21-30 and in contrast to the study of Debiand Mohantyin which the most common involved age group is 41-60 years.Mean age of lepra reactionsIn the present study mean age of patients with lepra reactions was 39.2

years (Mean). It is comparable with the study done by Vijay Adhe et al [64]in whichthe mean age was 37.8 years and Kumar et al study in which mean age was 39years at the time of diagnosis.

Table-13 Showing comparison of mean age in different studies

Authors	Mean age
Kumar et al[57]	39 years
Vijay Adhe et al[64]	37.8 years
Present study	39.2 years

SEX:

In the present study 52 patients had type-I reaction among which 38(73.1%) patients were males and 14 (26.9%) patients were females, whereas 32patients had type-II reaction out of which 20 (62.5%) patients were males and12(37.5%)patients were females. Thus both type-I and type-II reactions weremore common in men than in women.The sex incidence in the present is compared with Kumar et al (57) study, Scollardet al (63) study, Sharma et al and Vijay Adhe et al studies. In the study of Kumar et al.,found an incidence of 60% among males and 40% among females whichincluded both type-I and type-II reactions (57). However Scollard et al hadobserved higher incidence of type-I reaction among females a 47% but the overall incidence of reactions i.e., both type-I and type-II reactions was 26 %(63). In thestudy of Sharma et al(62) the incidence of type-1 reaction among males was 86%and females was 14% and the incidence of type-2 reaction among males was 59%and among females was 41%.In the study Vijay Adhe et al (64) the incidence of reaction in males was about65.5% and females was about 34.4%

Table-14 Comparison of sex incidence in type-1 reactions

Authors	Males	Females
Sharma et al[62]	86%	14%
Scollard et al[63]	63.5%	36.5%
Present study	73.1%	26.9%

Thus the results of sex incidence of type-1 reactions in the present study are almost in concurrence with above studies.

Table-15 Comparison of sex incidence in type-2 reactions

Authors	Males	Females
Sharma et al[62]	59%	41%
Scollard et al[63]	74%	26%
Present study	62.5%	37.5%

Thus the results of sex incidence of type-2 reactions in the present studyare also almost in concurrence with above studies.The excess cases of lepra reactions in males has been attributed to theirgreater mobility and increased opportunities for contact in many populations. Thus,the observations in the present study regarding the sex incidence are close to theobservations made in the above mentioned studies.

TYPE OF REACTIONS:
In the present study 61.9% of patients had type-I reaction where as38.1%of patients had type-II reaction.

Table-16 Comparison of type of reactions in different studies

Authors	Type-1	Type-2
Kumar et al[57]	71.5%	28.5%
Scollard et al[63]	64.1%	35.9%
Sharma et al[62]	71.8%	28.2%
Vijay Adhe et al[64]	34.37%	65.63%
Saritha et al[65]	70.8%	29.2%
Present study	61.9%	38.1%

The type of reactions in the present study are compared with Kumar etal[57]), Scollard et al [63]), Saritha et al [65] and Vijay Adhe et al[64] studies. In the studyof Kumar et al[57]., 71.5% had type-I reaction where as 28.5% had type- IIreaction[69]. In the study of Scollard et al[63]., found type-I reaction in (64.1%) andtype-II reaction (35.9%) of the patients. In the study of Sharma et al[62].,71.8%found to be type -1 reaction and 28.2 % were found to be type-2 reaction. In thestudy of Saritha et al[65] out of 48 cases 34 (70.8%) cases presented with type 1reaction and 14 (29.2%) cases presented with type 2 reaction.

In the study of Vijay Adhe et al[64] type 2 reactions which constitutes about65.63% are common than type 1 reactions which constitutes about 34.37% whichis in contrast to present study in which type2 (which includes 38.1% of cases) areless common than type 1 reaction(which includes 61.9%of cases).The present study constitutes about 61.9% of type 1 reactions which is inconcurrent with the study of Kumar et al with 71.5% of type 1 reactions, Sharma etal 71.8% of type 1 reaction, Scollard studies in which type-1 reaction constitutesabout 61.1% and Saritha et al 70.8% of type1 reaction. In all the above mentionedstudies type-1 reactions are more common than type-2 reaction.Type 1 reaction was the commonest reaction encountered, more commonthan type 2 reaction.Type 1 reaction is cell mediated immunity reaction to a mycobacterialantigen body defence mechanism. The incidence of ENL reactions appears tohave fallen with the introduction of MDT, possibly due to the combinedbactericidal effect of rifampicin and the antiinflammatory effect of clofazimine insuppressing ENL. This could be accounted for by the decreasing number ofpatients in lepromatous leprosy due to multidrug therapy and intense control work.This is because both in the above mentioned studies and the present studymajority of the patients belong to the borderline leprosy and type-I reaction is morecommon in the borderline spectrum.

Reactions In Different Types Of Leprosy:

Among the 52 patients who had type I reaction, 40 cases (76.92%),patients were Borderline tuberculoid , 10 cases (19.3%) were mid borderline and2 (3.8%) were borderline lepromatous. Thus borderline tuberculoidpatients hadhigher incidence of type I reaction. Out of 32 patients who had type II reactions, 9 cases (28.1%) were of borderline lepromatous leprosy and 23 cases (79.1%)were of lepromatous leprosy.

In the study of Desikan et al(66) out of 412 patients who presented withtype I reaction 313 patients had BT, 9 patients had BB, 85 patients had BL and 5patients had LL. Among 95 patients who had type II reaction 61 had LL and 34had BL.In the study of Seghal et al(67)., out of 22 patients who presented withreaction 11 were of type I out of which 6 patients had BT, 1 patient had BB and 4patients had BL . Among 11 patients who had type II reaction all the patientsbelong to LL spectrum.In the study of Sharma et al (62), out of 156 patients who presented with type-1 reaction were 112 patients out of which 36 patients had BT, 31 patients had BBand 45 patients had BL . Among 44 patients who had type II reaction 20 patientshad BL and 24 patients had LL.
In study of Vijay Adhe et al (64), out of 64 patients who presented withreaction 22 were type 1 out of which 15 patients had BT and 7 patients had BL. Among 42 patients who had type II reaction 13 patients had BL and 29 patients had LL. The present study reactions in different types were compared with different studies, Deskin et

al(66), Seghal et al(67), Sharma et al(62) and Vijay Adhe et al (64)studies. Thus the type of reaction and its relation to the clinical leprosy were almostsimilar to Deskin et al in which lepra reactions were common in BT Hansen(76%)and contrast to Seghal et al in lepra reactions were common in LL Hansen(50%)followed by BT Hansen (23.7%) and Sharma et al in which lepra reactions werecommon in BL Hansen (42%) followed by BT Hansen (23%) and contrast to thestudy of Vijay Adhe et al in which lepra reactions were common in LL Hansen(45.3%).Thus in the study of Deskin et al(66),Sharma et al (62) studies majority of thepatients belong to the borderline leprosy and reactions were more common in theborderline spectrum. This was almost nearer to the present study.

Table-17 Comparison of type-1 reactions in different types of leprosy

Authors	BT	BB	BL	LL
Desikan et al[66]	76%	2.2%	20.6%	1.2%
Seghal et al[67]	54.5%	9.1%	36.4%	0
Sharma et al[62]	23%	20%	42%	15%
Vijay Adhe et al[64]	68.2%	0	31.8%	0
Present study	77%	19.2%	3.8%	0

Table-18 Comparison of type-2 reactions in different types of leprosy

Authors	BT	BB	BL	LL
Desikan et al[66]	0	0	35.8%	64.2%
Seghal et al[67]	0	0	0	100%
Sharma et al [62]	23%	20%	42%	15%
Vijay Adhe et al[64]	0	0	31%	69%
Present study	0	0	28.1%	71.9%

PRECIPITATING FACTORS:

In the present study anti-leprosy drugs constitute the major risk factor (50%) and physiological stress(menstruation) 3.6%, physical strain 11.9%,psychological stress 8.4%, extremes of climate (summer) 9.5%, concominantinfections 11.9%, psychological stress (8.4%) and idiopathic(4.7%) constitute theother (50%).In the study of Kumar et al (57), female gender, disseminated disease,(extent of clinical disease measured by involvement of a number of body areas,nerves, and skin lesions) at the time of diagnosis were the risk factors for type 1reactions.For ENL, the risk factors identified in Kumar et al study were lepromatousleprosy, female gender, and higher bacteriological index > 3In the study of Kumaret al., pregnancy and lactation were also responsible for precipitation of reactions.But in the present study patients who were pregnant or lactating were not includedin the study.Nigam et al (68)(1975) mentioned that 64.5% of their patients developedreactions during dapsone therapy. In their series reactions were mainly observedduring summer months (61.9%).In the study of Sharma et al intercurrent infections (44.3%) were mostcommon followed by physical and mental stress (19.4%).Paul Klerenman states that stress is an immunostimulant and that twopathways may be of importance: 'hardwiring' to lymphoid tissue, spleen etc. From the nervous system and humoral links through a remarkable number of sharedchemical transmitters (e.g. endorphins, substance P) which may act in bothdirections making the immune system a 'mobile brain'.Thus in the present study the various precipitating factors are comparable tothe above mentioned studies. In the present study drugs are the major precipitatingfactor for reactions which constitutes about 50% occur during, or after the treatment.This was consistent with study conducted by Nigam et al. The next most commonprecipitating factor is concomitant infection because they probably affect theimmunity of the body either cell mediated or humoral. An intercurrent viralinfection, by inducing interferon production, could allow activation of otherwisequiescent antigen presenting cells.

Table: 19 Comparison of major precipitating factor indifferent studies

Authors	Precipitating factor
Nigam et al[68]	Drugs (Dapsone) 64.5%
Sharma et al[62]	Intercurrent infections (44.3%)
Present study	Drugs (50%)

CLINICAL FEATURES OF TYPE I REACTIONS

In the present study erythema and swelling of the skin lesions were presentin 76.9% of the cases, occurrence of new skin lesions in 42.3%, neuritis in 38.5%,neuritis and skin lesions in 23.1%, fever in 19.2% and oedema of hands and feetin 30.8% of the total 52(100%) of type I reaction cases. No case of ulceration was noted.In the study of Lockwood et al 43.1% had skin lesions alone, 22.7% hadboth skin lesions and neuritis and 31.8% had only neuritis without any ulcerationwas in concurrence with the present study(69) .Hastings mentioned that the erythema and swelling of the existing lesionand neuritis the predominant features in case type I reaction along with mildconstitutional features like fever (36). This has been mentioned by Joplingalso(53). In study of Kumar et al involvement of the skin and nerves occurred eithersingly or together. Of the total number of reactions at the time of presentation,31.7% had only cutaneous involvement, whereas 68.3% had involvement of bothskin and nerves.In the study of Sharma et al the exacerbation of pre-existing skin lesionsand or appearance of new lesions in 150 (96.1%) and nerve involvement in 80(51.3%)patients.It has been shown that reversal reactions are associated with an increasein lymphocyte responsiveness to M.leprae antigens which could be due to resultof macrophages destroying the bacilli with the liberation of M.leprae antigens or initiation of treatment may lead to destruction of many more bacilli with theresultant liberation of large antigen loads that can provoke a delayedhypersensitivity response and result in reversal reaction.

Table-20 Comparison of clinical features in various studies

Author	Skin lesions	Neuritis	Skin lesions and neuritis
Lockwood et al[69]	43.1%	31.8%	22.7%
Present study	42.3%	38.5%	23.1%

The clinical features of type 1 reactions in the present study is almostsimilar to above mentioned studies in which skin lesions are most commonfeature.

CLINICAL FEATURES OF TYPE II REACTIONS

In the present study all the 32 patients (100%) presented with fresh cropsof erythematous and tender nodules. Joint pain, neuritis, ulceration and oedema(68.7%), myalgia (78.1%), fever (84.3%) were the next common clinical features.Iritis (18.8%) orchitis (31.2%) and lymphadenopathy (15.6%) were the leastfeatures encountered.Van Brakel et al study shows presence of following clinical signs isdiagnostic of ENL i.e., multiple, usually small, tender nodules, with or withoutulceration, neuritis (shooting or burning), fever, oedema, involvement of otherorgans, e.g., Iritis, orchitis and arthritis. The features are almost in concurrencewith the present study. Hastings and Jopling also mention the same features forENL reaction [43), (53), (70)]. The clinical features of type 2 reactions in the above mentioned studies arealmost concurrence with present study.

RECURRENCE OF REACTIONS

In the present study out of 52 patients with type I reaction 42 (80.8%) hadone episode and 10 patients (19.2%) had multiple episodes of type I reactionduring the period of 2 years. Among patients who had type II reactions 8 patientshad (25%) only one episode and 24 patients (75%) had multiple episodes duringthe same period.

In the study of Scollard et al., among 35 patients who had type I reaction24 patients (68.58%) had one episode and 31.42% had multiple episodes. Out of44 patients of type 2 reactions10 patients i.e., 22.73% had one episode and77.27% of patients had multiple episodes. The follow up period was 3 years [63].In the study of Kumar et al., 70.6% had single episode of recurrence and29.4% had 2 or more episodes among patients of type I reaction. Amongpatients of type II reaction 12.1% patients had single episode, 64.4% up to 4episodes and 23.5% had 4 or more than 4 episodes. The patients were followedup for a period of 3 to 8 years [57].

Table-21 Recurrence in type-1 reactions

Authors	One episode	Multiple episodes
Scollard et al[63]	68.6%	31.4%
Kumar et al[57]	70.6%	29.4%
Present study	80.8%	19.2%

The present study was compared with other studies, Kumar et al[57] andScollardet al[63]. In both studies the rate of recurrence in type 1 reactions with oneepisode was more (70.6% and 68.6% respectively) compared to multipleepisodes (29.4% and 31.4%) which correlated with the findings of the present study.

Table-22 Recurrence in type-2 reactions

Authors	One episode	Multiple episodes
Scollard et al[63]	22.73%	77.2%
Kumar et al[57]	12.1%	87.9%
Present study	25%	75%

The present study was compared with other studies, Kumar et al [57] andScollardet al [63]. In both studies, Kumar et al[57] and Scollard et al[63] the rate ofrecurrence in type 2 reactions with one episode is 12.1% and 22.7% respectivelycompared to multiple episodes 87.9% and 77.3% respectively which correlatedwith the findings of the present study.Thus, the rate of recurrence of reactional leprosy depends on the type ofclinical leprosy and also the various other factors like adherence to treatment,precipitating factors and also the follow up period.Histopathology of lepra reactionsHistopathological features of type -1 reactionIn the present study among patients of type I reaction oedema of thedermis(78.8%), infiltration by lymphocytes(57.7%), epitheloid cells(53.8%),lymphocytic panniculitis(27%), folliculotropism(23.1%), epidermotropism(19.2%),giant ells(17.3%) and macrophages(13.5%) were the main histopathologicalfeatures.According to Ridley(71) early reactions were characterized by mild edemaand proliferation of fibrocytes in inter fascicular spaces of the dermis. He observedthat an increase in the number of lymphocytes was more marked in upgradingthan downgrading reactions. In the acute stage, necrosis was apparent in severecases, giant cells of various types were frequently present and evolution of thegranuloma cells depended on the type of reaction with clusters of matureepithelioid cells in upgrading reactions and macrophages in downgradingreactions. Of these features, fibroplasias, macrophage necrosis, and intragranuloma and peri granuloma lymphocytes were not found to be of objectivevalue for diagnosis of type 1 lepra reaction in our study.Important diagnostic features for type 1 reaction appeared to be intragranulomaedema, dermal oedema, the presence of plasma cells and

ranulomafraction. Standardized criteria for the diagnosis of Type-1 on histopathology areyet to be defined (Walker and Lockwood 2008).

The basic characteristics noted by pathologists to diagnose type 1reaction were those described by Ridley([71]).This study used the pre-agreed criteriaused by Lockwood et al [(69)] as follows:1. Edema: dermal edema was defined as separation of collagen with pallorand dilated vasculature. Intragranulomaedema was said to be presentwhen the granuloma was not compact and the inflammatory cells wereseparated by intercellular spaces.2. Epidermal erosion: defined as presence of granulomatous inflammatorydestruction of basal epidermis and3. Spongiosis: defined as separation of keratinocytes by intercellular edema.Lever et al ., have described predominance of lymphocytes in type Iupgrading reactions, which is almost similar to present study in whichlymphocytic infiltrate constitutes about 57.7%.Lockwood et al ([69]) ., found that five histological findings, intragranulomaedema, giant cell size, giant cell numbers, dermal oedema, and HLA-DRexpression correlated with clinical type 1 reactions. Of these, we did not studyHLADR expression analysis, increase in giant cell size in our cases but the otherthree variables are included in the present study.Hastings describes intense oedema in the acute phase, marked rise inlymphocytes, occasional neutrophils and giant cells and a reduction in oedema at the time of subsidence of reaction in upgrading type I reaction. Oedema, reductionin lymphocytes and more number of macrophages with occasional Langerhansgiant cells in downgrading type I reaction ([36]). The present study is almost similarto above mentioned study.

Lazaro-medina et al., have described some new histopathological markersfor type -1 reactions which include the spongiosis of the epithelium and follicularepithelium with exocytosis of mononuclear cells, parakeratosis, focal interfacechanges with occasional individual cell necrosis of keratinocytes and follicularmucinosis([72]). The above histopathological markers described by Lazaro-medina etal., were not seen in the present study.Thus the histopathological findings in reactional leprosy depend upon thetype of reaction and again in type I reaction it depends whether it is upgradingor downgrading.Upgrading type-1 reactionIn the present study histopathological features of the upgrading reactionwas characterised by the presence of plenty of protective cells infiltrate oflymphocytes and giant cells, with respective to the leprosy.

Downgrading type-1 reaction In the present study histopathological features of the downgrading reactionis characterised by paucity of lymphocytes and or giant cells, with respective tothe leprosyThe histopathological features of present study were compared with recentstudies Sharma et al([62])., Vijay Adhe et al[(64).,]Saritha et al([65]). In the study of Sharma et al 10 cases (9%) showed lymphocytes in granuloma, 45 cases (40%)showed edema within papillary dermis, 4 cases (3.6%) showed lymphocytes atinterface and 52 cases (46.2%) showed giant cells.In the another study conducted by Vijay Adhe et al([64]) histopathologicalfeatures of type-1 reaction 82% of cases showed lymphocytes in the granuloma,79.5% showed edema in the papillary dermis, 77% showed Pyknosis oflymphocytes, 73% edema with in the granuloma, 64% lymphocytes at interface,59% giant cells, 55% spongiosis, 58% folliculotropism, 36% lymphocyticpanniculitis and 36% showed epidermotropism.

In the another study conducted by Saritha et al([65]) histopathologicalfeatures of type-1 reaction showed dermal edema in the 17 (50%) patients all ofthem had clinically severe reaction.In the present study dermal edema was the common histopathologicalfinding in most of the cases accounting for 78.8% similar to the study conductedby Saritha et al and in contrast to the Sharma et al study in which giant cells(46.2%) were the most common finding and Vijay Adhe et al study in whichlymphocytes in the granuloma (100%) was the most common finding.

Table-23 Comparison of histopathological features of type-1 reactions

Histopathological features	Vijay Adhe et al	Present study
Oedema	86%	78.8%
Lymphocytes	100%	57.7%
Epithelioid cells	-	53.8%
Giant cells	59%	17.3%
Macrophages	-	13.5%
Pyknosis of lymphocytes	77%	28.8%
Lymphocytic panniculitis	36%	27%
Epidermotropism	36%	19.2%
Folliculotropism	58%	23.1%

The present study was almost similar to above mentioned studies.Histopathological findings can also help to say whether the reaction is upgradingor downgrading in situations, where facilities for doing Lepromin test are notavailable and also when the patient present with reaction at the first visit itself.

Histopathological features of type -2 reactionIn the present study among the specimens taken from patients of type IIreaction vasculitis was seen in 93.8%, Infiltration by PMNL in 87.5% of thepatients, vasculitis in 75%, increased vascularity in 59.3%,oedema in 46.9% andneutrophilicpanniculitis (37.5%).In type 2 lepra reactions, because of the immune complex deposition,neutrophils were attracted in these lesions. Neutrophils were present either withinthe granulomatous infiltrate or/and in the interstitium with or withoutleukocytoclasia.In a few sections, they were also seen encroaching the epidermis and thesweat ducts. The density of neutrophilic infiltrate was variable. More severe andrecent onset lesions of lepra reactions showed much denser infiltrate ascompared less severe and subsiding lesions. The dense collection of neutrophilsin the epidermis and dermis is probably responsible for the clinical finding ofpustules in ENL lesion Infiltration of sweat duct and sweat gland by neutrophilswas found in a few cases without any evidence of damage or necrosis of thesweat duct or sweat glands. The histopathologic spectrum of vasculitis rangesfrom endothelial swelling, neutrophilic infiltration of the vessel wall withdestruction of the walls and leucocytoclasia[73]).A degree of vascular involvement in type 2 reaction was noted in our studyand majority of the lesions with type 2 reaction have showed classical features ofvasculitis. This finding was in agreement with previous literature where vasculitisaffecting arterioles and venules was observed in 50% cases of type 2 reaction byJob et al. in 1964 and Mabalay et al. in 1965[74]).The histological features of vasculitis depend upon the stage at which alesion has been biopsied. An older lesion will have sparse neutrophilic infiltrateand predominance of mononuclear cells whereas an early lesion showspredominantly neutrophilic infiltrate with fibrin deposition. Occlusion of thevascular lumina with extensive involvement where vessels in lower part of thedermis and subcutaneous tissue are involved leads to necrosis or ulceration ofthe lesion. The vascular changes we noted were more prevalent in the upper mid dermis.Necrosis and ulceration is fairly uncommon in ENL in contrast to Lucioreaction where ulceration and necrosis is almost always seen. In Lucio reactionendothelial proliferation along with thrombosis of dermal and subcutaneousvessels leads to ischemic necrosis and ulceration. As we observed, occlusion ofvessel lumen was seen in a few lesions and was limited to upper and mid dermisand that may be the reason why none of the lesions in our study showedulceration and necrosis.Involvement of subcutaneous tissue by granulomatous infiltrate can beseen in cases of lepromatous leprosy though the lesion is not in reaction[75]) .Butthe presence of neutrophils in subcutaneous tissue is an important clue to thetype 2 reaction. Lobular or septalpanniculitis can be seen in lesions of ENL(76).We noted lobular panniculitis more commonly than a septal or mixed panniculitis.Hasting describes the predominant features in type II reaction areinfiltration by neutrophils and vasculitis[36]). Lever et al., have describedpredominance of neutrophilicinfilteration, vasculitis and occasionally eosinophilsin type 2 reaction which is almost similar to present study in which neutrophilicinfiltrate constitutes about 93.8% and vasculitis constitutes about 75%.The histopathological features of type 2 reactions in the present studieswere compared with recent studies Sharma et al[62])., Vijay Adhe et al(64).,Sarithaet al(65). In the study of Sharma et al 1 case (2.1%) showed neutrophilic infiltrate,33 cases (74.4%) showed edema with in papillary dermis, 1 case (2.1%) showedfibrin in the vessel wall.

In the another study conducted by Vijay Adhe et al histopathologicalfeatures of type-2 reaction shows 100% of neutrophils in the granuloma, 81%leukocytoclasia, 81% showed edema in the papillary dermis, 66% eutrophilicpanniculitis, 38% fibrin in vessel wall,19% neutrophilic spongiosis,12% fibrinthrombi, 12% folliculotropism, 12% neutrophils in vessel wall, 7% intradermalpustule, 7% neutrophils in the sweat gland and 5% lymphocytes in the sebaceousglands.

In the another study conducted by Saritha et al histopathological featuresof type-2 reaction 8 (57.1%) cases showed neutrophilic infiltrate on a backgroundof macrophage granuloma with dermal edema, 1(7.1%) case showed neutrophilicvasculitis a background of macrophage granuloma with dermal edema.

Table-24 Comparison of histopathological features of type-2 reactions

Histopathology	Sharma et al	Vijay Adhe et al	Present study
PMNL Cells	2.1	100%	87.5%
Oedema	74.4%	81%	46.9%
Increased vascularity	-	-	59.3%
Vasculitis	-	-	93.8%
Neutrophilic panniculitis	-	66%	37.5%

In the present study among patients of type II reaction vasculitis (93.8%)and Infiltration by PMNL (87.5%) were more commonly seen which is almostsimilar to Job et al and Mabalay et al studies and slight disagreement with VijayAdhe et al, Saritha et al, Sharma et al studies respectively in which infiltration byneutrophils was the most common finding .

VII. Summary

Lepra reactions are more common in the patients above 20 years of agebecause these people are more exposed to the disease as this period is theproductive period.Male preponderance is because the men go out for work more and higherexposure when compared to women and hence have more possibilities of gettinginfected.As majority of the patients had borderline leprosy which is the usual scenario, type I reaction was more among them. Similarly the higher incidence of type IIreaction among LL patients is an established fact.Anti-leprosy drugs were the commonest precipitating factor as seen in majority of studies, which should be explained to the patient. Otherwise there is a tendencyamong these patients to stop these drugs.The occurrence of type Ireaction during first year of treatment and that of type II after 2 years is an established fact. With regard to the recurrences single episodewas more common in type I reaction and multiple episodes in type II reaction.It is very essential to recognize the reactional leprosy irrespective of the type of reaction. This is because the patients with type I reaction are more prone fordeformities which are responsible for the stigmata attached to leprosy, whereas thepatients with type II reactions are more prone for systemic complications and it is thefact that it is a very severe condition and the persistence of it makes the personsunproductive adding to socio-economic liability.Education of the patients regarding the leprosy especially regarding the reactions goes a long way in containing the social problems. As the reactions are more common after initiating therapy, patients should be well informed about thepossibility of occurrence of reactions and they should not defer from treatmentwhich compounds to the problem. Early detection, education regarding the diseaseis an important weapon in the fight against the disease and its complications.Early diagnosis of reactions and recognition of the precipitating factors can bevery helpful in preventing disability and deformity. Histopathology has a diagnostic as well as prognostic significance.

VIII. Conclusion

· Lepra reactions were common in the patients over 20 years of age.
· There was a male preponderance.
· Type-I reaction was the most common type of reaction seen. More number of BT patients had Type-I reaction and among those who had type II reactionmore patients were LL patients.
· Anti- leprosy drugs were found to be the most common precipitating factor contributing to nearly half the cases.
· Erythema and swelling of the skin lesions, neuritis and oedema of hands and feet were common features of Type I reaction. Fresh crops of tenderevanescent nodules, joint pain, neuritis and fever were common in Type-II reaction.
· More number of type-I reactions occurred during the first year of treatment whereas the type-II reactions occurred more after 2 years of diagnosis.
· Among patients of type-I and type-II reactions, type-II reaction patients had multiple episodes of reaction.
· Classical histopathological features were present in all the slides examined;there was BI between 2+ to 6+ in all the MB cases.
· Among the patients of type 1 reaction dermal oedema (78.8%),lymphocyticinfiltrate (57.7%)are most common histopathological features.
· Among patients of type II reaction vasculitis (93.8%) and infiltration by PMNL(87.5%) were most common histopathological features.

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