



HISTOPATHOLOGICAL SPECTRUM OF SKIN LESIONS DIAGNOSED BY PUNCH BIOPSY: A RETROSPECTIVE STUDY

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ABSTRACT

BACKGROUND: Skin diseases are a major public health concern in India with an estimated 6.3 – 11.6 % of population affected. [1] Due to the varied nature of clinical presentations of skin lesions ranging from inflammatory non-neoplastic lesions to neoplasms, histopathological assessment of skin biopsy is essential to provide accurate diagnosis and guide patient management. [1][2] This study evaluated the spectrum of skin lesions diagnosed through punch biopsy at a tertiary care center in Bhavnagar, Gujarat.

MATERIALS AND METHODS: Retrospective analysis was conducted on 113 consecutive skin punch biopsy samples received at the Department of Pathology, Government Medical College, Bhavnagar during September 2024 to August 2025. All samples were fixed in 10 % formalin; processed routinely; cut into 4-5µm sections; and stained using H&E. Special stains (i.e., Fite-Faraco, PAS) were performed as necessary to support diagnosis. Clinical information (patient age, gender, lesion type, location) was collected. Descriptive statistics were applied to describe the findings.

RESULTS: Among 113 patients, 62 (54.9 %) were females while 51 (45.1 %) were males (Female:Male ratio = approximately 1.2 : 1). Patient's ages ranged from 6 to 75 years with a mean age of 40.5 years. The most common age groups were 31-40 years (n=26, 23.0%), followed by 51-60 years (n=21, 18.58%). Hypopigmented patches were the most common clinical presentation (n=31, 27.4%), followed by hyperpigmented patches (n=14, 12.4%). The most common biopsy site was the back (n=26, 23.0%). Hansen's disease (leprosy) was the largest histopathologic category and comprised 49 (43.4 %) of all biopsy samples. The Borderline Lepromatous subtype was the most common among these (n=17/49, 34.7%). Papulosquamous disorders were the second-most common category (n=17, 15.0%) and consisted primarily of lichen planus (n=10, 58.8% of papulosquamous category) and psoriasis (n=5, 29.4%). Nonspecific dermatitis represented 9 (8.0%) biopsy samples and included allergic contact dermatitis as the most common (n=5/9, 55.6%). A total of 8 patients (7.1%) were diagnosed with vesiculobullous diseases, with pemphigus vulgaris representing the majority (n=5, 62.5% of the vesiculobullous group). (Tables 1–3, Figures 1–3). These findings are similar to other studies published in India. For example, Dawande et al. [3] (Nagpur), similarly found that leprosy (24%) and pemphigus (10%) were common.

CONCLUSION: Evaluation of skin biopsy samples demonstrated a broad range of dermatopathologies. Leprosy was again the most common diagnosis identified in the present Gujarat cohort. The findings highlight the importance of performing skin biopsy to correctly classify dermatological lesions in order to apply effective treatment, particularly in areas endemic for infectious and inflammatory skin diseases.[1][3]

Keywords: Punch Biopsy, Skin Lesions, Histopathology, Leprosy, Lichen Planus.

INTRODUCTION

Skin is the biggest organ (16% of body weight), and it has complex functions of barriers and senses.[3] Dermatoses occur in all ages and display a wide variety of clinical manifestations - ranging from mild papular rashes to malignant tumors. Skin diseases are very prevalent in India (population prevalence about 6-12 %).[1] The clinical manifestation depends on location, demographic characteristics of the patients and other factors such as climate, socioeconomic status, and endemic infections.[3] Patients may clinically present with

hypopigmented or hyperpigmented patches, papules, vesicles, and plaques, which may represent either benign or severe dermatoses (for example, hypopigmented patches can represent leprosy, pityriasis, post-inflammatory hypopigmentation, etc.).[2] Because of this, punch biopsy - a method that provides a cylindrical sample of the entire thickness of the skin - is an important tool for the diagnosis of skin diseases. Biopsy permits the evaluation of the epidermis, dermis, and superficial subcutaneous tissue in one sample and is particularly

useful for the diagnosis of inflammatory, infectious, autoimmune and neoplastic lesions.[2]

Histopathological examination of a biopsy sample is considered the gold standard for the definitive diagnosis of many skin conditions.[1], [2] Histopathological examination of a biopsy sample can help to identify etiological agents (for example, lepra bacillus), specific morphological changes (for example, acanthosis in psoriasis, granuloma in leprosy) that will guide the treatment. Many studies from India have described the results of histopathological examination of dermatology patients' skin biopsies. These studies have shown a large diversity of combinations of non-neoplastic and neoplastic skin lesions. For example, Italiya et al.[4] (Ahmedabad) showed that among 200 skin biopsies, there were mainly papulosquamous eruptions (especially psoriasis) and vesiculobullous disorders (pemphigus). Similarly, Dawande et al.[3] (Nagpur) demonstrated that among 50 skin biopsies, the most common histopathological findings were leprosy and squamous cell carcinoma. A good knowledge of the histopathological spectrum of skin lesions in the area where they practice is essential for clinicians to evaluate their list of differential diagnoses and for public health authorities to follow the prevalence of these diseases.

To collect information that could help physicians practicing in this area to establish differential diagnoses and to add updated data to the current literature on the spectrum of dermatological pathology, we conducted a retrospective study of all punch skin biopsies done during a period of one year at our center located in Bhavnagar (Gujarat). This study also provided additional data on the distribution of age, sex, clinical presentations, and histopathological diagnoses of the biopsied skin samples, which can complement national disease burden data (such as those presented by Kavita et al.,[5] who showed that skin diseases account for about 4% of India's disability burden).

MATERIALS AND METHODS

This retrospective study included all skin punch biopsy specimens received by the Department of Pathology, GMC Bhavnagar, from 1st September 2024 through 31st August 2025. No cases were excluded on basis of diagnosis. Clinical information (age, sex, clinical diagnosis/presentation, lesion site) was recorded from request forms. Specimens were formalin-fixed and paraffin-embedded. Sections (4–5 µm) were stained with hematoxylin and eosin. Special stains (Fite–Faraco for Mycobacteria, PAS for fungal elements, etc.) were applied when indicated to confirm or clarify diagnoses. Data were tabulated and analyzed descriptively. No patient-identifiers were recorded; ethical approval was waived due to the use of archival de-identified data.

RESULTS

A total of 113 skin biopsy specimens were evaluated.

Demographics: Patients' ages ranged from 6 to 75 years (mean ≈40.5). The 31–40-year group was the largest (26 patients, 23.0%), followed by 51–60 years (21, 18.58%) (Table 1). 51 patients (45.1%) were male and 62 (54.9%) were female (M:F ≈1:1.2). These age and sex patterns are similar to other reports (e.g., Vedula et al. also found peak incidence in the 31–40 age group).

Clinical Presentation and Biopsy Site: Clinically, the most common lesion type biopsied was hypopigmented patch/plaque (31 cases, 27.4%), followed by hyperpigmented patch (14, 12.4%), Plaque (23, 20.4%), Papule (17, 15.01%), Vesicle/bulla (8, 7.1%) and Macule (3, 2.7%) (Table 2). The single most frequent biopsy site was the back (26 cases, 23.0%), followed by lower limbs (24, 21.2%), upper limbs (22, 19.5%), scalp/neck (18, 15.9%), face (12, 10.6%), and other sites (11, 9.7%).

Histopathological Diagnoses: The distribution of final diagnoses is summarized in Table 3 and Figure 2. Hansen's disease (all forms) was by far the most common category, accounting for 49 of 113 cases (43.4%). In keeping with Ridley–Jopling classification, these included 17 cases of Borderline Lepromatous (BL, 34.7% of Hansen's cases), 11 each of Borderline Tuberculoid (BT) and Lepromatous (LL) (22.4% each), and the remainder Borderline Borderline, Tuberculoid or Histoid variants (total 20.4%). Figure 3 shows the frequency of leprosy subtypes. (The predominance of BL is in line with some studies; however, others have found BT to be most common in India. Our male patients with leprosy tended to have BL, whereas females had more BT.)

The second-largest group was papulosquamous and erythematous dermatoses (17 cases, 15.0%). The majority were lichen planus (10 cases, 58.8% of papulosquamous group), followed by psoriasis (5 cases, 29.4%) and pityriasis rosea and PLEVA (one each). A group of dermatitis and eczematous dermatoses formed the third group (9 cases, 7.96%), with allergic contact dermatitis being the commonest (5 cases, 55.6%). Vesiculobullous disorders comprised 8 cases (7.1%): pemphigus vulgaris (5 cases) was by far the most frequent (62.5% of this group), while one case each of pemphigus foliaceus, paraneoplastic pemphigus, and bullous pemphigoid were also seen. Benign neoplasms were rare (e.g. 1 clonal seborrheic keratosis).

These findings resonate with other Indian series. For example, an Ahmedabad study similarly found hypopigmented patches to predominate as the clinical presentation (27%) and Hansen's disease as the top histologic diagnosis. In the Nagpur series of Dawande et al.,[3] leprosy (24%) and squamous cell carcinoma (14%) were the top non-neoplastic and neoplastic lesions, respectively, comparable to our

leprosy rate. Likewise, Goswami et al.[1] (also in Bhavnagar) reported leprosy as 22.6% of biopsies. Table 3 and Figure 2 illustrate the relative proportions of each diagnostic category.

Tables and Figures: Tables 1–3 detail the age distribution (Table 1), clinical lesion types (Table 2),

and histopathological diagnoses (Table 3). Figure 1 plots age group vs. case count. Figure 2 is a pie chart of diagnostic categories (Hansen's disease, papulosquamous, dermatitis, vesiculobullous, others). Figure 3 shows a bar chart of leprosy subtypes.

Table 1. Age distribution of patients (n=113)

Age group (years)	Number (%)
<20	5 (4.4)
21–30	20 (17.7)
31–40	26 (23.0)
41–50	20 (17.7)
51–60	21 (18.6)
61–70	17 (15.0)
>70	4 (3.5)
Total	113 (100)

Table 2. Clinical presentation of lesions (n=113)

Clinical Feature	Number (%)
Hypopigmented patch	31 (27.4)
Hyperpigmented patch	14 (12.4)
Plaque	23(20.4)
Papule	17(15)
Macule	3(2.7)
Vesicle/Bulla	8 (7.1)
Nodule	7 (6.2)
Other lesions (rash, pustules, etc)	10(8.8)
Total	113 (100)

Table 3. Histopathological diagnoses of skin lesions (n=113)

Diagnostic Category	Number (%)
Infectious:	
– Hansen's disease (leprosy)	49 (43.4)
– Other infections (tuberculosis, viral exanthem etc.)	2 (1.8)
Papulosquamous:	
– Lichen planus	10 (8.8)
– Psoriasis	5 (4.4)
– Other (PR, PLEVA, etc.)	2 (1.8)
Dermatitis/Eczema:	
– Allergic contact dermatitis	5 (4.4)
– Other eczema	4 (3.5)
Vesiculobullous:	
– Pemphigus vulgaris	5 (4.4)
– Pemphigus foliaceus	1 (0.9)
– Paraneoplastic pemphigus	1 (0.9)
– Bullous pemphigoid	1 (0.9)
Benign neoplasms:	
– Seborrheic keratosis	1 (0.9)
Others/Miscellaneous (melanocytic nevi, vascular lesions, etc.):	23 (20.4)
Total	113 (100)

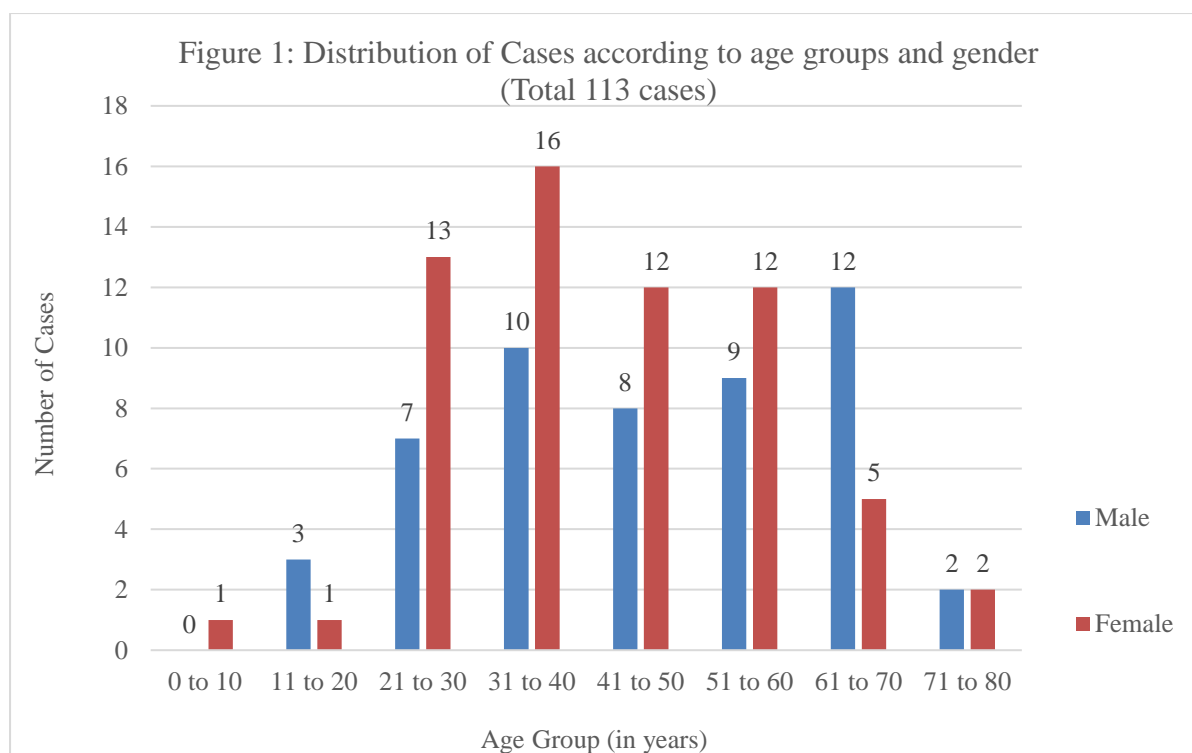


Figure 1: Age distribution of patients (bar chart). Age 31–40 years group had the highest number of cases

Figure 2. Distribution of Histopathological Diagnoses

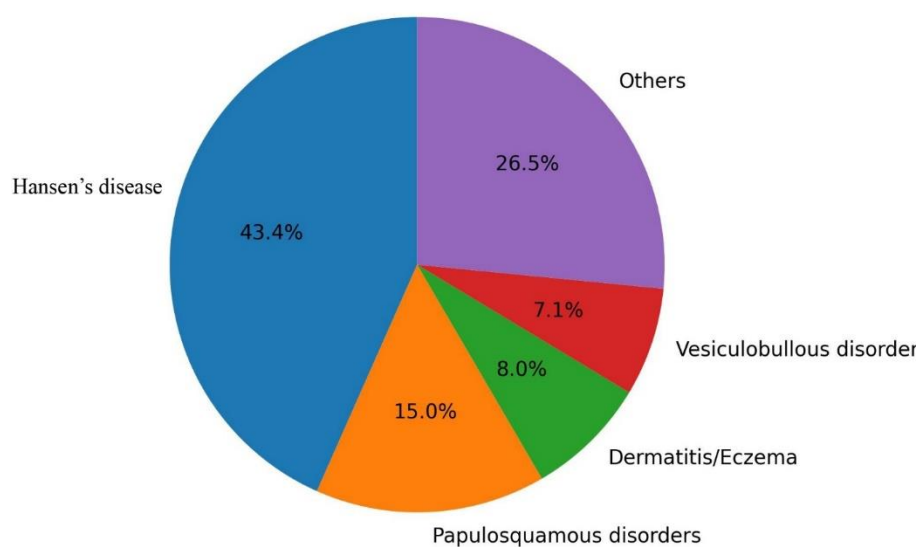


Figure 2: Pie Chart of Histopathological Diagnosis Categories. Hansen's disease (Leprosy) Predominated (43%), Followed by Papulosquamous Disorders (15%), Dermatitis (8%), Vesiculobullous Diseases (7%), And Miscellaneous (27%).

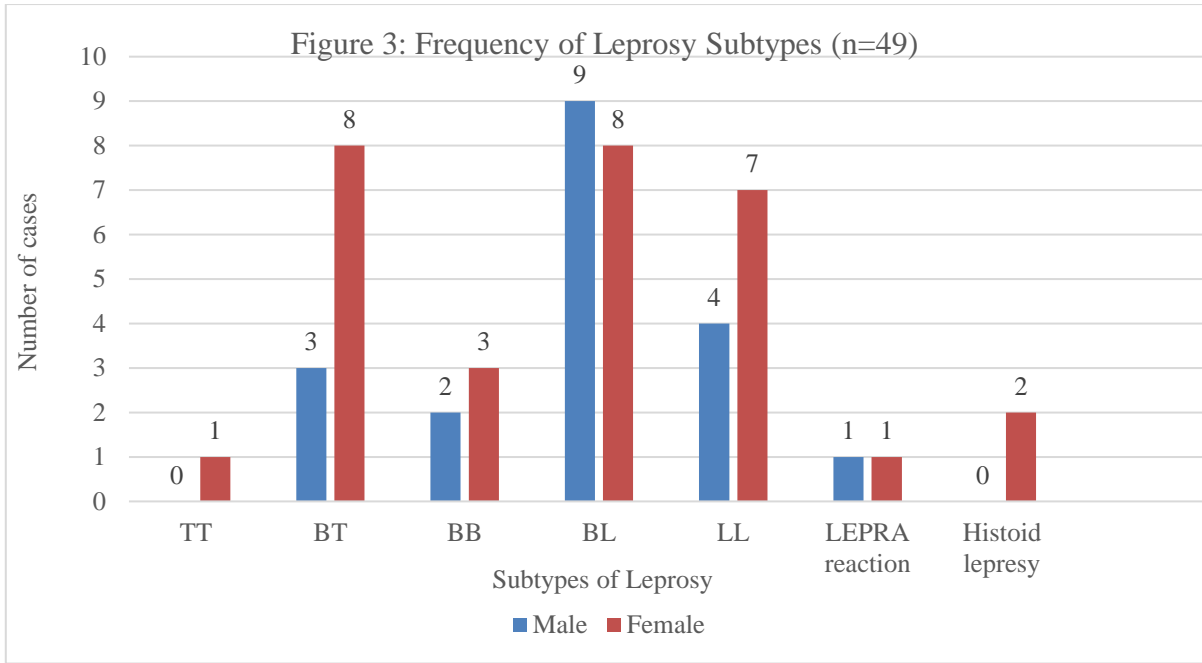


Figure 3: Bar chart of leprosy subtypes (n=49). Borderline lepromatous (BL) was most frequent (34.7% of leprosy cases)

Supplementary Figures:

Figure S1: Borderline Lepromatous Leprosy: Variably thickened epidermis with grenz zone

formation beneath and dermis show aggregates of foamy macrophages and discrete lymphocytes occasional epithelioid cells entrapping nerve bundle.

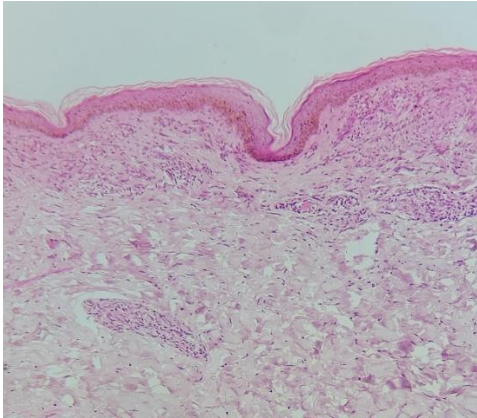


Figure S2: Borderline Tuberculous Leprosy: Epidermis is unremarkable with mild acanthosis dermis show aggregates of vague to well epithelioid

granuloma with dense lymphocytic infiltrate in upper and deep dermis in periadenexal region

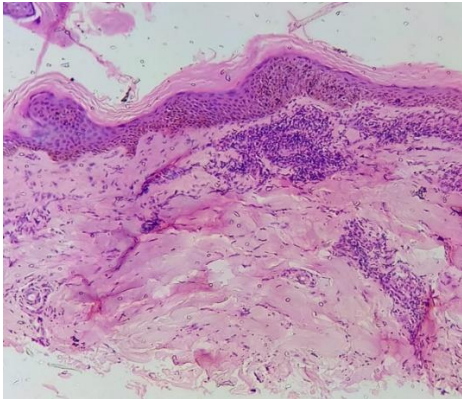


Figure S3: Tuberculous Leprosy: Epidermis is atrophic dermis show tight aggregates of well formed epithelioid granuloma occasion giant cells

and dense lymphocytic infiltrate eroding epidermis and surrounding nerve and skin appendages.

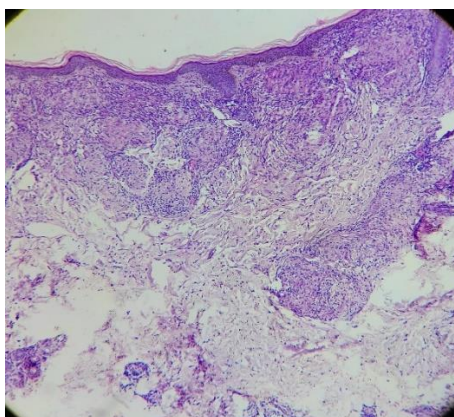


Figure S4: Histoid leprosy: Epidermis is thinned out with grenz zone formation dermis show nodular aggregate consisting of spindle shaped histiocytes

having elongated nuclei and eosinophilic cytoplasm in storiform and whorled pattern with few lymphocytic infiltrate and blood vessels.

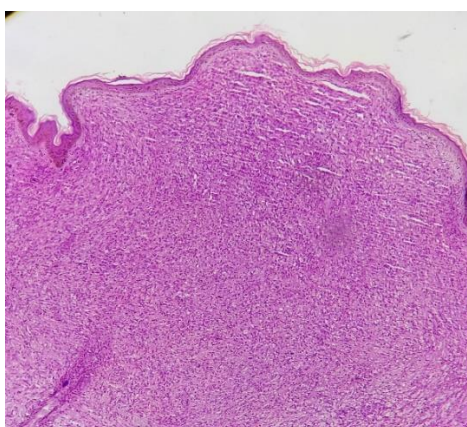


Figure S5: Lichen Planus Hypertrophicus: Epidermis show marked acanthosis with orthokeratotic hyperkeratosis, hypergranulosis and

focal basal cell degeneration with discrete band like lymphocytic inflammatory infiltrate at dermoepidermal junction and in superficial dermis

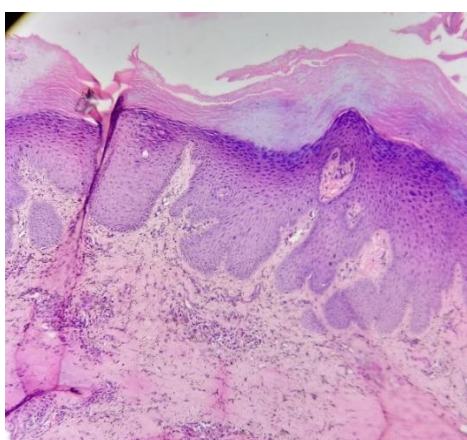


Figure S6: Pemphigus Vulgaris: Section show suprabasal clefting with acantholysis loose intercellular bridges between basalcells and demal

attachment giving tombstone appearance upper dermis show mild mixed inflammation

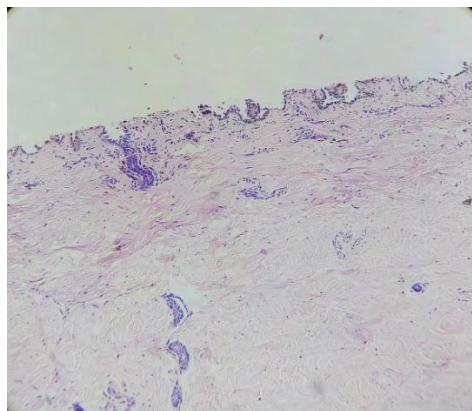


Figure S7: Clonal seborrheic keratosis: Acanthotic epidermis show well circumscribe intraepidermal nests of basaloid cells with mild hyperkeratosis, intact

basement membrane and superficial dermis show mild perivascular lymphocytic infiltrate

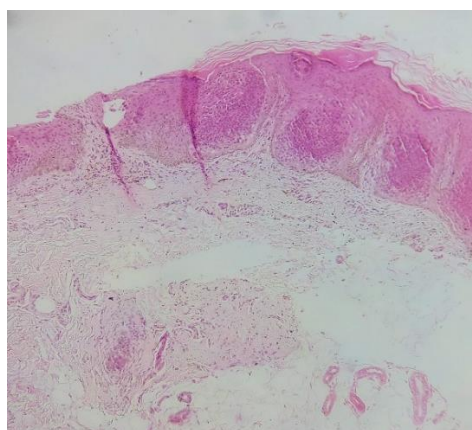
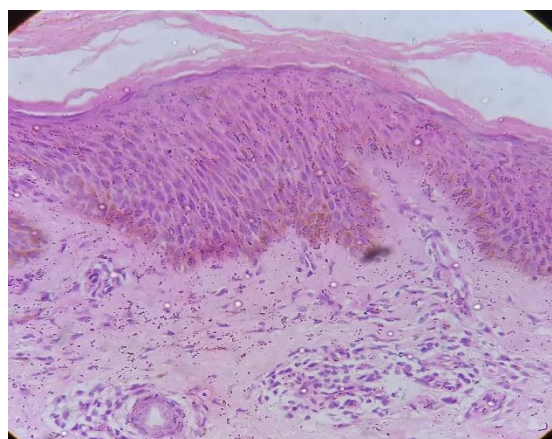


Figure S8: Allergic Contact Dermatitis: Epidermis show irregular acantholysis with orthokeratotic hyperkeratosis, focal basal cell vacuolar

degeneration and superficial dermis shows dilated vessels with perivascular inflammatory infiltrate of lymphocytic and a few eosinophils.



DISCUSSION

This study illustrates the diversity of dermatopathology at our institution. As noted above, the peak age for these disorders is reported in the 3rd-4th decades, and there is a slight female predominance (F:M = 1.2:1) as has been previously described.[1] However, others have reported a wide

range of ages, including report by Vedula et al., and MGM Medical College, Indore [13] where they found 31-40 years to be the most common age group comparable to present study, while others have reported a predominance of males.[6][11][12] Such variations may reflect regional demographic differences and healthcare-seeking behaviour.

As noted in our Clinical Observations section, the most common presentations were hypopigmented patches (27.4%), and similarly, as seen in Noopur Bansal's Ahmedabad data (27%), this may be reflective of the high prevalence of leprosy and post-inflammatory hypopigmentation in our geographic location.[7]

In the present study, leprosy was the most common non-neoplastic skin lesion, accounting for 43.36% of cases. Similar observations have been reported by Kumar and Goswami[11] (30.6%), Mehar et al.[13] (30%), and Patel and Rawal[14] (41%). Veludrthy et al. [15] also documented a significant proportion of leprosy among non-neoplastic dermatoses. The relatively higher percentage observed in the present study may reflect the regional endemicity and referral pattern of clinically suspected cases for histopathological confirmation.

As noted earlier, the most common subtype of Hansen's disease in this study was the Borderline Lepromatous Leprosy form (34.7%), which is different from some other studies e.g., Narang and Jain [8] reported that Tuberculoid and Borderline Tuberculoid forms were the most common subtypes same as C.U. Shah Medical College, Surendranagar[14] documented borderline tuberculoid as the most common subtype (34.14%)., while others studies from , B.J. Medical College, Ahmedabad[11] reported lepromatous leprosy as the most frequent subtype (39.4%), while MGM Medical College, Indore[13] observed tuberculoid and lepromatous subtypes with equal frequency (44.6% each). Such variations across studies may be attributable to differences in host immune status, geographical distribution, local epidemiology, disease burden, and timing of biopsy. Accurate classification of Hansen's disease is important because it will determine the appropriate treatment regimen.

In addition, Papulosquamous disorders constituted another significant category in the present study. Lichen Planus (LP) was the most common papulosquamous disorder (10 of 17 - 58.8% of this category), which is a larger number. This finding is comparable with the study conducted at Government Medical College, Jammu[16], where lichen planus was also the predominant lesion (42.9%). It has been reported in some of the literature typically LP accounts for approximately 3% of skin biopsies present study reports 8.8% of skin biopsies. It is possible that there is referral bias toward Lichen Planus because it is a distinctive papulosquamous dermatosis.

Psoriasis was identified in five cases (4.4% of total skin biopsies and 29.41% of Papulosquamous disorder), which is consistent with the literature that identifies psoriasis as a relatively common condition in this patient population.[3] However, Reddy and Krishna[17] reported psoriasis (42.7%) as the most common papulosquamous lesion in their series.

Dermatitis/eczematous lesions (allergic contact dermatitis, palmar eczema, etc.) were present in 9 cases (7.96%), which is a smaller number than has been reported in some of the literature (10-25% of biopsies).[1][4] Whereas the findings reported by Bhaskar Medical College [15] and MGM Medical College[13] are comparable to present study, where dermatitis comprised approximately 5% of cases. Such variations are may be due to under-biopsy of easily diagnosed eczema, or there may be a difference in population.

The vesiculobullous cases (eight total) were primarily pemphigus vulgaris, consistent with numerous reports from India (pemphigus vulgaris typically accounts for greater than 50% of autoimmune bullous cases). Dawande et al. also found that pemphigus vulgaris was the predominant type of bullous disease.[3]

Dermatitis (such as spongiotic dermatitis) and psoriasis were less commonly represented in this study, possibly as a result of clinical selection (the dermatologist may reserve biopsy for atypical or resistant cases). There were few cases of drug reactions and connective tissue disease like drug induced cutaneous atrophy, SALE, scleroderma, etc. reported by histopathology in this study.

The three tables provided below summarize the data in a concise manner, and the bar/pie charts provided visually aid the clinician in understanding the relative frequency of infectious versus noninfectious categories (for example, see Figure 2). Such visualisation aids the clinician in recognizing that, in our setting, infectious leprosy is the leading differential for a hypopigmented or anesthetic patch. Additionally, the breakdown of leprosy subtypes (see Figure 3) can aid epidemiologists in their assessment of the pattern of disease spread.

These findings have practical implications: In Bhavnagar and other areas that are endemic for leprosy, any atypical hypopigmented or nodular skin lesion should raise suspicion for leprosy and prompt biopsy. Furthermore, when assessing generalized eruptions, histopathology often reveals a specific dermatose (e.g., lichen planus, pemphigus vulgaris, etc.), and therefore should not be delayed.

Additionally, these data highlight the continuing burden of leprosy (a neglected tropical disease) within our community, and support the national data showing that infectious dermatoses continue to represent a significant problem. Lastly, given the high level of disability associated with skin diseases in India (4% of Years Lived With Disability), the importance of early detection and effective treatment (which can only be achieved through accurate biopsy diagnosis) is emphasized.[5]

Potential limitations of this study include its retrospective design and single-center focus. Additionally, we did not collect data regarding the correlation rates of clinical and histopathological diagnoses. Finally, many clinically apparent cases

(e.g., typical psoriasis or eczema) may not have undergone biopsy, thereby potentially affecting the proportions of various conditions. Nonetheless, the size of the sample (113 cases over a one-year period) provides a representative sample of biopsy-based diagnoses.

CONCLUSION

The spectrum of skin lesions demonstrated through histopathology was very wide for these retrospective biopsies from a tertiary hospital located in the state of Gujarat. The majority of the cases identified were infectious diseases primarily leprosy, then papulosquamous dermatoses and lastly eczematous conditions. Thus our study demonstrates how prevalent traditional diseases such as leprosy remain in dermatopathology in regions where they are endemic despite modern advances. It also demonstrates the necessity of skin biopsy in making definitive diagnoses and subsequently guiding appropriate treatment and improving clinical outcomes for patients. Biopsy data may provide useful information to both local healthcare providers and public health officials regarding trends in skin diseases.

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