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Profile of Skin Biopsy Patients Undergoing Histopathological Examination at Universitas Sebelas Maret Hospital, Surakarta, Indonesia, in 2024

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ABSTRACT

Background: The clinical presentation of various skin diseases often overlaps, necessitating ancillary examinations to establish an accurate diagnosis. Skin biopsy followed by histopathological evaluation remains the standard method to confirm a wide range of dermatological disorders. This study aims to describe the demographic, clinical, and histopathological profiles of skin biopsy patients as well as to evaluate clinicopathological concordance.

Subjects and Method: This retrospective descriptive study utilized secondary data from medical records of patients who underwent skin biopsy and histopathological examination between January and December 2024 at Universitas Sebelas Maret Hospital. Patients with complete medical records and available histopathological results were included, while those with incomplete data were excluded. Variables analyzed included demographic characteristics (age and sex), lesion site, clinical indications for biopsy, and histopathological diagnosis.

Results: A total of 29 patients underwent skin biopsy during the study period. The majority were male (51.72%) and within the 46–65-year age group (48.28%). The most common biopsy site was the upper extremities (41.38%). Histopathological findings showed that erythematosquamous and infectious disorders were the most frequent diagnoses (20.7% each). The least common diagnosis was vesiculobullous disease, with only one case (3.45%). The concordance rate between clinical and histopathological diagnoses was 93.1%.

Conclusion: Most skin biopsy patients were males aged 46–65 years, with lesions commonly located on the upper extremities. Erythematosquamous and infectious dermatoses were the predominant diagnostic categories. The high clinicopathological concordance (93.1%) emphasizes the reliability of histopathology in confirming dermatologic diagnoses.

Keywords: Skin biopsy, histopathology, skin infection

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BACKGROUND

The skin, as the largest organ of the human body, serves as a primary barrier protecting internal structures from environmental insults. Due to its constant exposure, the skin is susceptible to a wide range of diseases, including infectious, inflammatory, autoimmune, and neoplastic disorders. The clinical manifestations of skin diseases frequently overlap, complicating accurate diagnosis and management (Popadić and Brasanac, 2022; Dika et al., 2020).

Skin disorders represent a substantial and growing global health burden, affecting individuals of all ages and accounting for a considerable proportion of outpatient visits. Their distribution is shaped by environmental exposure, occupational factors, and population ageing. Cumulative ultraviolet (UV) radiation in particular contributes to the rising incidence of cutaneous malignancies worldwide (Apalla et al., 2017; Leiter et al., 2020; Sung et al., 2021). In tropical countries such as Indonesia, where year-round sun exposure coexists with a high prevalence of infectious and inflammatory dermatoses, the spectrum of skin disease encountered in clinical practice is especially broad (Wahyu et al., 2023; Hardianto et al., 2025).

Because many dermatoses share similar morphological features, clinical examination alone is frequently insufficient to reach a definitive diagnosis. Skin biopsy is therefore one of the most commonly requested dermatological investigations, indicated for lesions with atypical presentation, suspected malignancy, and chronic or treatment-resistant eruptions, as well as for conditions in which clinicopathological correlation is required (Elston et al., 2016; Alwahaibi and Alwahaibi, 2025). Appropriate selection of the biopsy method and sampling site is essential to obtain a representative specimen and to minimise diagnostic error (Ramsey and Rostami, 2025). Histopathological examination following skin biopsy remains the gold standard for confirming dermatologic diagnoses. It provides detailed morphological information that assists in distinguishing between conditions with similar clinical appearances (Singh et al., 2021; Kumar and Gupta, 2019). Proper biopsy technique and sample handling are crucial to obtaining representative specimens for accurate histopathological assessment (Lee et al., 2020).

Beyond establishing individual diagnoses, comparison of the provisional clinical impression with the final histopathological diagnosis, a relationship described as clinicopathological concordance provides an important measure of diagnostic accuracy and quality assurance in dermatology (Venugopal et al., 2020; Thrippleton et al., 2025). Reported concordance rates vary according to disease category, biopsy technique, and the completeness of the clinical information supplied to the pathologist, with discordance arising most often among chronic inflammatory dermatoses that share overlapping histological features (Sopijani et al., 2022; Talwar et al., 2023).

Several hospital-based studies have characterised the spectrum of biopsied skin lesions and their clinicopathological correlation. In India, Dawande et al. (2023) and Goswami et al. (2022) described the histopathological patterns of skin lesions in tertiary teaching hospitals, while Sharma et al. (2023) reported the distribution of primary cutaneous malignancies (Dawande et al., 2023; Sharma et al., 2023; Goswami et al., 2022). Within Indonesia, Asnar et al. (2022) documented the profile of skin biopsy patients at Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, and Hardianto et al. (2025) reported the characteristics of skin cancer patients in

Palembang (Hardianto et al., 2025; Asnar et al., 2022). Closer to the present setting, skin-related clinical research from Central Java has so far been largely procedural in focus, as illustrated by Rinaldi et al. (2017), who evaluated wound healing after split-thickness skin grafting at Dr. Moewardi Hospital, Surakarta (Rinaldi et al., 2017).

Such data help to clarify local disease patterns and to guide diagnostic and preventive strategies, yet comparable information from Central Java remains scarce. Despite its diagnostic value, data on the epidemiological characteristics and diagnostic concordance of skin biopsies are still limited, especially in Indonesia. This study aims to describe the demographic, clinical, and histopathological profiles of skin biopsy patients at Sebelas Maret University Hospital (RS UNS) during the period of January–December 2024, as well as to evaluate clinicopathological concordance.

SUBJECTS AND METHOD

1. Study Design

This study adopted a retrospective descriptive approach, drawing upon secondary data derived from medical records and histopathological documentation of patients who underwent skin biopsy between January and December 2024. The research was carried out collaboratively by the Departments of Dermatology and Venereology and Anatomical Pathology at Sebelas Maret University Hospital, Surakarta. The retrospective nature of the design enabled a comprehensive assessment of pre-existing clinical and pathological information to outline the profile and clinicopathological relationship of patients presenting with diverse dermatologic lesions during the study period.

2. Population and Sample

The target population comprised all individuals who underwent skin biopsy at Universitas Sebelas Maret Hospital between January and December 2024. A total sampling technique was applied, in which every eligible case during the study period was included, yielding a final sample of 29 patients.

3. Inclusion and Exclusion Criteria

The inclusion criteria were patients who underwent skin biopsy and had complete, accessible clinical records together with confirmed histopathological results. Cases with incomplete or inaccessible clinical or pathological data were excluded to preserve the validity and consistency of the findings. After these criteria were applied, 29 patients remained eligible for inclusion in the study cohort.

4. Study Variables

Variables examined encompassed demographic factors (age and gender), anatomical distribution of lesions (biopsy sites), preliminary clinical diagnosis, definitive histopathological findings, and the degree of agreement between clinical and pathological results. These variables were chosen to provide insight into diagnostic trends and the accuracy of skin biopsy interpretations in a hospital-based dermatology practice.

Data were gathered by systematically reviewing patient charts from the Dermatology and Venereology Department and corresponding biopsy reports from the Anatomical Pathology Department. Relevant information was extracted, coded, and compiled into a structured dataset to ensure data integrity and confidentiality.

5. Operational Definition of Variables

Age was recorded in completed years and grouped into the categories 0–5, 6–11, 12–25, 26–45, and 46–65 years, while sex was

classified as male or female. Biopsy site referred to the anatomical region from which the specimen was obtained, categorised as face, trunk, abdomen, upper extremity, or lower extremity. Clinical diagnosis was defined as the provisional diagnosis recorded by the dermatologist before biopsy, whereas histopathological diagnosis referred to the definitive diagnosis established by the anatomical pathologist on microscopic examination. Clinicopathological concordance was defined as agreement between the clinical and histopathological diagnoses: a case was classified as concordant when the two diagnoses matched and as discordant when they differed.

6. Data Analysis

Descriptive statistics were applied for data interpretation. The outcomes were summarized in terms of frequency distributions and percentages, reflecting demographic profiles, lesion locations, types of clinical and histopathologic diagnoses, and clinicopathological concordance. Inferential analyses were not performed, as the purpose of the study was to provide an overview of observed characteristics rather than to explore statistical associations or causal relationships.

7. Research Ethics

Ethical clearance for this investigation was granted by the Ethics Committee of Sebelas Maret University Hospital, Surakarta (No. 091/UN27.46TA.04.19/KEP/EC/2025). All research procedures adhered to the ethical standards of the Declaration of Helsinki, ensuring strict protection of patient privacy throughout data handling and analysis.

RESULTS

The data collection of skin biopsy patients who underwent histopathological examination at Universitas Sebelas Maret Hospital between January and December 2025 showed a total of 29 cases that met the inclusion criteria. Most of the patients were male, accounting for 15 cases (51.72%), while 14 were female (48.28%). The majority of patients were within the age range of 46–65 years (48.28%), followed by the 12–25 years group (34.48%) and the 26–45 years group (17.24%). No cases were found in the 0–5 years or 5–11 years age groups.

The most common biopsy site was the upper extremities (41.38%), followed by the face (24.14%), lower extremities (20.68%), and the trunk and abdomen (each 6.9%), as seen in Table 1.

Table 1. Demographic Distribution of Skin Biopsy Patients (January–December 2025) at Universitas Sebelas Maret Hospital, Surakarta

Demographic Variable	Number of Cases	Percentage (%)
Sex		
Male	15	51.72
Female	14	48.28
Age Group (years)		
0–5	0	0.00
6–11	0	0.00
12–25	10	34.48
26–45	5	17.24
46–65	14	48.28
Biopsy Site		
Face	7	24.14

Demographic Variable	Number of Cases	Percentage (%)
Abdomen	2	6.90
Trunk	2	6.90
Upper extremity	12	41.38
Lower extremity	6	20.68
Total	**29**	**100.00**

Based on clinical diagnosis from medical records, cases of erythronpapulo-squamous diseases and bacterial infections were the most common, each accounting for 20.7%. The erythronpapulosquamous group included psoriasis vulgaris (10.35%), psoriasis guttata, psoriasiform dermatitis, and generalized pustular psoriasis (each 3.45%), while the infection group consisted of bacterial infections (10.35%), fungal infections (6.9%), and parasitic infections (3.45%).

Skin tumors were found in four cases (13.8%), including basal cell carcinoma (6.9%), squamous cell carcinoma (3.45%), and neurofibroma (3.45%). The eczematous dermatitis group accounted for 17.25% of patients, consisting of intertriginous dermatitis, allergic contact dermatitis, irritant contact dermatitis, nummular dermatitis, and neurodermatitis (each 3.45%).

Pigmentation disorders were found in two cases (6.9%), including erythema dyschromicum perstans and post-inflammatory hypopigmentation (each 3.45%). The vesiculobullous group included a single case (3.45%) of bullous pemphigoid. Other conditions included fixed drug eruption, insect bite, papular urticaria, and pyoderma gangrenosum (each 3.45%), as shown in Table 2.

Table 2. Clinical Diagnosis of Patients Based on Medical Records (January–December 2025)

Diagnosis Group	Specific Diagnosis	Number of Cases	Percentage (%)
Eczematous Dermatitis	Intertriginous dermatitis	1	3.45
	Allergic contact dermatitis	1	3.45
	Irritant contact dermatitis	1	3.45
	Nummular dermatitis	1	3.45
	Neurodermatitis	1	3.45
Erythropapulosquamous Disorders	Psoriasis vulgaris	3	10.35
	Psoriasis guttata	1	3.45
	Psoriasiform dermatitis	1	3.45
	Generalized pustular psoriasis	1	3.45
Infections	Bacterial infection	3	10.35
	Fungal infection	2	6.90
	Parasitic infection	1	3.45
Pigmentary Disorders	Erythema dyschromicum perstans	1	3.45
	Post-inflammatory hypopigmentation	1	3.45
Neoplasms	Basal cell carcinoma	2	6.90
	Squamous cell carcinoma	1	3.45

Diagnosis Group	Specific Diagnosis	Number of Cases	Percentage (%)
	Neurofibroma	1	3.45
Vesiculobullous Disorders	Bullous pemphigoid	1	3.45
Others	Fixed drug eruption	1	3.45
	Insect bite reaction	1	3.45
	Papular urticaria	1	3.45
	Pyoderma gangrenosum	2	6.90
Total		**29**	**100.00**

According to histopathological examination, the most frequent histopathological diagnoses were erythropapulosquamous and infectious diseases (each 20.7%). Within the erythropapulosquamous group, psoriasis vulgaris was the most common (10.35%), followed by psoriasis guttata, psoriasiform dermatitis, and generalized pustular psoriasis (each 3.45%).

Among infectious diseases, bacterial infections were most prevalent (13.79%), followed by fungal infections (6.9%). Eczematous dermatitis was diagnosed in 17.25% of cases, consisting of intertriginous dermatitis, allergic contact dermatitis, irritant contact dermatitis, nummular dermatitis, and neurodermatitis (each 3.45%). Neoplastic lesions were found in 17.24% of patients, including basal cell carcinoma (6.9%), squamous cell carcinoma, neurofibroma, and sebaceous nevus (each 3.45%). The vesiculobullous group (3.45%) and other conditions, such as insect bite (3.45%), papular urticaria (3.45%), and pyoderma gangrenosum (6.9%), were also identified, as presented in Table 3.

Table 3. Histopathological Diagnosis of Skin Biopsy Patients (January–December 2025)

Diagnosis Group	Specific Diagnosis	Number of Cases	Percentage (%)
Eczematous Dermatitis	Intertriginous dermatitis	1	3.45
	Allergic contact dermatitis	1	3.45
	Irritant contact dermatitis	1	3.45
	Nummular dermatitis	1	3.45
	Neurodermatitis	1	3.45
Erythropapulosquamous Disorders	Psoriasis vulgaris	3	10.35
	Psoriasis guttata	1	3.45
	Psoriasiform dermatitis	1	3.45
	Generalized pustular psoriasis	1	3.45
Infections	Bacterial infection	4	13.79
	Fungal infection	2	6.90
Pigmentary Disorders	Erythema dyschromicum perstans	1	3.45
	Post-inflammatory hypopigmentation	1	3.45

Diagnosis Group	Specific Diagnosis	Number of Cases	Percentage (%)
Neoplasms	Basal cell carcinoma	2	6.90
	Squamous cell carcinoma	1	3.45
	Neurofibroma	1	3.45
	Nevus sebaceous	1	3.45
Vesiculobullous Disorders	Bullous pemphigoid	1	3.45
Others	Insect bite reaction	1	3.45
	Papular urticaria	1	3.45
	Pyoderma gangrenosum	2	6.90
Total		**29**	**100.00**

This study demonstrated that 27 out of 29 cases (93.10%) showed concordance between clinical and histopathological diagnoses, while only two cases (6.9%) were discordant, as seen in Table 4.

Table 4. Correlation Between Clinical and Histopathological Diagnoses

Correlation Status	Number of Cases	Percentage (%)
Concordant	27	93.10
Discordant	2	6.90
Total	**29**	**100.00**

DISCUSSION

Skin biopsy is a frequently utilized diagnostic tool to identify or verify dermatological conditions. The main objective of this procedure is to determine the nature of a skin lesion or eruption and to facilitate histopathological analysis of tissue specimens. Because it carries a very low complication risk, biopsy can be safely and routinely conducted for both inpatient and outpatient cases. Although the technical aspect of the procedure is straightforward, proper selection of both the biopsy method and sampling site is essential to ensure that representative tissue is obtained (Elston et al., 2016; Alwahaibi & Alwahaibi, 2025).

Generally, biopsy types are divided into *incisional* where only part of the lesion is sampled and *excisional*, in which the entire visible lesion is removed. Incisional approaches include shave, punch, curettage, or scissor biopsy, whereas excisional ones are typically performed using full-thickness or oblique scalpel excision (Ramsey & Rostami, 2025).

In the current study, patients who underwent histopathological evaluation of skin biopsies at Universitas Sebelas Maret Hospital during January–December 2024 were mostly males aged 46–65 years. Similar demographic patterns were noted by Dawande et al. (2023) at Datta Meghe Medical College, Nagpur, where 78% of 50 biopsy patients were male. Correspondingly, Goswami et al. (2022) observed that the majority of 610 biopsy cases involved elderly male patients over 60 years.

Advanced age serves as a significant risk factor for multiple dermatologic disorders particularly non-melanoma skin cancers—owing to cumulative exposure to ultraviolet (UV) light, senescent cellular changes, and diminished skin immune responses (Apalla et al., 2017; Adelman &

Weber, 2024). Male predominance is linked to greater outdoor exposure, lower sunscreen use, and hormonal influences affecting the skin's UV sensitivity (Leiter et al., 2020; Sung et al., 2021).

The histopathological spectrum in this study revealed that neoplastic lesions, especially basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), were most frequently diagnosed. This corresponds with Sharma et al. (2023), who identified SCC as the leading malignancy (148 cases), followed by BCC (70 cases) and malignant melanoma (12 cases) among 230 skin cancer specimens. SCC remains the predominant cutaneous malignancy worldwide (Que et al., 2018; Sendin-Martin et al., 2025), commonly arising from prolonged UV exposure, genetic predisposition, or immunosuppression (Wahyu et al., 2023). In Southeast Asia, Alnami et al. (2021) also noted SCC predominance among outdoor workers, while BCC tended to occur in lighter-skinned individuals with intermittent UV exposure.

In this cohort, the face and extremities were the most common sites of biopsy-proven lesions, aligning with their frequent sunlight exposure. This finding reinforces the established role of cumulative UV radiation in the pathogenesis of skin cancer, particularly SCC (Abdulmajid et al., 2021; Westphalen et al., 2022). The distribution pattern observed supports the strong environmental contribution especially sun exposure to skin malignancy development (Ren et al., 2020; Watson et al., 2024). Watson et al. (2024) further documented in Australia that 65–90% of melanoma cases are attributable to UV radiation, occupational exposure, elevated temperatures, and air pollutants.

Additionally, this study identified several chronic inflammatory dermatoses, including dermatitis, psoriasis, and vesiculobullous disorders such as bullous pemphigoid. Chronic dermatitis often necessitates biopsy because of its broad clinical spectrum and similarity to other inflammatory skin diseases (Skayem et al., 2025). Psoriasis, as a globally prevalent chronic inflammatory disease, requires histopathologic differentiation from chronic eczema and lichen planus (Gerdes et al., 2022; Karakioulaki et al., 2024). Bullous pemphigoid, an autoimmune blistering disease predominantly affecting the elderly, can be clinically indistinguishable from other vesiculobullous conditions; hence, histology and direct immunofluorescence are crucial for precise diagnosis (Heymann, 2021; Tomasini et al., 2023).

The infectious skin lesions identified emphasize the diagnostic value of biopsy in confirming infection etiology. Infectious diseases of fungal, bacterial, or parasitic origin may simulate inflammatory or neoplastic processes; thus, histopathological examination plays a key role in establishing a definitive diagnosis (Maronese et al., 2022; Maverakis et al., 2020). Supporting this, Ronchi et al. (2021) in Italy found that biopsies substantially aided the differential diagnosis of chronic infections refractory to empirical therapy.

Overall, findings from this study illustrate that neoplastic conditions were the dominant histopathological category among biopsy samples in this Indonesian teaching hospital. This aligns with observations from Dr. Mohammad Hoesin General Hospital, Palembang (2019–2021), where BCC was the most frequent neoplasm (Hardianto et al., 2025).

The diversity of biopsy results underscores the vital role of histopathology laboratories in teaching hospitals for enhancing diagnostic precision and supporting evidence-based dermatologic care (Shi et al., 2022; Xue et al., 2022).

Furthermore, the findings carry preventive implications public education on sun safety, sunscreen usage, and early detection of cutaneous malignancies should be prioritized, particularly for elderly males (Ozcan et al., 2022; Kani et al., 2024). Combining clinical and histopathological evaluation in chronic inflammatory and autoimmune skin diseases may reduce misdiagnosis and improve therapeutic outcomes (Thrippleton et al., 2025; Bagchee-Clark et al., 2025).

This investigation not only provides an epidemiological profile of biopsy cases at UNS Hospital but also highlights the continuing importance of histopathology in contemporary dermatologic practice. The data contribute to understanding disease trends in Indonesia and may inform future research exploring etiologic factors, clinical outcomes, and preventive strategies (Klein et al., 2021; Cucka et al., 2022).

The study recorded a 93.1% concordance rate between clinical and histopathological diagnoses, with only 6.9% discrepancies. This suggests high clinical diagnostic accuracy, although discordance may arise from various causes. Venugopal et al. (2020) reported comparable discordance rates (5–15%) depending on disease type and biopsy technique.

Overlapping histologic appearances among chronic inflammatory dermatoses such as psoriasis, eczema, and lichen planus may cause misclassification, especially when clinical details are incomplete (Talwar et al., 2023). Diagnostic precision is also influenced by biopsy site selection—samples taken from necrotic or secondary inflammatory zones may not represent the primary pathology (Bagchee-Clark et al., 2025). Clark et al. (2025) emphasized that sampling errors are a major contributor to clinicopathological discordance. In addition, histologic features evolve with disease stage; for example, early psoriasis can resemble eczema, leading to misinterpretation.

Prior treatments, including topical corticosteroids or antibiotics, may further mask key histologic changes and affect diagnostic outcomes (Sopijani et al., 2022). Several limitations should be noted. The retrospective nature of this research depends heavily on the completeness of medical records, and its single-center design at Universitas Sebelas Maret Hospital, Surakarta, may restrict generalizability.

Most skin biopsy patients at Sebelas Maret University Hospital in 2024 were males aged 46–65 years, with lesions predominantly located on the upper extremities. The most frequent diagnoses were erythematosquamous and infectious disorders. The high clinicopathological concordance (93.1%) underscores the critical role of histopathological examination in confirming dermatologic diagnoses and enhancing diagnostic accuracy.

AUTHOR'S CONTRIBUTION

RP and AM contributed to the conceptualisation and design of the study. RP and HFY carried out the collection of clinical and medical-record data. AM performed and reviewed the histopathological examinations and provided the pathological data. RP and HFY performed the data analysis and interpretation and drafted the manuscript. AM and AM critically revised the manuscript for important intellectual content. All authors read and approved the final version of the manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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