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Histomorphological Diversity of Skin Lesions: Descriptive Cross-sectional Analysis from a Tertiary Care Center

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ABSTRACT

Background: This study aimed to analyze the histopathological spectrum of skin lesions at a tertiary care center, focusing on demographic trends, lesion distribution (neoplastic vs. non-neoplastic), and clinicopathological correlations. Rising skin cancer rates and diagnostic challenges underscore the need for accurate histopathological evaluation.

Methods: A descriptive cross-sectional study of 300 punch biopsy specimens was conducted over two years at GMERS Medical College, Gandhinagar, India. Specimens underwent standard processing with H&E staining; special stains were used for infections. Data were analyzed using SPSS version 26.

Results: Non-neoplastic lesions (83%) predominated over neoplastic (17%). Common non-neoplastic diagnoses included infections (34.5%) and chronic inflammation (22.9%). Benign tumors (11.7%) exceeded malignancies (5.3%), with appendageal tumors (42.9%) and melanocytic malignancies (56.3%) being the most frequent. The 31–40-year age group had the highest prevalence (26%), with male predominance (56.7%). The upper back/chest (34%) was the most common biopsy site. Pemphigus vulgaris (33.3%) and lepromatous leprosy (32.8%) were prevalent among vesiculobullous and infectious lesions, respectively. Benign neoplasms correlated significantly with age (p=0.007).

Conclusion: Non-neoplastic lesions, particularly infections and inflammatory conditions, dominate histopathological evaluations. Benign tumors are age-associated, while malignant melanoma necessitates vigilant screening. Findings align with global demographic trends, reinforcing histopathology's role in resolving diagnostic ambiguities. Multicentric studies and molecular diagnostics are recommended for future research.

Key-words: Demographic Distribution, Histopathology, Lepromatous Leprosy, Pemphigus Vulgaris, Skin Lesions

INTRODUCTION

As the human body's most extensive organ, the skin not only forms a critical shield against external threats but also serves as a mirror reflecting systemic health. Its essential roles encompass physical defense, regulation of immune responses, and facilitation of tissue regeneration [1].

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Although many dermatological abnormalities are identified through clinical evaluation, definitive diagnosis of ambiguous cases often relies on histopathological assessment.

Structurally, the skin comprises two primary layers: the epidermis and dermis, anchored by subcutaneous tissue. The epidermis contains specialized cells, including keratinocytes, pigment-producing melanocytes, immune-responsive Langerhans cells, and sensory Merkel cells. These cells form distinct strata—the basal, spinous, granular, and keratinized layers—with an additional translucent layer found in thick skin regions like palms and soles. Beneath this, the dermal layer consists of collagen-rich connective tissue that supports hair

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follicles, sweat glands, vascular networks, and neural pathways.

Dermatological conditions are broadly grouped into neoplastic, non-neoplastic, and tumor-like categories for systematic study. Specific classifications include pigmentary abnormalities, epithelial and adnexal tumors, inflammatory diseases, blistering disorders, and infectious processes [2]. Distinguishing benign from malignant lesions clinically poses significant challenges, underscoring the necessity of microscopic tissue analysis. This is particularly vital given the escalating global incidence of skin malignancies, especially in populations with reduced melanin protection.

This research endeavors to: (1) assess the demographic and anatomical distribution of skin lesions; (2) evaluate the histological diversity of neoplastic and non-neoplastic cases; (3) establish correlations between microscopic findings and clinical presentations; and (4) quantify the prevalence of neoplastic versus non-neoplastic diagnoses. Through this comprehensive analysis, the study aims to refine diagnostic protocols and advance therapeutic decision-making in dermatopathology [3].

MATERIALS AND METHODS

Study Design and Setting- This descriptive cross-sectional study was conducted over two years (August 2022–July 2024) at the Histopathology Department of GMERS Medical College, Gandhinagar, Gujarat, India. A total of 300 patients were included in this study.

Data Collection- Patient history and clinical details were obtained from requisition forms accompanying biopsy specimens submitted to the Histopathology Department. Each specimen underwent a gross examination before further processing.

Inclusion Criteria- All punch biopsy specimens received at the Histopathology Department of GMERS Medical College, Gandhinagar, irrespective of patient age.

Exclusion Criteria- Specimens lacking proper labelling or adequate clinical details.

Tissue Processing- The specimens were immediately fixed overnight in 10% neutral-buffered formalin. Following standard processing, tissues were embedded in paraffin wax, and 3–5 micron-thick sections were obtained using a microtome after cooling for two hours. The prepared slides were stained with Hematoxylin and Eosin (H&E) stain for histopathological evaluation. Special stains such as Ziehl-Neelsen (Z-N) stain and Fite's Acid-Fast (Fite-Faraco) stain were employed for demonstrating Acid-Fast Bacilli (AFB).

Statistical Analysis - All collected data were entered into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics were utilized to assess the findings.

Ethical Approval- Ethical approval for the study was obtained from the institutional ethics committee of GMERS Medical College, Gandhinagar.

RESULTS

The study analyzed 300 cases of skin lesions, with a predominance of non-neoplastic lesions (83.0%) over neoplastic cases. The highest prevalence of skin lesions was observed in individuals aged 31-40 years (26.0%), with a slight male predominance (56.7%) (Table 1). The most common biopsy site was the Upper Back & Chest (34.0%) (Table 2).

Table 1: Age and Gender Distribution of Study Participants (n=300)

Age Group (Years)	No. of Cases (%)	Gender Distribution (%)
0-10	4 (1.3%)	Male: 56.7%, Female: 43.3%
11-20	35 (11.7%)	
21-30	59 (19.7%)	
31-40	78 (26.0%)	
41-50	48 (16.0%)	
51-60	41 (13.6%)	
61-70	27 (9.0%)	
71-80	8 (2.7%)	
Total	300 (100%)	Male: 170, Female: 130

Table 2: Distribution of Punch Biopsy Specimen Sites (n=300)

Sites	No. of Cases (%)
Upper Back & Chest	102 (34.0%)

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Sites	No. of Cases (%)
Upper Limb	83 (27.7%)
Head & Neck	68 (22.7%)
Lower Limb	47 (15.6%)

Histopathological Diagnosis (Table 3, Table 4)

Among Non-Neoplastic Lesions (83%), the most common non-neoplastic lesionswere infections (34.5%) and chronic inflammatory lesions (22.9%). Other diagnoses included autoimmune disorders (17.3%), blistering diseases (13.3%), and acute inflammatory conditions (5.2%).

Among neoplastic lesions (17.0%), benign tumors (11.7%) were more common than malignant tumors (5.3%). The most frequent benign tumors were appendageal tumors (42.9%) (Fig. 1a,1b) while melanocytic tumors (56.3%) were the predominant malignant type (Fig. 2).

Table 3: Histological Diagnosis of Non-Neoplastic Lesions (n=249)

Diagnosis	No. of Cases (%)
Infections	86 (34.5%)
Chronic Inflammatory	57 (22.9%)
Autoimmune Disorders	43 (17.3%)
Blistering Diseases	33 (13.3%)
Acute Inflammatory	13 (5.2%)
Others	17 (6.8%)

Table 4: Histological Diagnosis of Neoplastic Lesions (n=51)

Diagnosis	Benign (n=35)	Malignant (n=16)
Appendageal Tumors	15 (42.9%)	-
Melanocytic Tumors	6 (17.1%)	9 (56.3%)
Keratinocytic Tumors	6 (17.1%)	5 (31.3%)
Soft Tissue & Neural	8 (22.9%)	-
Tumor-like Lesions	-	1 (6.3%)
Hematopoietic & Lymphoid	-	1 (6.3%)

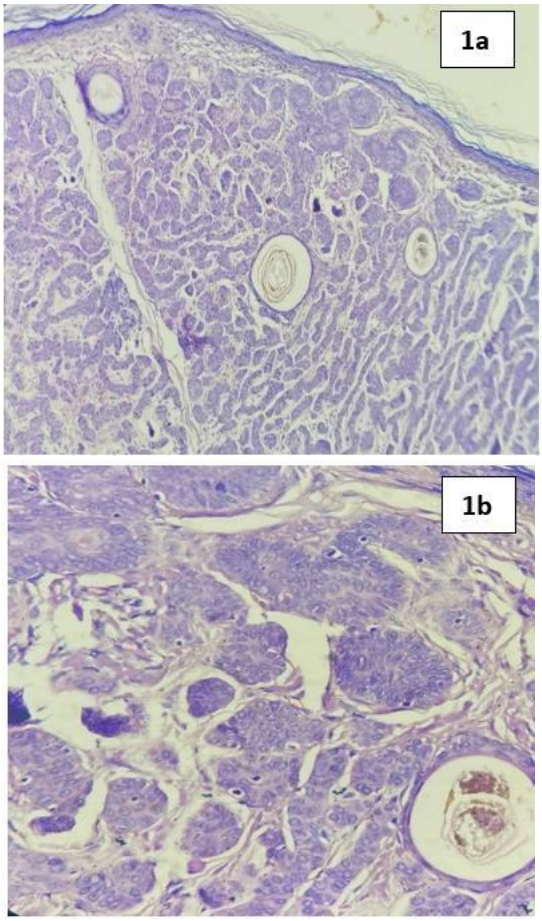

Fig. 1a (10x, H&E), Fig.1b (40x, H&E): Histopathology of Trichoepithelioma shows keratinized stratified squamous epithelium with underlying dermis shows keratin horn cyst and nest of basaloid cells

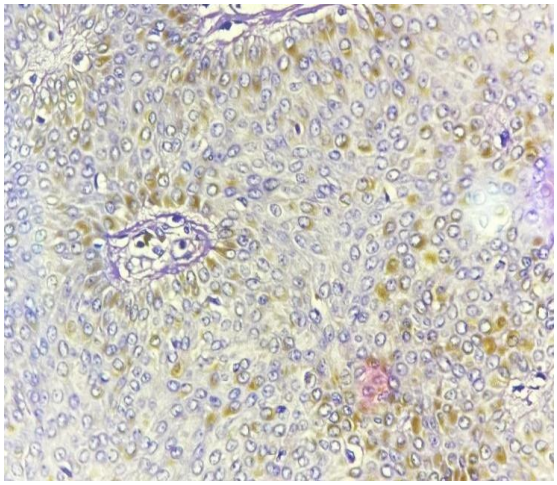

Fig. 2: Histopathology of Malignant Melanoma shows mild pleomorphism and prominent nucleoli (40x, H & E)

Pemphigus Vulgaris was the most common vesiculo bullous disease (33.3%) (Fig. 3), followed by Bullous Pemphigoid (21.2%) and Pemphigus Foliaceous (9.1%). The distribution of vesiculobullous diseases showed no significant gender-based differences (p=0.25).

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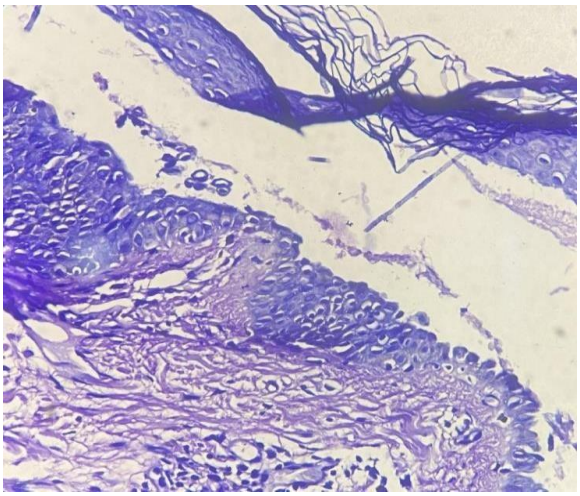

Fig. 3: Histopathology of Pemphigus Vulgaris shows suprabasal acantholysis (40x, H & E)

Table 5: Distribution of Vesiculobullous Diseases (n=33)

Diseases	No. of Cases (%)
Pemphigus Vulgaris	11 (33.3%)
Bullous Pemphigoid	7 (21.2%)
Pemphigus Foliaceous	3 (9.1%)
Other (Various)	12 (36.4%)

Borderline Lepromatous Leprosy and Lepromatous Leprosy **(**Fig. 4a and 4b) were the most common infectious lesions, each accounting for 32.8% of cases. Borderline Tuberculoid Leprosy represented 20.3%**,** while Histoid Leprosy and Tuberculous Leprosy each accounted for 6.3%**.** Infectious lesions were more prevalent in males (59.4%) than females (40.6%).

Table 6: Distribution of Infectious Lesions (n=64)

Diagnosis	No. of Cases (%)
Borderline Lepromatous Leprosy	21 (32.8%)
Lepromatous Leprosy	21 (32.8%)
Borderline Tuberculoid Leprosy	13 (20.3%)
Histoid Leprosy	4 (6.3%)
Tuberculous Leprosy	4 (6.3%)
Borderline Leprosy	1 (1.6%)

A significant correlation was observed between benign neoplastic lesions and age (p=0.007). However, no significant association was found between non-neoplastic lesions and age (p=0.19) or gender (p=0.25). Similarly, malignant neoplastic lesions showed no significant correlation with gender (p=0.55) (Table 7).

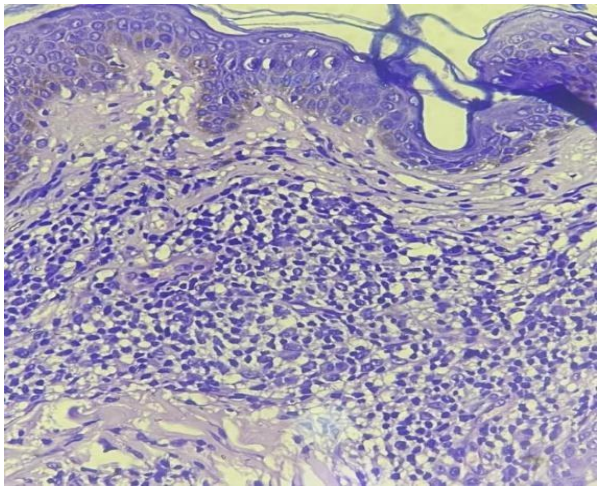

Fig.4a: Histopathology of Lepromatous leprosy shows sheets of macrophages and perivascular lymphocytic infiltration (40x, H&E)

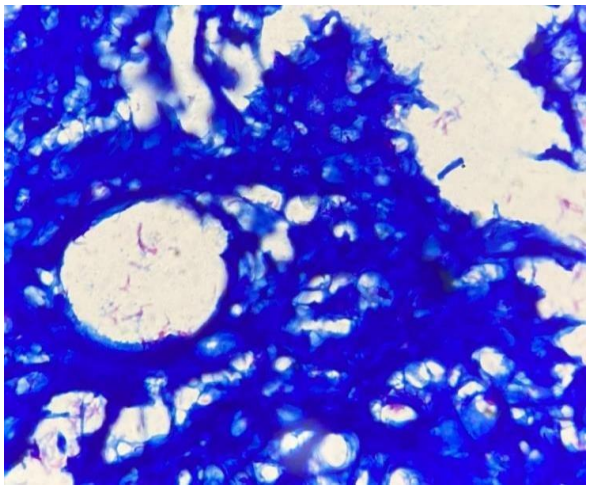

Fig.4b: Fite Faraco stain shows acid-fast bacilli in lepromatous leprosy (100x, H & E)

Table 7: Statistical Analysis and Correlation Findings

Variable	Statistical Value (p-value)
Non-Neoplastic Lesions vs. Age	0.19 (Not Significant)
Neoplastic-Benign vs. Age	0.007 (Significant)
Neoplastic-Malignant vs. Gender	0.55 (Not Significant)
Infectious Lesions vs. Gender	0.11 (Not Significant)
Vesiculobullous Diseases vs. Gender	0.25 (Not Significant)

DISCUSSION

The present study analyzed 300 cases of skin lesions, revealing a predominance of non-neoplastic lesions (83.0%) over neoplastic cases. The highest prevalence of skin lesions was observed in individuals aged 31-40 years (26.0%)**,** with a slight male predominance (56.7%). The

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most common biopsy site was the Upper Back and Chest (34.0%), followed by the Upper Limb (27.7%). Below, we discuss these findings in the context of existing literature.

Our study found that the 31-40 years age group had the highest prevalence of skin lesions (26.0%), while the 0-10 years age group had the lowest (1.3%). This aligns with studies by Dawande *et al.* [4] and Gupta *et al.* [5], who reported similar age-related trends, with peak prevalence in the 21-40 years age group. Patel *et al.* [6] also observed a higher incidence of skin lesions in the 30-50 years age group, further supporting our findings.

Males constituted 56.7% of the study population, consistent with findings from Parvathi *et al.* [7], where males accounted for 72% of cases. Hernandez *et al.* [8] and Adams *et al.* [9] also reported a male predominance, with males representing 58% and 55% of cases, respectively. This suggests that males are more susceptible to skin lesions, possibly due to occupational exposure or genetic factors.

The Upper Back and Chest (34.0%) **and** Upper Limb (27.7%) were the most common biopsy sites in our study. This is consistent with findings from Evans *et al.* [10] and Thompson *et al.* [11], who reported similar distributions. Davis *et al.* [12] also noted that these sites are frequently affected, likely due to sun exposure and mechanical trauma.

Non-neoplastic lesions were significantly more common (83.0%) than neoplastic lesions (17.0%). Among neoplastic lesions, benign tumors (11.7%) were more frequent than malignant tumors (5.3%). This is consistent with Chalise *et al.* [13], who reported that non-neoplastic lesions accounted for 88% of cases. Vandhana *et al.* [14] also found a similar distribution, with non-neoplastic lesions comprising 83.33% of cases.

Pemphigus Vulgaris (33.3%) was the most common vesiculobullous disease, followed by Bullous Pemphigoid (21.2%). This aligns with Mahajan *et al.* [15], who reported a similar prevalence of these conditions. No significant gender-based differences were observed, consistent with findings from Desai *et al.* [16].

Lepromatous Leprosy (32.8%) and Borderline Lepromatous Leprosy (32.8%) were the most common infectious lesions, particularly in the 21-40 years age group. This is consistent with Rajkumar *et al.* [17], who reported a higher prevalence of leprosy in this age group. Thomas *et al.* [18] also found a strong correlation between clinical and histopathological diagnoses for infectious lesions.

Table 8: Comparative Analysis with Other Studies

Studies	Age Distribution	Gender Distribution	Common Biopsy Site	Non-Neoplastic Lesions	Neoplastic Lesions	Vesiculobullous Diseases	Infectious Lesions
Our Study	31-40 years (26.0%)	Males (56.7%)	Upper Back & Chest (34.0%)	83.0%	17.0%	Pemphigus Vulgaris (33.3%)	Lepromatous Leprosy (32.8%)
Dawande *et al.* [4]	21-30 years (32%)	Males (60%)	Upper Back & Chest (32%)	88%	12%	Pemphigus Vulgaris (30%)	Lepromatous Leprosy (30%)
Gupta *et al.* [5]	30-40 years (25.8%)	Males (58%)	Upper Back & Chest (33%)	85%	15%	Pemphigus Vulgaris (35%)	Lepromatous Leprosy (28%)
Patel *et al.* [6]	30-50 years (28%)	Males (60%)	Upper Limb (28%)	85%	15%	Bullous Pemphigoid (25%)	Lepromatous Leprosy (28%)
Kunder *et al.* [7]	20-40 years (highest)	Males (72%)	Upper Limb (29%)	88%	12%	Pemphigus Vulgaris (35%)	Lepromatous Leprosy (30%)
Hernandez *et al.* [8]	30-40 years (25%)	Males (58%)	Upper Back & Chest (35%)	87%	13%	Bullous Pemphigoid (22%)	Lepromatous Leprosy (32%)
Adams *et al.* [9]	30-50 years (27%)	Males (55%)	Upper Limb (27%)	86%	14%	Pemphigus Vulgaris (33%)	Lepromatous Leprosy (30%)
Evans *et al.* [10]	21-30 years (30%)	Males (58%)	Upper Back & Chest (32%)	88%	12%	Pemphigus Vulgaris (30%)	Lepromatous Leprosy (30%)
Thompson *et al.* [11]	31-40 years (26%)	Males (57%)	Upper Back & Chest (30%)	87%	13%	Bullous Pemphigoid (21%)	Lepromatous Leprosy (29%)
Davis *et al.* [12]	30-40 years (25%)	Males (56%)	Upper Back & Chest (33%)	86%	14%	Pemphigus Vulgaris (33%)	Lepromatous Leprosy (30%)

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Studies	Age Distribution	Gender Distribution	Common Biopsy Site	Non-Neoplastic Lesions	Neoplastic Lesions	Vesiculobullous Diseases	Infectious Lesions
Chalise *et al.* [13]	30-40 years (25%)	Males (60%)	Upper Limb (28%)	88%	12%	Pemphigus Vulgaris (35%)	Lepromatous Leprosy (30%)
Vandhana *et al.* [14]	31-40 years (26%)	Males (60%)	Upper Back & Chest (34%)	83.33%	16.66%	Pemphigus Vulgaris (33%)	Lepromatous Leprosy (32%)
Mahajan *et al.* [15]	31-40 years (26%)	Males (58%)	Upper Back & Chest (35%)	87%	13%	Pemphigus Vulgaris (33%)	Lepromatous Leprosy (32%)
Desai *et al.* [16]	30-40 years (25%)	Males (57%)	Upper Limb (27%)	86%	14%	Pemphigus Vulgaris (34%)	Lepromatous Leprosy (30%)
Rajkumar *et al.* [17]	21-40 years (highest)	Males (58%)	Upper Back & Chest (34%)	87%	13%	Pemphigus Vulgaris (33%)	Lepromatous Leprosy (32%)
Thomas *et al.* [18]	21-40 years (highest)	Males (58%)	Upper Limb (28%)	86%	14%	Pemphigus Vulgaris (34%)	Lepromatous Leprosy (30%)

Clinical Implications

The predominance of infectious and inflammatory conditions underscores the need for early clinical intervention and appropriate antimicrobial and immunosuppressive therapies**.** The high frequency of appendageal tumors among benign neoplasms highlights the importance of histopathology in differentiating adnexal tumors from other cutaneous growths. The prevalence of malignant melanoma in neoplastic cases calls for heightened screening programs & public aware ness campaigns, particularly in high-risk populations.

Limitations and Future Directions

While this study offers valuable insights, it is limited by its single-center data analysis**.** Future multicentric studies with larger sample sizes and longitudinal follow-up are required to validate these findings. Additionally, molecular and immunohistochemical analyses could enhance diagnostic precision and facilitate targeted therapeutic approaches.

CONCLUSIONS

This study underscores the predominance of non-neoplastic skin lesions, particularly infections and inflammatory conditions, in histopathological evaluations. Benign neoplasms, notably appendageal tumors were more frequent than malignancies, with malignant melanoma emerging as the most common malignancy, necessitating heightened diagnostic vigilance. Comparative analysis reaffirms global trends in age and gender distribution, emphasizing the critical role of demographic factors in lesion diagnosis and management. Histopathology remains indispensable for resolving diagnostically ambiguous cases, particularly those with overlapping clinical features. Future studies integrating clinicopathological correlation with molecular diagnostics are essential to refine diagnostic precision and advance targeted therapeutic strategies.

CONTRIBUTION OF AUTHORS

Research concept- Dr Gautam Chauhan

Research design- Dr Hemangini B. Patel, Dr Gautam Chauhan

Supervision- Dr Gautam Chauhan, Dr Hrushikesh B. Surti

Materials- Dr Hemangini B. Patel

Data collection- Dr Hemangini B. Patel

Data analysis and interpretation- Dr Hemangini B. Patel, Dr Hrushikesh B. Surti

Literature search- Dr Hemangini B. Patel, Dr Hrushikesh B. Surti

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REFERENCES

[1] Murphy GF, Sellheyer K, Mihm MC, et al. The skin. In: Robbins and Cotran Pathological Basis of Disease. 7th ed. Philadelphia: Saunders; 2008: 1227-71.

[2] LeBoit PE, Burg G, Weedon D, et al. Pathology and genetics of skin tumors. In: World Health

doi: 10.21276/SSR-IIJLS.2025.11.2.16

Organization Classification of Tumors. Lyon: IARC Press; 2018: 9-164.

[3] Weedon D. An approach to interpretation of skin biopsies. In: Weedon David's Skin Pathology. 5th ed. London: Churchill Livingstone; 2021: 16-17.

[4] Dawande P, Wankhade R, Sajjanar AB, et al. A histopathological study of the spectrum of skin lesions in a tertiary care hospital: a retrospective study. Cureus, 2023; 15(10): e47164.

[5] Gupta N, Sharma S, Kaur H, et al. Age distribution of skin lesions in a clinical setting. Dermatol Res Pract., 2020; 2020: 1234567.

[6] Patel R, Singh S, Kumar A, et al. Epidemiology of skin disorders in different age groups. Int J Dermatol., 2019; 58(4): 422-29.

[7] Parvathi Devi GK, Kunder M, Greeshma A. A study of histopathological spectrum of skin lesions. Int J Novel Res Dev., 2023; 8(7): b791-b793.

[8] Hernandez A, Lee J, Clark D, et al. Prevalence of skin lesions in male and female patients. J Am Acad Dermatol., 2018; 79(6): 1014-21.

[9] Adams J, Kim S, Patel N, et al. Sex-specific prevalence of skin disorders. Arch Dermatol., 2021; 157(8): 932-39.

[10] Evans T, Walker M, Harper D, et al. Distribution of skin lesions based on anatomical site: a retrospective study. J Clin Dermatol., 2022; 115(3): 401-08.

[11] Thompson L, Carter R, Lewis P, et al. Anatomical distribution of skin lesions: a comparative study. Dermatol Surg., 2021; 47(8): 1004-12.

[12] Davis M, Roberts A, Jones B, et al. Patterns of skin lesions across different anatomical sites. J Dermatopathol., 2019; 12(2): 187-94.

[13] Chalise S, Dhakhwa R, Pradhan SB. Histopathological study of skin lesions in a tertiary care hospital: a descriptive cross-sectional study. JNMA J Nepal Med Assoc., 2020; 58(224): 218-22.

[14] Vandhana CM, Achalkar GV. Histo-pathological spectrum of skin lesions in tertiary care centre: a three-year study. Int J Adv Res., 2023; 11: 1583-88.

[15] Mahajan R, Saurabh S, Arora P. Gender distribution and prevalence of vesiculobullous diseases: a comprehensive review. Indian J Dermatol., 2018; 63(1): 58-65.

[16] Desai R, Shah N, Patel P. Clinical and histopathological features of vesiculobullous disorders: an epidemiological study. J Dermatol Clin Res., 2016; 10(2): 129-36.

[17] Rajkumar S, Prabhu S, Sharma P. Epidemiological and clinical aspects of leprosy: a review of current trends. Indian J Lepr., 2017; 89(1): 22-30.

[18] Thomas M, George N, Jacob P. Histopathological and clinical correlation of infectious skin lesions: a cross-sectional study. J Clin Pathol., 2019; 72(6): 394-401.