



HISTOPATHOLOGICAL PATTERN ANALYSIS OF SKIN BIOPSIES- AN OBSERVATIONAL STUDY

Histopathology

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ABSTRACT

Introduction: The skin, a highly specialized organ, exhibits limited histopathological reaction patterns despite the wide range of dermatological conditions. Skin diseases, ranging from benign inflammatory disorders to severe autoimmune conditions, often present with overlapping clinical features, making histopathological examination essential for accurate diagnosis. This study aimed to analyze and classify non-neoplastic and non-infective skin lesions based on histopathological patterns and assess the correlation between clinical and histopathological diagnoses. **Materials and Methods:** A prospective observational study was conducted at a tertiary care center from December 2019 to March 2022. A total of 110 patients presenting with non-infectious dermatological conditions underwent skin biopsy. Patients with infective and neoplastic skin conditions were excluded. Clinical data, including lesion morphology, were documented, and punch/excisional biopsies were processed for histopathological examination. The specimens were analyzed using hematoxylin and eosin staining, with additional special stains as needed. Statistical analysis was performed using SPSS software, and the association between clinical and histopathological diagnoses was evaluated using chi-square and Fisher's exact test ($p < 0.05$ considered significant). **Results:** Most cases were in the 31–40 age group, with a slight male predominance (50.9%). Psoriasis (23.6%) was the most common histopathological diagnosis, followed by Pemphigus Vulgaris (10.9%) and Lichen Planus (9.1%). Clinical-histopathological concordance was 86.4%, with the highest agreement for psoriasis and bullous pemphigoid. **Conclusion:** Histopathological examination remains the gold standard for diagnosing dermatological disorders. The study highlights the significance of structured pattern-based classification in improving diagnostic accuracy and guiding appropriate therapeutic interventions.

KEYWORDS

Skin biopsy, Histopathological pattern, Dermatopathology

INTRODUCTION

The skin is a highly specialized organ that serves as the primary protective barrier of the human body. It consists of multiple layers, including the epidermis, dermis, and subcutis, as well as various skin adnexes, such as sebaceous glands, sweat glands, and hair follicles. [1] The melanocytic system within the epidermis plays a crucial role in pigmentation and photoprotection. [1,2] Any imbalance in these structural components can disrupt skin homeostasis, ultimately manifesting as a wide array of dermatological disorders. [3]

Skin diseases are among the most frequently encountered medical conditions, ranging from common benign disorders like acne, eczema, and psoriasis to severe and potentially fatal conditions such as melanoma and other cutaneous malignancies. The vast spectrum of dermatological conditions necessitates a systematic approach for accurate diagnosis and treatment. [4] However, despite the broad histopathological variations in skin diseases, their clinical presentations are often limited to a few discernible changes, such as pigmentation abnormalities (hypo- or hyperpigmentation), macules, papules, nodules, vesicles, and ulcers. [5] This overlap in clinical manifestations makes histopathological examination a critical tool in diagnosing and classifying skin disorders.

There are eight specified locations, which are assigned Roman numerals I through VIII based on their location and pathological characteristics. Pattern I includes disorders primarily affecting the epidermis and stratum corneum, while Pattern II encompasses localized superficial epidermal or melanocytic proliferations. Pattern III consists of disorders involving the superficial cutaneous reactive unit, whereas Pattern IV includes acantholytic, vesicular, and pustular disorders. Pattern V comprises conditions characterized by perivascular, diffuse, and granulomatous infiltrates of the reticular dermis. Tumors and cysts of the dermis and subcutis are classified under Pattern VI, while inflammatory and other benign disorders of skin appendages fall under Pattern VII. Lastly, Pattern VIII includes disorders primarily affecting the subcutis. This classification system provides a structured approach to understanding the diverse spectrum of skin pathologies.

Histopathological pattern analysis is a valuable diagnostic method in

dermatopathology. The skin exhibits limited reaction patterns in response to various pathological stimuli. [6] Recognizing these patterns under microscopic examination can significantly aid in reaching a definitive diagnosis. For many dermatological conditions, a thorough clinical history combined with histopathological evaluation of skin biopsies provides a more accurate diagnosis than clinical assessment alone. [7] This is particularly true for non-specific dermatitis and inflammatory dermatoses, where clinical features often fail to provide a conclusive diagnosis.

The present observational study aims to analyze and classify non-neoplastic and non-infective skin lesions based on their histopathological patterns. It also seeks to establish correlations between clinical and histopathological diagnoses, enhancing diagnostic accuracy of dermatological disorders. Furthermore, this study determines the relative frequency of various skin lesions concerning demographic variables such as age and sex distribution. By systematically evaluating skin biopsy samples, this research will contribute to a better understanding of the spectrum of dermatopathological conditions and support clinicians in making more informed therapeutic decisions.

MATERIALS AND METHODS

The present hospital-based prospective observational study was conducted at a tertiary care center from December 2019 to March 2022 after obtaining approval from the Institutional Ethical Committee. Informed consent was taken from all participants before their inclusion. The study enrolled all patients attending the Dermatology outpatient department (OPD) who underwent a skin biopsy for non-infectious dermatological conditions, presenting with clinical features such as macules, papules, patches, plaques, nodules, bullae, scales, erosions, ulcers, or lichenification. Infective and neoplastic skin conditions, as well as Pattern VI lesions, were excluded. The sample size was estimated based on the prevalence of non-infectious papulosquamous skin lesions (48%) with an allowable error of 9.6%, yielding a minimum required sample of 110 cases. All eligible patients during the study period were registered, ensuring an adequate sample representation.

Clinical data were collected by a dermatologist, including lesion

characteristics such as size, color, and distribution. Following the clinical assessment, a lesional punch or excisional biopsy was performed using an appropriate biopsy technique based on lesion morphology, anatomical location, and patient-specific considerations. The biopsy specimen was immediately placed in 10% formalin for fixation and transported to the pathology department. Gross examination included documentation of tissue size, epidermal integrity, color, hair presence, and surface alterations. The specimens were processed using standard histopathological techniques, embedded in paraffin, sectioned, and stained with hematoxylin and eosin for microscopic evaluation. Additional special stains were performed when required for further characterization.

Statistical analysis was performed using SPSS software. Descriptive statistics were used to summarize clinical and histopathological findings. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. The association between clinical and histopathological diagnoses was evaluated using the chi-square or Fisher's exact test. A p-value of <0.05 was considered statistically significant. The study aimed to establish correlations between dermatological clinical features and histopathological findings, providing valuable insights into the diagnostic utility of skin biopsies in non-infectious dermatological conditions.

RESULTS

A total of 110 cases were analyzed, with an almost equal distribution of male (50.9%) and female (49.1%) patients. The majority of cases (36.4%) were in the 31-40 years age group, followed by those aged >60 years (17.3%). The lowest proportion of cases (1.8%) was observed in the <10 years age group (Table 1).

Table 1: Demographic Distribution Of Cases

Characteristic	Frequency (n)	Percentage (%)
Age in Years		
<10	2	1.8
11-20	5	4.5
21-30	15	13.6
31-40	40	36.4
41-50	18	16.4
51-60	11	10.0
>60	19	17.3
Gender		
Male	56	50.9
Female	54	49.1

Psoriasis was the most common clinical presentation, accounting for 26.4% of cases, followed by Pemphigus Vulgaris (11.8%) and Bullous Pemphigoid (9.1%). Other less common presentations included erythematous papules, hyperpigmented patches, and annular lesions (Table 2).

Table 2: Distribution Of Cases According To Clinical Presentation And Diagnosis

Clinical Presentation & Diagnosis	Frequency (n)	Percentage (%)
Erythematous scaly lesion (Psoriasis)	29	26.4
Fluid-filled vesicles and crusted erosions (Pemphigus Vulgaris)	13	11.8
Tense blisters with itching (Bullous Pemphigoid)	10	9.1
Hyperpigmented scaly lesion (Lichen Planus)	10	9.1
Erythematous papule with scaling	6	5.5
Hyperpigmented to violaceous patches	6	5.5
Redness, scaling, and itching	5	4.5
Hyperpigmented patches	4	3.6
Annular hyperpigmented well-circumscribed patch	3	2.7
Multiple red papules, plaque, and scaly lesions	3	2.7

The most common histopathological diagnosis was psoriasis (23.6%), followed by Pemphigus Vulgaris (10.9%) and Lichen Planus (9.1%). A comparison between clinical and histopathological diagnoses revealed an overall concordance of 86.4% (Table 7). Among specific conditions, the highest concordance was observed for psoriasis and bullous pemphigoid, while conditions such as Pemphigus Foliaceus and chronic dermatitis showed some discrepancies between clinical

and histopathological findings (Table 3).

Table 3: Clinical And Histopathological Correlation

Diagnosis	Clinical		Histopathological	
	Frequency	Percentage	Frequency	Percentage
Psoriasis	27	24.5	26	23.6
Pemphigus Vulgaris	13	11.8	12	10.9
Lichen Planus	10	9.1	10	9.1
Bullous Pemphigoid	10	9.1	10	9.1
Pemphigus Foliaceus	3	2.7	4	3.6
Morphea	3	2.7	3	2.7
Pityriasis lichenoides Chronica	2	1.8	-	-
Small Vessel Vasculitis	1	0.9	-	-
Chronic Dermatitis	-	-	4	3.6
Pityriasis Rubra Pilaris	-	-	3	2.7
Contact Dermatitis	-	-	3	2.7

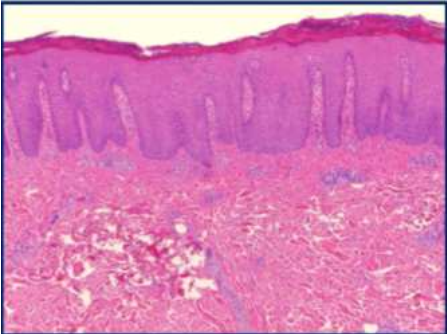


Figure 1: Photomicrograph of Psoriasis vulgaris showing regular acanthosis, parakeratosis, and elongation of rete ridges with upper dermal chronic inflammatory cells comprising mostly lymphocytes. (H&E;10X)

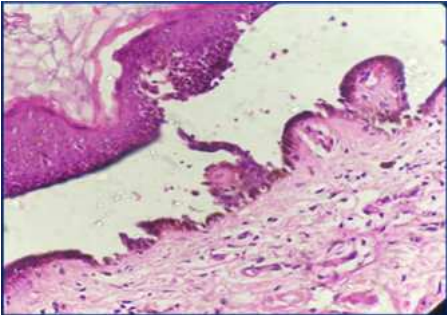


Figure 2: Photomicrograph of Pemphigus Vulgaris showing suprabasal blister, acantholytic cells, and tomb-stone appearance (H & E, 40X)

Histopathological Pattern III was the most frequently observed (62.7%), followed by Pattern IV (27.3%) and Pattern V (6.4%). The correlation between clinical and histopathological diagnoses was highest for Patterns I, II, VII, and VIII (100% correlation), while Pattern V showed a lower correlation (71.4%) (Table 4).

Table 4: Correlation of Clinical and Histopathological Diagnosis by Pattern

Pattern	Clinical Diagnosis	Histopathological Diagnosis	Percentage of Correlation
I	1	1	100
II	1	1	100
III	70	60	85.7
IV	29	26	89.7
V	7	5	71.4
VII	1	1	100
VIII	1	1	100

DISCUSSION

Accurately diagnosing skin lesions is crucial for appropriate treatment and prognostic assessment. Since many skin lesions present with similar clinical features, histopathological evaluation remains the gold

standard for diagnosis. This study was conducted to classify non-neoplastic and non-infective skin lesions based on histopathological patterns and correlate them with clinical findings while analyzing their distribution concerning age and sex. Among the 110 patients included, biopsy specimens were evaluated histopathologically to determine the relative frequencies of various skin lesions.

The present study observed that the most commonly affected age group was 31-40 years, which aligns with findings from similar studies, including those by Sonal Agrawal et al. [8], Bhargavi Mohan et al. [9], and Ram Chandra Adhikari et al. [10]. Conversely, the least affected age group was 0-10 years. The male-to-female ratio in the study was 1.04:1, indicating a slight male preponderance, consistent with studies conducted by Sushil Chichani et al. [11] and Bhargavi Mohan et al. [9]. However, Chowdari et al. [12] reported a female predominance in their study, highlighting the variability in sex distribution across different populations.

Regarding histopathological diagnosis, psoriasis was the most frequently observed lesion in Pattern III, accounting for 37.7% of cases, comparable to the findings of Sonal Agrawal et al. [8] and Rohit Gupta et al. [13] though lower than the prevalence reported by Sushil Chichani et al. [11]. Conversely, lichen planus accounted for 14.5% of cases in Pattern III, ranking as the second most common lesion, with results aligning closely with those of Ram Chandra Adhikari et al. [10]. In Pattern IV, pemphigus vulgaris was the predominant lesion, constituting 40% of cases, which was similar to findings from Shekhawat Pratibha et al. [14] and Sarwat Fatma et al. [15], while bullous pemphigoid accounted for 33.3%, higher than reports from other studies.

The study also evaluated the concordance between clinical and histopathological diagnoses. In Pattern III, the concordance rate was 85.7%, aligning with studies by Preethi Dinesh et al. [16] and D Costa et al. [17] but significantly higher than that reported by Sonal Agrawal et al. [8]. In Pattern IV, a concordance rate of 89.7% was observed, comparable to Arundhati S et al. [18] and Krishnamurthi et al. [19]. In Pattern V, the concordance rate was 71.4%, similar to the results reported by Mahmud MM et al. [20]. These findings reinforce the essential role of histopathology in confirming clinical diagnoses and emphasize the need for histopathological evaluation in dermatological practice.

CONCLUSION

Histopathological examination remains the gold standard for diagnosing diverse skin diseases, complementing clinical assessment, and confirming diagnoses. This study highlights Pattern III lesions, particularly psoriasis and lichen planus, were the most common, followed by Pattern IV lesions, primarily pemphigus vulgaris and bullous pemphigoid. A slight male preponderance was noted, with most cases occurring in the third decade of life (31–40 years). The overall clinical-histopathological correlation was 86.4%, reinforcing the significance of histopathology in accurate diagnosis and effective management. Furthermore, this study underscores the challenge of overlapping clinical features and the necessity of a structured, pattern-based classification to minimize nonspecific diagnoses and optimize patient care.

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