

Granulomatous Lesions: A Diagnostic Challenge To Dermatopathologists

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ABSTRACT

Objective: Present study aims at diagnosing Granulomatous dermatosis with its clinicohistopathological correlation and to present the profile of granulomatous reaction pattern with an attempt to find out etiology.

Materials and Methods: In the present prospective descriptive type of observational study conducted in the Department of pathology S.M.S Medical college, over a period of 2 years, 118 clinically diagnosed granulomatous lesion were selected. Out of total 1500 skin biopsies, 105 were proved histopathologically as granulomatous lesions, which were further classified in various histological granulomatous patterns. Nuances in histopathological features with special stains were used to find out etiology.

Results: Out of 105 histopathologically proven granulomatous lesions, 68 (64.76%) were males and 37 (35.23%) were females. Male preponderance was observed in tuberculoid and suppurative granulomas while necrobiotic granulomas showed female preponderance. Maximum numbers of cases were found in 3rd decade, followed by 2nd decade. We classified these granulomatous lesions in various granulomatous patterns, Tuberculoid type of granulomas outnumbered 84 cases (80%). Majority of cases were due to infectious etiology 94 cases (89.53%). Leprosy was commonest followed by Tuberculosis. Rest of the cases included various fungal, necrobiotic and other lesions.

Conclusion: Histopathology is still a gold standard tool in classification of granulomatous lesions and with support of special stains we can arrive at exact etiology to meet out appropriate treatment. Overall clinicopathological concordance was 88.9% in present study.

KEY WORDS: Granulomatous Dermatoses, Acid Fast Bacilli (AFB), Cutaneous Tuberculosis, Leprosy, GMS stain, ZN staining.

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INTRODUCTION

Granulomatous dermatoses frequently present a diagnostic challenge to Dermatopathologists, since an identical histological picture is produced by several causes and conversely a single cause may produce varied Histological patterns.¹

The term granuloma defines a pattern of reaction to a wide range of etiological agents, organic or inorganic, with certain morphological correlates.² Granulomas are relatively discrete collections of histiocytes or epithelioid histiocytes with variable number of admixed multinucleate giant cells of varying types and other inflammatory cells.³

Granulomatous inflammations are a common and intriguing problem. The arrival at a proper diagnosis is mandatory, so that the appropriate treatment can be meted out.

Good clinical history, a close histological examination and a clinicopathological correlation are essential in making a final diagnosis.⁴

By combining all the available information, one should be able to arrive at a reasonable differential diagnosis on which to further proceed.⁴ It is important in any granulomatous lesion to know the infectious etiology.³

Six histological types of granulomas can be identified on the basis of constituent cells and other changes within the granulomas.³

- Tuberculoid
- Sarcoidal
- Suppurative
- Necrobiotic
- Foreign body
- Miscellaneous

A rational Histological diagnostic approach to granulomatous inflammation with its classification into one of the above mentioned category is also not present without its problems. Special stains may also be required to reach an etiological diagnosis.

In the present study a diligent histological work up was done to classify a granulomatous lesion into one of the above mentioned Histomorphological classification, use of necessary special stains and other ancillary techniques to find out the etiology.

MATERIALS AND METHODS

This was a prospective descriptive type of observational study conducted in the Department of Pathology SMS Medical College Jaipur, a tertiary care centre over a period of 2 years from January 2014 to December 2015. Informed consent was taken from all the

patients included in the study. The study complied with the guidelines of the Local Ethics Committee.

Detailed clinical history and clinical data were collected from patients requisition forms and treatment sheets. Dermatological diagnosis was made by Dermatologists. Skin punch biopsies were taken at Dermatology Department and specimens were sent to Histopathology laboratory.

There were 118 clinically diagnosed cases of granulomatous lesions out of total 1500 skin biopsies, received during study period. The biopsy samples were undergone routine tissue processing, section cutting and stained with H & E staining.⁵ Histopathological diagnosis was made. Out of 118 clinically diagnosed cases, 105 were found to be granulomatous lesions histopathologically. In our study we have included 105 Histopathologically confirmed cases of granulomatous lesions. To arrive at the etiological diagnosis relevant special stains like Ziehl – Neelson (ZN), Periodic Acid Schiff (PAS), Giemsa, Modified ZN, Alcian blue, Gomori Methenamine stain, Grams, Reticulin stain were done.⁵ All cases of granulomatous lesions were analysed in respect to clinical information and Histopathological examination.

Table 1: Sex distribution of various granulomatous lesions

	Male	Female	Total
Tuberculoid	55	29	84
Suppurative	9	2	11
Necrobiotic	1	3	4
Sarcoidal	1	0	1
Foreign Body	0	1	1
Miscellaneous	2	2	4

RESULTS

In the present study out of 1500 skin biopsies, granulomatous lesions constituted 105 (7%) cases. Among 105 cases, 68 (64.76%) were males and 37 (35.23%) were females with male to female ratio 1.84:1. Male preponderance was observed in tuberculoid and suppurative granulomas while necrobiotic granulomas showed female preponderance (Table 1). The age of the patients ranged from 8 to 66 years with mean age 32.2 years. Maximum number of cases occurred in the third decade followed by second decade (Table 2).

Table 2: Age distribution of various granulomatous lesions

Age in Years	Tuberculoid	Suppurative	Necrobiotic	Sarcoidal	Foreign Body	Miscellaneous
1-10	5	0	0	0	0	0
11-20	21	2	0	1	0	1
21-30	27	3	0	0	0	0
31-40	11	3	2	0	0	2
41-50	5	1	1	0	1	1
51-60	9	1	1	0	0	0
61-70	6	1	0	0	0	0
Total	84	11	4	1	1	4

Table 3: Site distribution of various granulomatous lesions

	Tuberculoid	Suppurative	Necrobiotic	Sarcoidal	Foreign Body	Miscellaneous	Total
Upper extremity	25	3	2	-	1	1	32
Lower extremity	12	2	-	-	-	1	15
Face	16	-	-	1	-	1	18
Trunk	7	-	-	-	-	-	7
Neck	7	1	-	-	-	-	8
Foot	2	4	1	-	-	-	7
Whole Body	3	-	-	-	-	-	3
Upper extremity, Lower extremity	12	-	1	-	-	1	14
Toe	-	1	-	-	-	-	1

Out of 105 cases most common site of granulomas were upper extremity 32 cases (30.47%) followed by face 18 cases (17.14%). (Table 3) On histopathological examination various granulomatous patterns were observed. We found 84 cases (80%) of tuberculoid granulomas, 11(10.5%) suppurative granulomas, 4 (3.8%) necrobiotic, 1 (0.95%) sarcoidal, 1 (0.95%) foreign body and 4 (3.8%) miscellaneous granulomas. (Table 4) In the tuberculoid type of granulomatous lesion maximum numbers of cases were of leprosy, 64 cases out of 84 cases including 34 cases (32.38%) of Borderline tuberculoid, 24 (22.85%) cases of Tuberculoid and 6 (5.71%) cases of mid borderline type.

Table 4: Distribution of various Histopathological patterns of granulomas

Types of granulomas	Frequency	Percentage (%)
Tuberculoid	84	80.0
Suppurative	11	10.5
sarcoidal	1	0.95
Necrobiotic	4	3.8
Foreign body	1	0.95
Miscellaneous	4	3.8
Total	105	100.0

Table 5: Frequency of various types of tuberculoid granulomas

Tuberculoid granulomas	Total Number	(%)
BT	34	32.38
TT	24	22.85
BB	6	5.71
Lupus Vulgaris	12	11.42
scrofuloderma	2	1.90
Tubercular Verrucosa Cutis	1	0.95
Lichen scrofulosorum	1	0.95
Lupus miliaris disseminatus faciei	1	0.95
Leishmaniasis	1	0.95
Rosacea	1	0.95
Perioral dermatitis	1	0.95

Table-6: Frequency of various types of suppurative granuloma

Suppurative granuloma	Total Number	(%)
Actinomycotic	4	3.85
Eumycotic	4	3.85
chromoblastomycosis	1	0.95
Pyoderma gangrenosum	1	0.95
Buruli ulcer	1	0.95

Next in order were 16 cases of cutaneous Tuberculosis including 12 (11.42%) cases of Lupus Vulgaris, 2 (1.9%) cases of scrofuloderma, 1 (0.95%) case of Tubercular verrucosa cutis and 1 case (0.95%) of Lichen Scrofulosorum. (Fig.1) There was 1 case (0.95%) each of Lupus miliaris disseminatus faciei. (Fig.2) Granulomatous Rosacea, Leishmaniasis (Fig.3), Perioral dermatitis (Table 5, Fig.4). Out of 84 tuberculoid granulomas 9 cases showed caseation, which was seen in 5 cases of lupus vulgaris, 1 case of TVC, 2 case of Scrofuloderma and 1 case of Lupus miliaris disseminatus faciei.

Granulomatous reaction pattern showing suppurative type included Actinomycotic (Fig.5) 4 (3.85%), Eumycotic (Fig.6) 4 (3.85%), Chromoblastomycosis (Fig.7), Buruli ulcer (Fig.8) 1 (0.95%) and Pyoderma gangrenosum 1 (0.95%). (Table 6) There were 4 cases (3.85%) of Granuloma Annulare (Fig. 9) falling in Necrobiotic granulomatous category.

Sarcoidal type of granulomatous reaction was seen in 1 (0.95%) case of sarcoidosis. (Fig. 10) Foreign body granulomatous pattern comprises of 1 (0.95%) case of foreign body granuloma formed around tattoo pigment. Among the miscellaneous category, 1 case (0.95%) each of Cryptococcus (Fig.11) and Histoplasmosis (Fig.12) were kept along with 2 cases (1.90%) showing granulomatous reaction pattern not fitting into any of the above mentioned category and no identifiable etiology despite diligent search.

Table-7: Results of Special Stains

	AFB+ (ZN & FF) leprae	AFB + (TB)	PAS+	PAS+ & GRAM +	ALCIAN BLUE +	PAS & MC +	RS+	GIEMSA +	PAS & GMS+
BT	20	-	-	-	-	-	-	-	-
TT	1	-	-	-	-	-	-	-	-
BB	6	-	-	-	-	-	-	-	-
Scrofuloderma	-	2	-	-	-	-	-	-	-
Lupus Vulgaris	-	1	-	-	-	-	-	-	-
Tubercular Verrucosa cutis	-	1	-	-	-	-	-	-	-
Leishmaniasis	-	-	-	-	-	-	-	1	-
Lupus milliaris disseminates faciei	-	-	-	-	-	-	-	-	-
Actinomycotic	-	-	-	4	-	-	-	-	-
Eumycotic	-	-	4	-	-	-	-	-	-
Buruli ulcer	-	1	-	-	-	-	-	-	-
Blastomycosis	-	-	-	-	-	-	-	-	1
Granuloma annulare	-	-	-	-	4	-	-	-	-
Sarcoidosis	-	-	-	-	-	-	1	-	-
Cryptococcus	-	-	-	-	-	1	-	-	-
Histoplasmosis	-	-	-	-	-	-	-	-	1

Table 8: Clinicopathological concordance

	Frequency	Percentage (%)
Yes	105	88.98
No	13	11.02
Total	118	100.0

After thorough histomorphological examination various special stains were also performed accordingly. In cases of Leprosy; lepra bacilli were noted in 20 out of 34 cases of Borderline Tuberculoid, in an occasional case of TT and all 6 cases of Mid borderline leprosy.

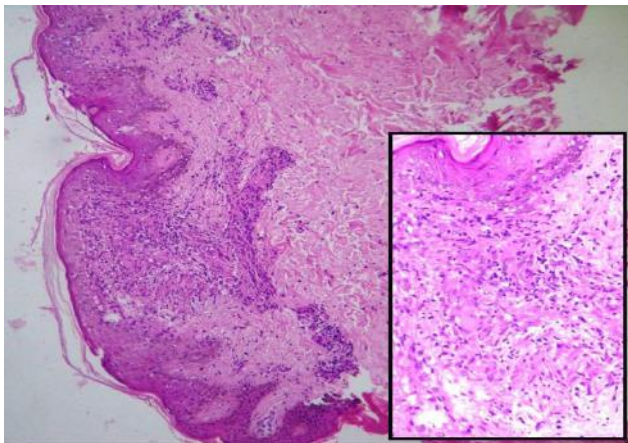


Fig 1: (H&E 100X) Epithelioid cells in the upper dermis abutting the dermoepidermal junction in Lichen scrofulosorum with Inset (400X) .

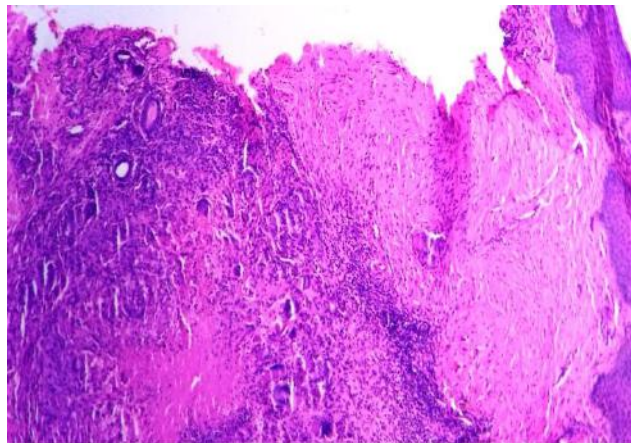


Fig 2: (H&E 100X) Caseous necrosis surrounded by epithelioid cells in mid dermis in Lupus miliaris disseminatus faciei .

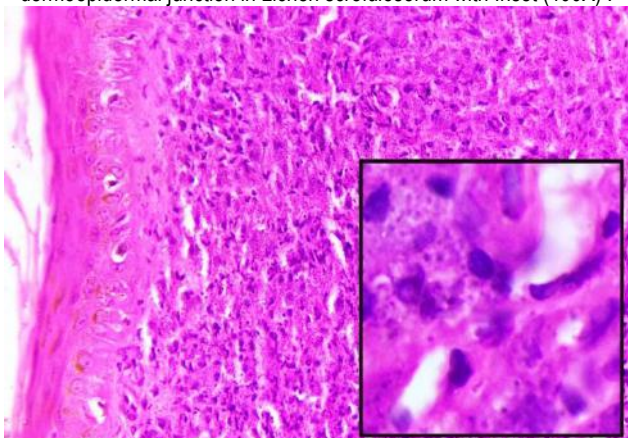


Fig 3: (H&E 100X) Leishmania donovani bodies present in macrophages. Inset (1000X) intracytoplasmic L.D bodies.

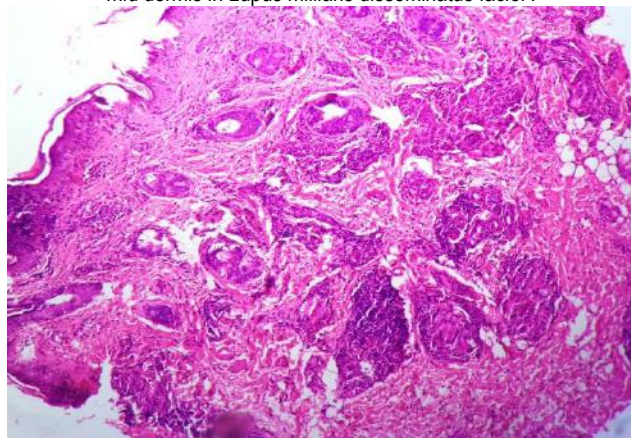


Fig 4: (H&E 100X) Epithelioid cell granulomas present throughout dermis in Perioral dermatitis.

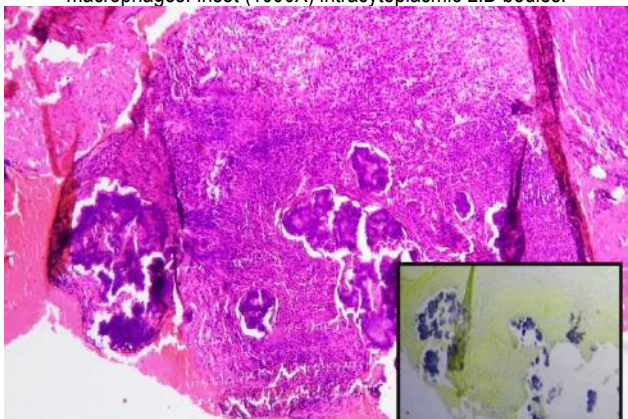


Fig 5: H&E 100X) Actinomycotic colonies in Actinomyces. Inset (100X) Gram stain showing Gram's positivity.

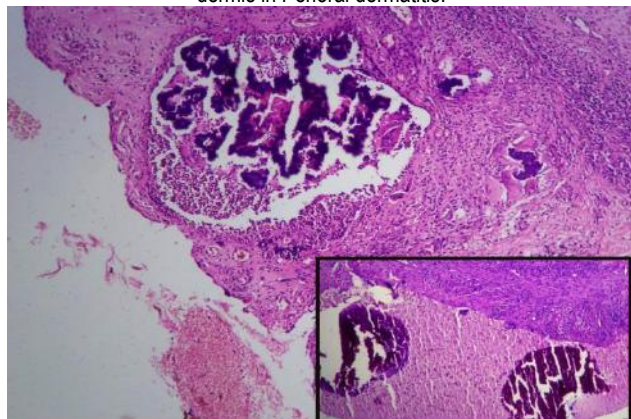


Fig 6: (H&E 100X) Eumycotic colonies with inset PAS stain (100X) showing strong PAS positivity.

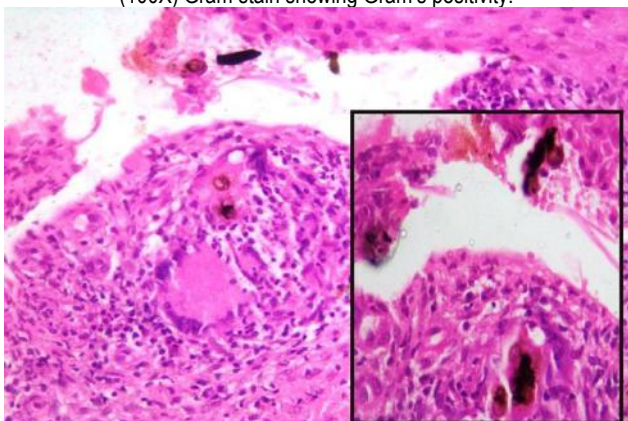


Fig 7: (H&E 400X) Chromoblastomycosis within giant cells in dermis. Inset (H&E 1000X)- showing brownish black "copper penny " appearance.

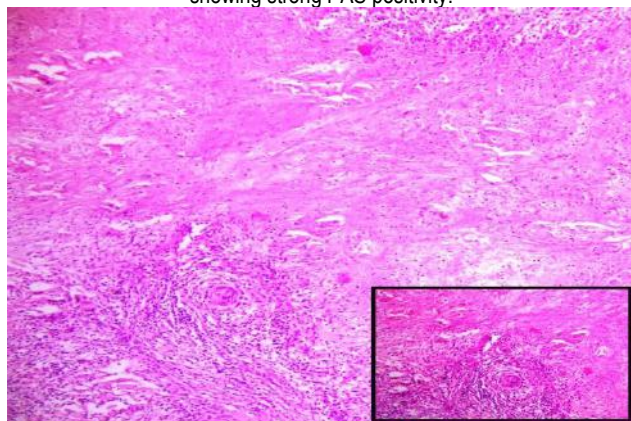


Fig 8: (H&E 100X) Extensive areas of necrosis with epithelioid cell granulomas in Buruli ulcer. Inset (1000X)- showing vast area of ischemic necrosis.

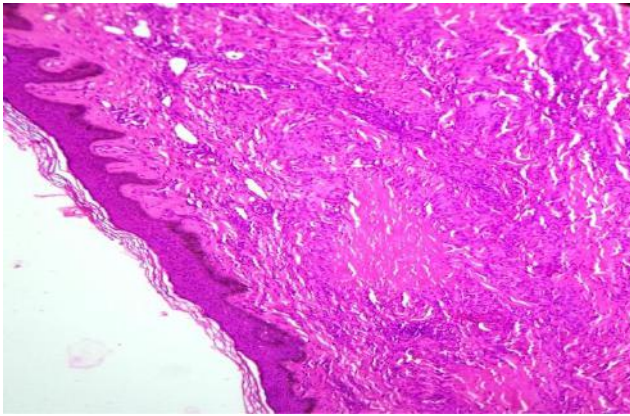


Fig 9: (H&E 100X) Degenerated collagen surrounded by histiocytes in palisading arrangement in upper dermis in Granuloma Annulare.

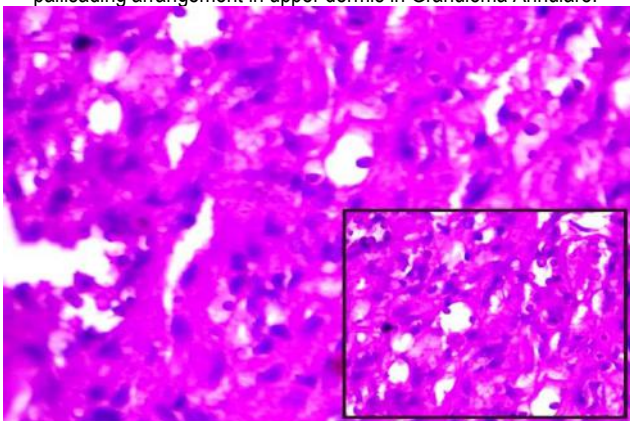


Fig 11: (H&E 400X) Cryptococci in macrophages. Inset (400X)- showing PAS positive capsule in Cryptococcosis.

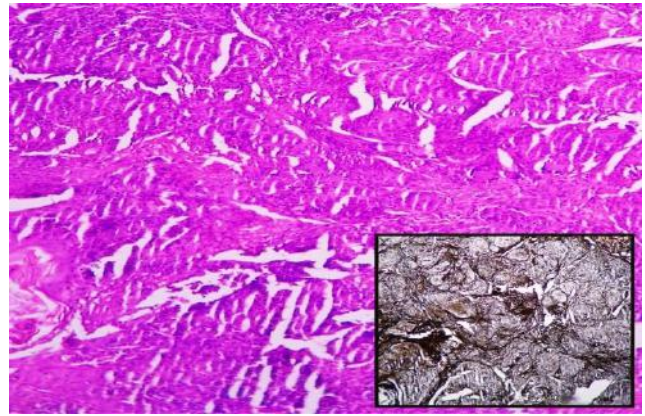


Fig 10: (H&E 100X) Sarcoidal granulomas in Sarcoidosis. Inset (100X)- showing reticulin stain positivity.

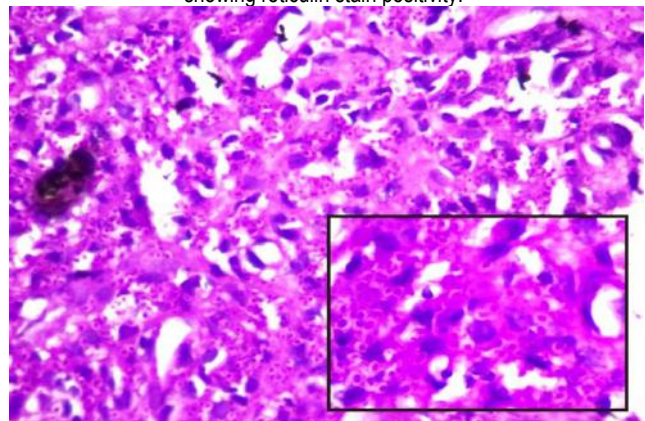


Fig 12: (H&E 400X) Histoplasma in macrophages. Inset (1000X)- showing PAS positive staining of capsule in Histoplasmosis

In Cutaneous Tuberculosis, Acid fast bacilli were seen in an occasional case of Lupus Vulgaris, in two cases of Scrofuloderma and in one case of TVC. No AFB was done in Lupus miliaris disseminates fasciei (diagnosed with clinical correlation). AFB was negative in single case of Lichen scrofulosorum. In leishmaniasis LD bodies were found positive with Giemsa stain and also weakly positive with PAS stain and negative for GMS. No special stains were required to establish the diagnosis in cases of Rosacea and Perioral Dermatitis. In suppurative granulomatous lesions, Actinomycotic colonies were positive for Gram's stain and PAS stain.

Eumycotic colonies were Gram's negative and PAS positive. In Buruli ulcer clumps of AFB positive bacilli were seen in necrotic regions. PAS and GMS stains demonstrated the fungal organism in Blastomycosis. Pyoderma gangrenosum was a diagnosis of exclusion after ruling out an infectious etiology by all negative stains. In Necrobiotic, granulomatous lesions 4 cases of Granuloma Annulare showed Alcian blue positivity. In Sarcoidosis, RS stain was done and reticulin laying down was noted around and within the granulomas and AFB staining for Tubercle bacilli was negative. Amongst miscellaneous granulomatous lesions PAS and Mucicarmine staining were found positive in Cryptococcus. In Histoplasmosis PAS stain and GMS stain were done and found positive. (Table 7) In cases of non-specific granulomatous lesion no definite histopathological pattern and no special stains were found positive. These cases were also placed in miscellaneous category. Out of 118 clinically reported granulomatous lesions, 105 were confirmed histopathologically. Hence overall level of concordance between the clinical and the histopathological diagnosis was 88.98%. (Table 8)

DISCUSSION

Granulomatous inflammation is a type IV hypersensitivity reaction to an antigen. Various infectious and non-infectious granulomatous dermatitis are frequent among the population of western part of India.

It is difficult to present a completely satisfactory classification of granulomatous dermatitis. It has been previously classified on the basis of pathophysiology, etiology, immunology and morphology.⁶ In the present study, granulomatous dermatitis was classified using a combination of etiology and morphology of granuloma. Out of 1500 skin biopsies granulomatous lesions comprised 105 (7%) cases which were comparable to the study conducted by Gautam et al.⁷ Out of 105 cases 68 (64.76%) cases were males and 37 (35.23%) were females with male to female ratio 1.84:1 which shows agreement to Gautam's, Dhar's and Pawale study⁷⁻⁹ but not in accordance with Zafar et al.¹⁰

Infectious granulomatous lesions were predominant in the present study in accordance to the study done by Gautam, Bal and Mohan.^{7,11,12} Maximum number of cases in our study were in 3rd decade followed by 2nd decade that is in accordance with Dhar and Zafar's study^{8,10} and contrary to Pawale and Chakrabarti et al.^{9,13} In our study the most common site affected was extremities which is in concordance with Gautam et al and contrary to Zafar et al. In the later study, commonest site affected was head and neck region.

In the present study we have classified various granulomatous lesions on the basis of constituent cells and other changes within the granulomas. Tuberculoid granulomas were occupying the largest group 84 cases (80%). Similar findings were seen in studies done by Gautam, Dhar and Chakraborty.^{7,8,13} In

tuberculoid granulomatous pattern Leprosy (Fite Farreco type of AFB staining) was the commonest lesion i.e 64 out of 84 cases of tuberculoid granulomas 76.19% (we did not included lepromatous leprosy in the study due to diffuse infiltration of macrophages)³. Our study was in accordance with Gautam and Bal^{7,11}, where tuberculosis was the commonest lesion but in contrast to Zafar's¹⁰. Majority of the cases 34 (32.38%) of Leprosy were of Borderline tuberculoid type of Ridley Jopling classifications followed by Tuberculoid Type (TT) which is in accordance with other studies.^{7,11,13} All the tuberculoid leprosy and most of the borderline tuberculoid cases were similar to non caseating granulomas of tuberculosis and sarcoidosis.^{2,14} Modified Z.N stain revealed lepra bacilli in 28 cases of Borderline Tuberculoid type (BT) and 6 cases of Mid-borderline and in an occasional case of tuberculoid leprosy. However location of granulomas around neurovascular bundles and skin adenexae with involvement of nerve bundles in the background of proper clinical presentation helped to differentiate from tuberculosis and sarcoidosis.^{11,13} Next frequent lesion of Tuberculoid granulomas was cutaneous tuberculosis. Different histological patterns found were Lupus Vulgaris (12 cases), scrofuloderma (2 cases), Tubercular verrucosae cutis (1 case), Lichen scrofulosorum (1case). These findings are in concordance with Zafar's study¹⁰, Khan¹⁵, Singh¹⁶ and kumar and Murlidhar¹⁷ who also found Lupus Vulgaris the commonest form.

Zeihl –Nelson (ZN) stain for Tubercle bacilli was positive in 1 cases of Lupus Vulgaris out of 12 cases, both 2 cases of scrofuloderma and 1 case of Tubercular Verucosa Cutis (TVC). Our findings are in accordance with Zafar and Bal.^{10,11} In latter cases also AFB positivity was more in cases of Scrofuloderma and Tubercular Verucosa Cutis (TVC) as compared to Lupus Vulgaris due to presence of caseation in former two conditions.

Lichen scrofulosorum is a type of Tuberculid, representing the hypersensitivity reaction to Tubercular Antigen. This case was diagnosed on clinical grounds with histomorphological features of superficial granuloma in the dermis. ZN stain was negative in single case. Our findings are in accordance with Bal.¹¹ We also found single case of lupus miliaris disseminates faciei with a characteristic histomorphologic appearance showing extensive area of caseation necrosis surrounded by epithelioid cells resembling cutaneous tuberculosis. Our findings are in accordance with Bal¹¹ diagnosed with clinical correlation and AFB negativity.

Among the group of Tuberculoid granulomatous pattern, 1case (0.95%) of leishmaniasis was found showing macrophages containing leishmania donovani (LD) bodies (Fig.3). LD bodies were positive with Giemsa stain. Our findings are consistent with other studies (Bal and Chakrabarti)^{11,13} as regarding incidence whereas Zafar and Qureshi^{10,18} found much higher incidence. In Gautam's study incidence was midway 3.7%.

1 case each of Perioral dermatitis and granulomatous Rosacea were also found showing tuberculoid granulomatous pattern. Perioral dermatitis was diagnosed with presence of perivascular and perifollicular epithelioid cell granulomas with clinical correlation.

Granulomatous Rosacea showed vascular dilatation and presence of perifollicular granulomas. In Zafar's study also one case of granulomatous Rosacea was found.

Next group in Histomorphological spectrum is suppurative type of granulomatous pattern comprising of 11 cases (10.5%). This

group included 4 (3.8%) cases of Actinomycosis, 4 (3.8%) cases Eumycotic, 1case (0.95%) each of Buruli ulcer, Pyoderma gangrenosum and Blastomycosis.

Our observation is consistent with Pawale⁴ showing 11.32% incidence while Zafar, Bal and Chakraborti found much lower incidence^{10,11,13}. Special staining was done to find out the exact etiological agent. Actinomycotic colonies were positive for Gram's and PAS stain. Eumycotic colonies were confirmed with PAS positivity and Gram's negativity.

In Chromoblastomycosis histomorphology revealed dermal infiltrate composed of numerous epithelioid histiocytes, multinucleated giant cells showing dark brown thick walled ovoid copper pennies like spores. No further confirmation with special stain was needed due to its characteristic appearance. Chromoblastomycosis was also found in Gautam and Zafar's study.^{7,10} AFB positivity by ZN staining reveal bacilli in clumps along with areas of ischemic necrosis and neutrophilic infiltration confirmed the diagnosis of Buruli ulcer. One case of Pyoderma gangrenosum was also identified in our study showing central necrotizing inflammation with suppurative granulomatous reaction. Buruli ulcer (Fig. 8) and Pyoderma gangrenosum were not observed in other studies. 4 (3.8%) cases of Granuloma Annulare were seen in Necrobiotic granulomatous reaction pattern. Incidence in present study is in accordance with previous studies.^{7,10,12,13} All 4 cases were showing palisading histiocytes around central mucin in upper dermis which is alcian blue positive. (Fig. 9) Our findings differ from Gautam's study who observed predominantly interstitial pattern. In the group of Sarcoidal type of granulomatous reaction pattern; 1case of sarcoidosis was seen showing non caseating naked epithelioid cell granulomas throughout dermis (Fig. 10). On RS stain reticulin was noticed around and within granulomas. Sarcoidosis is a rare noninfectious granulomatous disease in our region. Our finding are consistent with Gautam, Zafar's and Chakraborti's study.^{7,10,13} However increased incidence was noticed by Dhar and Mohan.^{8,12} Foreign body granulomatous reaction pattern was noted in 1 case (0.95%) of reaction against exogenous material i.e tattoo. This low incidence is in accordance with Mohan and Zafar's studies^{10,12}, while Gautam and Chakraborty^{7,13} observed high incidence. This difference may be due to different type of skin biopsies taken in their studies while we have included only skin punch biopsies in our study.

Among the miscellaneous category we have included one case each of Cryptococcosis and Histoplasmosis and two cases of non-specific granulomatous reaction pattern, due to their histomorphology not fitting in any of the specific categorises.

Single case of cryptococcosis was seen in immunocompromised person on post-transplantation corticosteroid therapy. Histomorphologically no specific granuloma formation was seen, spores were seen in macrophages and found positive with PAS, GMS and Mucicarmine. In case of Histoplasmosis, fungal spores were seen in cytoplasm of macrophages and found positive with PAS and GMS stain. Pawale also observed the same findings.⁹ All the granulomatous skin lesions were correlated with clinical history, clinical examination findings and ancillary investigations.¹⁹ In the present study, we have classified various cutaneous granulomatous lesions, into definite histomorphological patterns, with the help of nuances of histomorphology and support of various special stains, an endeavour was made to arrive at exact

etiology. Out of 105 cases, 4 cases were kept in miscellaneous category due to nonspecific histomorphological features. More cases need to be studied to further resolve the miscellaneous category. Thus histopathology is still a gold standard for final diagnosis, so as to meet out appropriate treatment with clinical correlation. Overall clinicopathological concordance in this study was 88.98%.

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REFERENCES

1. Zaim MT, Brodell RT, Pokorney DR. Non-neoplastic inflammatory dermatoses: a clinical pathologic correlative approach. *Mod Pathol* 1990; 3: 381-414
2. Hirsh BC and Johnson WC. Concepts of granulomatous inflammation. *Int J Dermatol* 1984 March; 24(2): 90-9.
3. Weedon D. The granulomatous reaction pattern. In: Weedon D (ed). *Skin Pathology*, 3rd ed. Philadelphia: Churchill Livingstone; 2010. Pp170.
4. Pawale J, Puranik R, Kulkarni MH. A Histopathological study of granulomatous inflammation with an attempt to find the aetiology. *J of Cli and diagnostic Re*; 2011 April, vol 5 (2): 301-306.
5. D.John Bancroft's. *Theory and Practice of Histological Techniques*. 7th Ed. Nottingham Churchill Livingstone; 2013 pp 172-306
6. Rabinowitz LO, Zaim MT. A clinicopathological approach to granulomatous dermatoses. *J Am Acad Dermatol* 1996;35:588-600. DOI: 10.1016/S0190-9622(96)90686-6
7. Gautam k, Pai RR, Bhat S. Granulomatous lesions of the skin. *Journal of Pathology of Nepal*. 2011;1(2):81-6.
8. Dhar S, Dhar S. Histopathological features of granulomatous skin diseases: an analysis of 22 skin biopsies. *Indian J Dermatol* 2002;47:88-90
9. J.Pawale, S.L Belagatti, V. Naidu, R. Puranik. Histopathological study of cutaneous granuloma. *Ind J Public Health Res Develop* 2011 July; 2(2):74-79.
10. Zafar MNU, Sadiq S, Memon MA. Morphological study of different granulomatous lesions of the skin. *J Pak Assoc Dermatol* 2008;18(1):21-8.
11. Bal A, Mohan H, Dhama GP. Infectious granulomatous dermatitis: a clinicopathological study. *Ind J Dermatol* 2006;51:217-20. DOI: 10.4103/0019-5154.27993
12. Mohan H, Bal A, Dhama GP Non-infectious granulomatous dermatitis: a clinicopathological study. *J Cutan Pathol* 2006; 33:767-71. DOI: 10.1111/j.1600-0560.2006.00566.x
13. Chakrabarti S, Pal S, Biswas B, Bose K, Pal S, Pathak S. Clinico – pathological study of cutaneous granulomatous lesions – a 5year experience in a tertiary care hospital in India : *Iranian journal of pathology* 2016; 11(1): 54-60.
14. Young RJ 3rd, Glison RT, Yanase D, Elston DM. Cutaneous Sarcoidosis. *Int J Dermatol* 2001 April; 40(4): 249-53.
15. Khan Y, Anwar J, Iqbal P, Kumar A. Cutaneous tuberculosis: a studies of ten cases. *J Pak Assoc Dermatol* 2001; 11: 6-10.
16. Singh G. Lupus Vulgaris in India. *Indian J Dermatol Venerolo* 1974; 40: 257-60.
17. Kumar B, Muralidhar S. Cutaneous Tuberculosis; a 22 year prospective study. *Int J Tuberculosis Lung Dis* 1999; 3:494-500.
18. Qureshi R, Sheikh RA, Haque AU. Chronic granulomatous inflammatory disorders of skin. *Int J Pathol* 2004; 2(1) 31-4. DOI 10.1.1.627.5363
19. Pinkus H, Mehregan AH, eds. *A Guide to Dermatopathology*, 3rd edn. New York: Appleton – Century –Crofts; 1981.

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