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Histomorphological evaluation of skin lesions at the Kadapa Government Medical College teaching institute: A two-year study

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Abstract

Background: The prevalence of skin diseases varies geographically due to factors, such as etiology, environment, genetics, and lifestyle. The current study aimed to determine the incidence and distribution of skin disorders and to provide a description of the histomorphological spectrum.

Methods: This retrospective study was conducted over a period of two years, from June 2021 to May 2023. A total of 202 skin biopsy samples were evaluated. The histopathological examination of the lesions categorized them into eight groups based on the site, pattern of involvement, and cytological features, according to the Lever's Histopathology of the Skin. Group 1 consisted of diseases limited to the epidermis and stratum corneum; group 2 consisted of diseases with localized superficial epidermal or melanocytic proliferation; group 3 consisted of diseases of the superficial cutaneous reactive unit; group 4 included diseases with acantholytic, vesicular, and pustular morphology; group 5 included diseases with perivascular, diffuse, and granulomatous infiltrate of the reticular dermis; group 6 included tumors and cysts of the dermis and subcutis; group 7 consisted of inflammatory disorders of skin appendages; and group 8 consisted of disorders of the subcutis.

Results: A total of 202 skin biopsies were collected from individuals aged 8-87 years. The majority of the cases belonged to the age group of 31-40 years. The male-to-female ratio was 1.2:1. The trunk was the most common site of biopsy, accounting for 40% of the cases, followed by the upper limb in 25% of the cases. Histopathological lesions were categorized into eight groups based on the site, pattern, and cytological features. Neoplastic lesions, both benign and malignant, accounted for 10.9% of the cases. The majority of the lesions were related to group 6, accounting for 38.1% of the cases, with the epidermal cyst being the most common lesion (7.92%). Basal cell carcinoma, observed in 2.97% of the cases, was the most common lesion among the neoplastic lesions. Group 5 lesions were the third most common (19.8%), with leprosy accounting for 9.4% of these cases.

Conclusion: Histopathological examination of skin biopsies is considered the gold standard for diagnosis, and it is often supported by ancillary techniques. Leprosy was the most common disease identified in this study, which underscores the importance of effective preventive measures for control.

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Highlights

What is current knowledge?

- Dermatological lesions represent a broad spectrum that varies not only from country to country, but also within different regions of the same country.
- These variations can be influenced by factors, such as sex, age, associated systemic disorders, economic conditions, literacy, racial demographics, and social customs.
- The most accurate method for diagnosing these lesions is through a histopathological study of skin biopsies. This approach can identify the etiological agent using special stains where feasible, providing clinicians with valuable information to determine the most appropriate management strategy.

What is new here?

- Our study demonstrates a unique distribution and histopathological pattern of skin lesions, which are grouped based on the Lever's Histopathology of the Skin. This grouping is distinct from other studies conducted in various geographical settings.
- Our study of clinicopathological correlation provides significant insights that aid in reaching a diagnosis.

Introduction

The skin, being the largest organ in the body, is indeed complex. It involves precisely regulated cellular and molecular interactions that govern many essential processes. One of its primary roles is to serve as a defense mechanism against harmful environmental agents (1). Skin diseases encompass a wide range of inflammatory and neoplastic lesions. These dermatological conditions are prevalent worldwide. In India, for instance, the prevalence of skin diseases is reported to range from 6.3% to 11.16% (2, 3). While many skin lesions can be diagnosed clinically based on patient history and physical examination of the lesions, some cases require additional diagnostic tests. These can include a potassium hydroxide (KOH) preparation to identify fungal elements, a clinical examination under Wood's light, and biopsies from skin lesions. These additional tests can provide crucial information that aids in reaching a final diagnosis.

Indeed, the clinical presentation of dermatological diseases can be quite narrow, with signs, such as hypopigmentation, hyperpigmentation, macules, papules, nodules, and a few others. However, the histomorphology of skin diseases reveals a much more diverse range of disease processes. Accurate diagnosis of skin disorders, especially those presenting with similar clinical lesions, is of utmost importance, as it aids clinicians in deciding the appropriate management plan (4). The aim of the current study was to evaluate the histomorphological spectrum and distribution of skin lesions at a tertiary care teaching institute.

Methods

This retrospective study collected data from the patients' medical records over two years, from June 2021 to May 2023 at the Department of Pathology of the Government Medical College (GMC, Kadapa, Andhra Pradesh, India).

Inclusion and exclusion criteria:

In this study, all adequate skin biopsies received by the Department of Pathology of GMC in Kadapa were included. However, any samples that were inadequate, poorly fixed, or auto-analyzed were excluded from the study.

Data collection

The Department of Pathology at GMC received a total of 4363 biopsy specimens, of which 202 were skin biopsies. These samples underwent a routine processing procedure. They were fixed in 10% neutral buffered formalin, embedded, and sectioned at a thickness of 4-5 microns. The sections were then stained with Hematoxylin & Eosin for examination. In certain cases, special stains, such as Ziehl-Neelsen (ZN) stain, Periodic Acid Schiff's (PAS) stain, and Wade-Fite or Fite-Faraco (FF) staining, were used as required. This comprehensive approach ensures a thorough examination of the samples. Along with the specimens, requisitions were sent to obtain demographic data, providing valuable context for the analysis of the biopsy results.

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Statistical analysis

The data collected in this study was recorded using a Microsoft Excel sheet. Statistical analyses were performed using SPSS Version 21.0 (USA). Frequency percentages were utilized to measure the prevalence of various skin disorders based on histopathological findings. A P-value of less than 0.05 was considered statistically significant.

Results

In this study, a total of 202 skin biopsies were examined. The age of the patients ranged from eight to 87 years. The distribution of cases across different age groups was as follows: 31-40 years: 42 cases (20.8%); 41-50 years: 41 cases (20.2%); 51-60 years: 39 cases; 21-30 years: 31 cases; and 61-70 years: 20 cases.

In this study, males constituted 112 cases (55.5%) and females constituted 90 cases (44.5%), resulting in a male-to-female ratio of 1.2:1. The most common site of skin disease was the trunk, with 80 cases (40%), followed by the upper limb with 51 cases (25%). The histopathological examination of these lesions led to their categorization into eight groups. The categorization of skin diseases, based on their site, pattern of involvement, and cytological features as suggested in the Lever's Histopathology of the Skin (5) (Table 1) is as follows:

1) Group 1: Diseases limited to the epidermis and stratum corneum (n=11, 5.45%).
2) Group 2: Diseases with localized superficial epidermal or melanocytic proliferation (n=7, 3.46%).
3) Group 3: Diseases of the superficial cutaneous reactive unit (n=47, 23.26%).
4) Group 4: Diseases with acantholytic, vesicular, and pustular morphology (n=13, 6.45%).
5) Group 5: Diseases with perivascular, diffuse, and granulomatous infiltrate of the reticular dermis (n=40, 19.8%).
6) Group 6: Tumors and cysts of the dermis and subcutis (n=77, 38.11%).
7) Group 7: Inflammatory disorders of skin appendages (n=3, 1.49%).
8) Group 8: Disorders of the subcutis (n=4, 1.98%).

Out of 202 samples, the majority of lesions were non-neoplastic, accounting for 180 cases (89.1%). The most common type of these non-neoplastic lesions was the epidermal cyst, found in 16 cases (7.92%). Neoplastic lesions, both benign and malignant, were found in 22 cases, making up 10.9% of the total. When specifically examining the malignant neoplastic lesions (12 cases in total), basal cell carcinoma was the most common, found in six cases (50%) of the malignant neoplastic lesions, followed by squamous cell carcinoma, which was found in four (33.4%) cases of the malignant neoplastic lesions (Figure 1 & Figure 2).

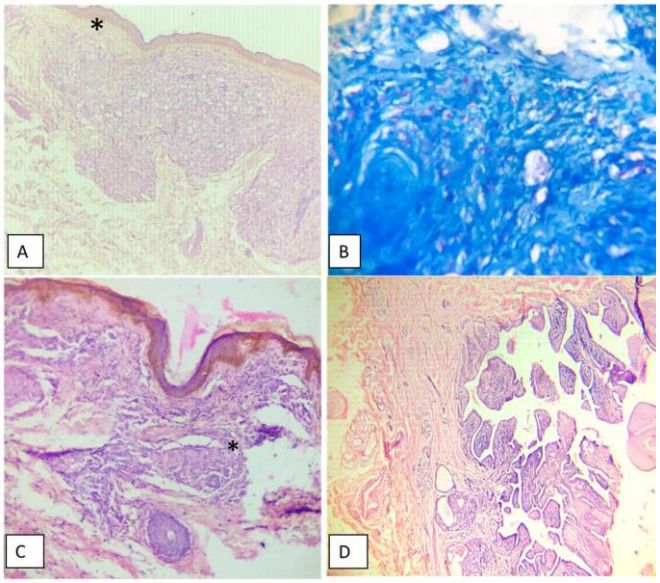

Figure 1. A: Lepromatous leprosy is characterized by a normal epidermis and a Grenz zone (*). The upper dermis displays poorly defined clusters of foamy macrophages (Virchow cells) (20x magnification, H&E staining). B: Macrophages distended with large groups of lepra globi (40x magnification, Wade-FF staining). C: Tuberculoid leprosy is characterized by dermal infiltration of non-caseating epithelioid granulomas with Langhan's giant cells and lymphocytes (*) (20x magnification, H&E staining). D: Syringocystadenoma papilliferum is characterized by cystic invagination with papillary proliferation of infundibular epithelium into the dermis (20x magnification, H&E staining).

Table 1. Categorization of skin lesions according to the groups

Groups	Skin lesions	Number	Percentage	Total number (100%)
Group 1	Vitiligo	4	1.98%	11 (5.45%)
	Prurigo simplex	3	1.48%	
	Ashy dermatosis	1	0.49%	
	Pityriasis versicolor	1	0.49%	
	Cutaneous horn	1	0.49%	
	Tinea barbae	1	0.49%	
Group 2	Seborrheic keratosis	4	1.98%	7 (3.46%)
	Verruca vulgaris	3	1.48%	
Group 3	Psoriasis	11	5.40%	47 (23.26%)
	Annular Lichen planus	5	2.47%	
	Hypertrophic Lichen planus	4	1.98%	
	Atopic dermatitis	4	1.98%	
	Pustular psoriasis	3	1.48%	
	Chronic actinic dermatitis	3	1.48%	
	Lichen sclerosus chronicus	2	0.99%	
	Pityriasis lichenoides chronica	2	0.99%	
	Prurigo nodularis	2	0.99%	
	Allergic contact dermatitis	1	0.49%	
	Hyperkeratotic Lichen planus	1	0.49%	
	Atrophic Lichen planus	1	0.49%	
	Lichen planus pigmentosum	1	0.49%	
	Lichen planus pilaris	1	0.49%	
	Eczematous dermatitis	1	0.49%	
	Lichen simplex chronicus	1	0.49%	
	Parapsoriasis	1	0.49%	
	Pityriasis rosea	1	0.49%	
	Psoriasis vulgaris	1	0.49%	
	Psoriasiform spongiotic disorder	1	0.49%	
Group 4	Bullous pemphigoid	6	2.97%	13 (6.45%)
	Pemphigus foliaceus	2	0.99%	
	Pemphigus vulgaris	2	0.99%	
	Cicatricial pemphigoid	1	0.49%	
	Dermatitis herpetiformis	1	0.49%	
	Miliaria rubra	1	0.49%	
Group 5	Leprosy	19	9.4%	20 (19.80%)
	Keloid scar	5	2.47%	
	Morphea	5	2.47%	
	Scleroderma	3	1.48%	
	Granuloma annulare	2	0.99%	
	Lupus vulgaris	2	0.99%	
	Sarcoidosis	1	0.49%	
	Actinic granuloma	1	0.49%	
	Leukocytoclastic vasculitis	1	0.49%	
	Erythema annulare centrifugum	1	0.49%	
Group 6	Epidermal cysts	16	7.92%	77 (38.12%)
	Keratinous cysts	15	7.40%	
	Sebaceous cysts	13	6.40%	
	Basal cell carcinoma	6	2.97%	
	Squamous cell carcinoma	4	1.98%	
	Dermal nevus	3	1.48%	
	Chondroid syringoma	2	0.99%	
	Dermoid cysts	2	0.99%	
	Eccrine spiradenoma	2	0.99%	
	Pilomatricoma	2	0.99%	
	Compound nevus	1	0.49%	
	Junctional nevus	1	0.49%	
	Eccrine adenoma	1	0.49%	
	Malignant melanoma	1	0.49%	
	Keratoacanthoma	1	0.49%	
	Nodular hidradenoma	1	0.49%	
	Sebaceous carcinoma	1	0.49%	
	Sebaceous hyperplasia	1	0.49%	
	Spiradenoma	1	0.49%	
	Steatocystoma multiplex	1	0.49%	
	Squamous papilloma	1	0.49%	
	Pyogenic granuloma	1	0.49%	
Group 7	Discoid lupus erythematosus	3	1.48%	3 (1.48%)
Group 8	Calcinosis cutis	3	1.48%	4 (1.98%)
	Erythema nodosum leprosum	1	0.49%	

Out of the total cases, 38.1% (n=77) were classified under group 6. The distribution of cases among the other groups is as follows: Group 1 included 11 cases (5.45%), all of which were diagnosed with vitiligo. Group 2 comprised seven cases (3.46%), group 3 included 47 cases (23.26%), group 4 included 13 cases (6.45%), and group 5 contained 40 cases (19.8%). As mentioned earlier, group 6 had the highest number of cases with 77 (38.11%). Lastly, group 7 and group 8 included three cases (1.49%) and four cases (1.98%), respectively (Figure 3).

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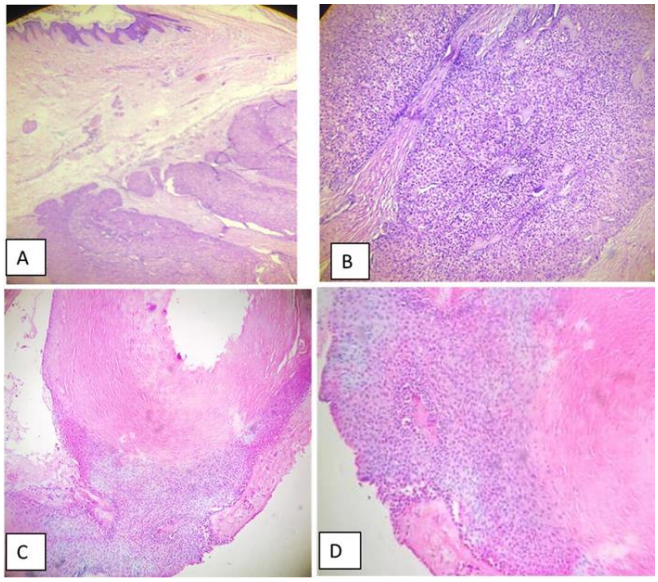

Figure 2. A & B: Nodular hidradenoma is characterized by well-circumscribed lobulated nests and nodules of epithelial cells within the dermis composed of two types of cells (Polyhedral cells with basophilic cytoplasm and clear cells with an eccentric round nucleus) (20x magnification, H&E staining). C & D: Pilomatricoma is characterized by lobulated circumscribed islands of basaloid cells with abrupt keratinization and ghost cells, without an intervening granular layer (Scanner, 20x magnification, H&E staining).

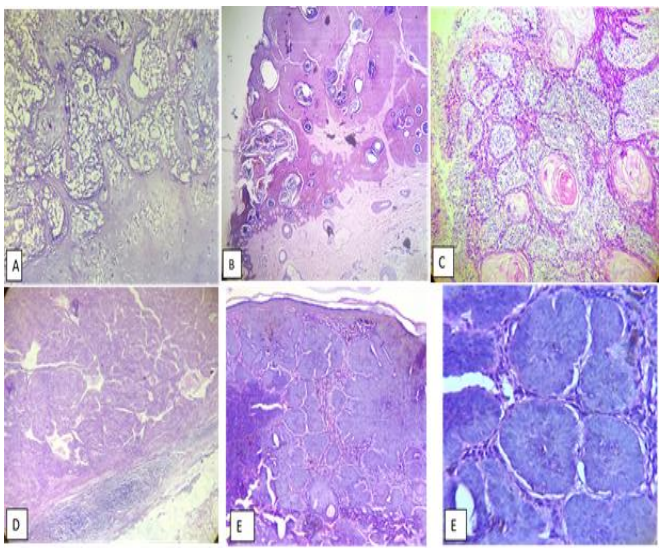

Figure 3. A: Chondroid syringoma is characterized by two cell components. The mesenchymal component exhibits chondroid differentiation, while the epithelial component is arranged in elongated, branching tubular structures with outer cuboidal and inner columnar cell layers (20x magnification, H&E staining). B: Seborrheic keratosis is marked by intraepidermal basiloid keratinocyte proliferation, which is hyperkeratotic. There is also the formation of numerous pseudo-horn cysts with well-demarcated edges and a flat base (20x magnification, H&E staining). C: Well-differentiated squamous cell carcinoma is characterized by well-differentiated squamous epithelium with marked keratinization and keratin pearls. There is minimal nuclear pleomorphism (20x magnification, H&E staining). D: Sebaceous carcinoma is marked by pleomorphic, hyperchromatic vacuolated sebocytes arranged in sheets and lobules, separated by a fibrovascular stroma (20x magnification, H&E staining). E: Basal cell carcinoma is characterized by pleomorphic basaloid cells arranged in lobules with peripheral nuclear palisading and cleft formation (20x & 40x magnification, H&E staining).

Discussion

Dermatological lesions represent a diverse group of disorders, each with unique clinical and histomorphological characteristics. The definitive method for diagnosing these disorders is through histopathological examination. In our recent study, we analyzed 202 skin biopsies. The most frequently represented age group was 31-40 years, accounting for 20.8% of the cases. This finding aligns with the results of studies co nducted by Bharadwaj V et al. (6) and Gupta et al. (7). In our study, male predominance was observed, with a male-to-female ratio of 1.2:1, which is similar to studies by Chandrakanta et al. (8), Yalla ASD et al. (9), Singh S et al. (10), Agarwal D et al. (11), and Mehar R et al. (12).

In our examination of 202 skin lesions, we identified neoplastic lesions in 22 cases, representing 10.9% of the total. The skin lesions were classified into eight groups, based on factors, such as the site of the lesion, the pattern of involvement, and cytological features. The majority of the cases fell into group 6, accounting for 77 cases (38.1%). Within this group, the most common lesion was the epidermal cyst, with 16 cases (7.92%). These findings are consistent with the results of studies conducted by Bharadwaj V et al., Gaikwad SL et al. (14), Yadav S et al. (15), and Sushma C et al. (16). Among the neoplastic lesions, basal cell carcinoma was observed in six cases (2.97%), which is similar to the findings of studies by Mamatha K et al. (1.74%), Bharadwaj V et al. (1.52%), Goswami P et al. (2.13%), and Amruth et al. (1.19%) (17).

In our research, the second most frequently involved group was group 3, which included diseases of the superficial cutaneous reactive unit. Within this group, psoriasis was the most common lesion, observed in 11 cases (5.4%). This finding differs from the results of studies by Mamatha K et al., where Lichen planus was the most common lesion. Group 5, which encompassed diseases with perivascular diffuse and granulomatous infiltrate of the reticular dermis, was the third most common group in our study, accounting for 40 cases (19.8%). Among these lesions, leprosy was the most common, observed in 19 cases (9.4%), whereas studies by Mamatha K et al. and Adhikari RC et al. (18) reported higher incidence rates. In our research, group 4, which included diseases with an acantholytic vesicular and pustular morphology, was represented by bullous pemphigoid as the most common lesion in six cases (2.97%). This contradicts the findings of a study by Mamatha K et al., where pemphigus vulgaris was reported as the most common condition in this group.

In our study, group 1 diseases, which are limited to the epidermis and stratum corneum, included seborrheic keratosis in four cases, accounting for 1.98% of the total. Group 7 skin lesions, which are inflammatory disorders of skin appendages, included discoid lupus erythematosus as the only lesion in this group, observed in three cases (1.48%). Group 8 disorders, which affect the subcutis, included calcinosis cutis as the most common lesion, observed in three cases (1.48%).

Conclusion

Dermatopathological lesions encompass a diverse group of disorders, each with a broad clinical and histopathological spectrum. The gold standard for confirming a diagnosis is a histopathological examination of skin biopsies, which can be further supported by ancillary techniques. Among these conditions, leprosy is the most common, underscoring the importance of effective preventive measures for control.

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Ethical statement

This study was performed in accordance with the Declaration of Helsinki, and written informed consent was obtained from the participants. The study protocol was approved by the Institutional Ethics Committee of the GMC, Kadapa, Andhra Pradesh, India.

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Author contributions

S.K., P.S.N., and G.S.R. analyzed and interpreted the patient's data regarding. V.N. and S.K. performed the histological examinations and were major contributors to writing the manuscript. P.S.N. and G.S. supervised the project and were responsible for editing the manuscript. All authors read and approved the final manuscript.

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