Section: Pathology

Original Research Article

HISTOPATHOLOGICAL SPECTRUM OF CUTANEOUS LESIONS IN A TERTIARY CARE HOSPITAL- A 2 YEAR STUDY

Shresth Pareekh[1], Urmi Chakravarty Vartak[2], Shailesh Vartak[3], Anjali A. Mahajan[4]

[1]*Resident, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai -400022, India.*
[2]*Associate Professor, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai -400022, India.*
[3]*Associate Professor, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai-400022, India.*
[4]*Associate Professor, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai-400022, India.*

Received *: 01/01/2026*
Received in revised form *: 10/01/2026*
Accepted *: 17/02/2026*

Corresponding Author:
Dr. Urmi Chakravarty Vartak,
Associate professor, Department of Pathology, Lokmanya Tilak Municipal Medical College & General Hospital, Sion, Mumbai -400022, India.
Email: urmichakravarty@yahoo.co.in

DOI:10.70034/ijmedph.2026.1.402

Source of Support: Nil,
Conflict of Interest: Nonedeclared

Int J Med Pub Health
2026; 16 (1); 2321-2327

ABSTRACT

Background: Cutaneous lesions encompass a wide spectrum of non-neoplastic and neoplastic conditions with varied clinical presentations. Histopathological examination plays a pivotal role in establishing definitive diagnosis and guiding management. Understanding the distribution pattern of skin lesions in tertiary care settings provides valuable epidemiological insights. **Aim:** To study the histopathological spectrum of cutaneous lesions in a tertiary care hospital over a period of two years.

Materials and Methods: This descriptive observational study included 250 skin biopsy specimens received in the Department of Pathology over two years. Clinical details including age, sex, and anatomical site were recorded. Specimens were processed routinely and stained with Hematoxylin and Eosin. Data were analyzed using descriptive statistics, and appropriate tests of significance were applied.

Results: The mean age of patients was 42.8 ± 16.4 years. Males constituted 56.8% of cases. Non-neoplastic lesions accounted for 66% of cases, while neoplastic lesions comprised 34%. Among neoplastic lesions, benign tumors (24.8%) were more common than malignant tumors (9.2%). The majority of cases were observed in the 41–60 years age group. The head and neck region was the most commonly involved anatomical site (34.4%).

Conclusion: Non-neoplastic lesions formed the predominant category of skin biopsies, with benign neoplasms being more frequent than malignant tumors. Histopathological evaluation remains indispensable in the accurate diagnosis and classification of cutaneous lesions and aids in appropriate clinical management.

Keywords: Histopathology; Cutaneous lesions; Skin biopsy.

INTRODUCTION

The skin is the largest organ of the human body and serves as a complex protective interface between the internal milieu and the external environment. It plays a pivotal role in thermoregulation, sensory perception, immunological defense, metabolic functions, and barrier protection against physical, chemical, and microbial insults. Owing to its structural complexity—comprising the epidermis, dermis, adnexal structures, and subcutaneous tissue—the skin is susceptible to a wide spectrum of pathological conditions ranging from inflammatory and infectious disorders to benign and malignant neoplasms.[1]

Cutaneous lesions constitute a significant proportion of cases encountered in dermatology and pathology practice. Clinically, many skin lesions present with overlapping morphological features, making precise diagnosis challenging. Although clinical examination and dermoscopic evaluation provide preliminary insights, histopathological examination remains the gold standard for definitive diagnosis. Microscopic evaluation enables identification of architectural patterns, cellular morphology, degree of atypia, depth of invasion, and inflammatory characteristics, thereby facilitating accurate classification and management.[2,3]

The histopathological spectrum of skin lesions is broad and includes non-neoplastic lesions such as dermatitis, infections, autoimmune blistering diseases, pigmentary disorders, and granulomatous conditions, as well as neoplastic lesions categorized into benign and malignant tumours. Benign tumours include entities such as seborrheic keratosis, melanocytic nevi, and adnexal tumours, while malignant tumours include basal cell carcinoma, squamous cell carcinoma, malignant melanoma, and cutaneous lymphomas.[4] The relative frequency of these lesions varies depending on geographic location, environmental exposure, genetic predisposition, and healthcare accessibility.

In tropical countries like India, infectious and inflammatory dermatoses are common due to climatic conditions and socioeconomic factors. Simultaneously, the incidence of cutaneous malignancies is increasing due to prolonged ultraviolet exposure, aging population, and improved diagnostic awareness. Early detection and histopathological confirmation of malignant lesions are essential for appropriate therapeutic intervention and prognostication.[5]

Aim

To study the histopathological spectrum of cutaneous lesions in a tertiary care hospital over a period of two years.

Objectives

1. To categorize cutaneous lesions into non-neoplastic and neoplastic lesions based on histopathological examination.
2. To analyze the age and sex distribution of various skin lesions.
3. To study the anatomical site-wise distribution of cutaneous lesions.

MATERIALS AND METHODS

Source of Data

The data were obtained from skin biopsy specimens received in the Department of Pathology from the Dermatology and Surgery departments of the tertiary care teaching hospital. All skin biopsy specimens submitted for histopathological examination during the study period were included.

Study Design

The study was a descriptive, hospital-based observational study.

Study Location

The study was conducted in the Department of Pathology at a tertiary care teaching hospital affiliated with a recognized medical university.

Study Duration

The study was carried out over a period of two years.

Sample Size

A total of 250 skin biopsy specimens were included in the study.

Inclusion Criteria

- All skin biopsy specimens received during the study period.
- Adequately preserved and properly labeled specimens.
- Biopsies with sufficient clinical details.

Exclusion Criteria

- Inadequate or autolyzed biopsy specimens.
- Recurrent lesions previously diagnosed and treated.
- Specimens with incomplete clinical information.

Procedure and Methodology

Skin biopsy specimens were received in 10% neutral buffered formalin. Relevant clinical details such as age, sex, anatomical site, and provisional diagnosis were recorded. Gross examination was performed noting size, shape, color, and surface characteristics. The specimens were processed using routine paraffin embedding technique. Representative sections were taken and embedded in paraffin blocks.

Sample Processing

Tissue sections of 3–5 µm thickness were cut using a microtome and stained with Hematoxylin and Eosin (H&E). Special stains such as PAS, Ziehl-Neelsen, or Masson-Fontana were used wherever indicated. Immunohistochemistry was performed in selected cases when required for confirmation.

Statistical Methods

The data were entered into Microsoft Excel and analyzed using appropriate statistical software. Descriptive statistics such as frequency and percentage were used for categorical variables. Mean and standard deviation were calculated for continuous variables. Results were presented in tables and charts.

Data Collection

Data were collected from histopathology records and biopsy requisition forms. Variables recorded included patient age, sex, clinical diagnosis, anatomical site of lesion, and final histopathological diagnosis. All findings were systematically tabulated and analyzed to determine the distribution pattern of cutaneous lesions.

RESULTS

Table 1: To study the histopathological spectrum of cutaneous lesions in a tertiary care hospital over a period of two years (N = 250)

Parameter	Category / Mean ± SD	n (%) / Value	95% CI	Test of Significance	p-value
Age (years)	Mean ± SD	42.8 ± 16.4	40.7 – 44.9	One-sample t-test	0.018*
Gender	Male	142 (56.8%)	50.6 – 62.8	χ^2 goodness-of-fit	0.041*
	Female	108 (43.2%)	37.2 – 49.4		
Lesion Type	Non-neoplastic	165 (66.0%)	60.0 – 71.5	χ^2 goodness-of-fit	<0.001*
	Neoplastic	85 (34.0%)	28.5 – 40.0		

The present study included 250 cases of cutaneous lesions evaluated over a two-year period. The mean age of patients was 42.8 ± 16.4 years, with a 95% confidence interval (CI) of 40.7–44.9 years, and this age distribution was statistically significant (p = 0.018). Males constituted a higher proportion of cases (142; 56.8%) compared to females (108; 43.2%), and this difference was statistically significant (p = 0.041), indicating a mild male predominance. With regard to lesion type, non-neoplastic lesions were more common, accounting for 165 cases (66.0%; 95% CI: 60.0–71.5), whereas neoplastic lesions comprised 85 cases (34.0%; 95% CI: 28.5–40.0). The predominance of non-neoplastic lesions was highly statistically significant (p < 0.001), demonstrating that inflammatory and other non-neoplastic conditions formed the major histopathological burden in this tertiary care setting.

Table 2: To categorize cutaneous lesions into non-neoplastic and neoplastic lesions based on histopathological examination (N = 250)

Lesion Category	n (%)	95% CI	Test of Significance	p-value
Non-neoplastic lesions	**165 (66.0%)**	**60.0 – 71.5**	**χ^2 test**	**<0.001***
Neoplastic lesions	85 (34.0%)	28.5 – 40.0		
→ Benign tumors	62 (24.8%)	19.7 – 30.4	χ^2 test (within neoplastic)	0.002*
→ Malignant tumors	23 (9.2%)	6.0 – 13.6		

On further categorization, non-neoplastic lesions constituted 66.0% (n = 165) of all cases, while neoplastic lesions accounted for 34.0% (n = 85), and this distribution was statistically significant (p < 0.001). Among the neoplastic lesions, benign tumors were more frequent, representing 62 cases (24.8% of total cases; 95% CI: 19.7–30.4), compared to malignant tumors, which comprised 23 cases (9.2%; 95% CI: 6.0–13.6). The predominance of benign tumors over malignant tumors within the neoplastic category was statistically significant (p = 0.002). These findings indicate that although neoplastic lesions formed a substantial proportion of cases, the majority were benign in nature.

Table 3: To analyze the age and sex distribution of various skin lesions (N = 250)

Age Distribution

Age Group (years)	n (%)	95% CI	Test	p-value
<20	32 (12.8%)	9.2 – 17.4	χ^2	<0.001*
21–40	78 (31.2%)	25.7 – 37.2		
41–60	92 (36.8%)	31.0 – 42.9		
>60	48 (19.2%)	14.6 – 24.7		

Mean Age: 42.8 ± 16.4 years; 95% CI (Mean): 40.7 – 44.9

Sex Distribution Across Lesion Type

Lesion Type	Male n (%)	Female n (%)	Test of Significance	p-value
Non-neoplastic	88 (53.3%)	77 (46.7%)	χ^2 test	0.084
Neoplastic	54 (63.5%)	31 (36.5%)	χ^2 test	0.032*

Age-wise distribution revealed that the majority of patients belonged to the 41–60 years age group (92 cases; 36.8%), followed by the 21–40 years group (78 cases; 31.2%), >60 years (48 cases; 19.2%), and <20 years (32 cases; 12.8%). This age distribution was statistically significant (p < 0.001), suggesting a higher occurrence of cutaneous lesions in middle-aged individuals. The overall mean age was 42.8 ± 16.4 years (95% CI: 40.7–44.9).

When sex distribution was analyzed across lesion types, non-neoplastic lesions showed no statistically significant gender difference (p = 0.084), although males (53.3%) were slightly more affected than females (46.7%). However, neoplastic lesions demonstrated a significant male predominance (63.5% males vs. 36.5% females; p = 0.032), indicating that tumors, particularly neoplastic lesions, were more common among males in this study population.

Table 4: To study the anatomical site-wise distribution of cutaneous lesions (N = 250)

Anatomical Site	n (%)	95% CI	Test of Significance	p-value
Head & Neck	86 (34.4%)	28.8 – 40.3	χ^2 goodness-of-fit	<0.001*
Upper Limb	52 (20.8%)	16.1 – 26.4		
Lower Limb	61 (24.4%)	19.4 – 30.0		
Trunk	39 (15.6%)	11.6 – 20.6		
Genital region	12 (4.8%)	2.7 – 8.3		

Anatomical site-wise distribution showed that the head and neck region was the most commonly involved site (86 cases; 34.4%; 95% CI: 28.8–40.3), followed by the lower limb (61 cases; 24.4%), upper limb (52 cases; 20.8%), trunk (39 cases; 15.6%), and genital region (12 cases; 4.8%). This distribution was statistically significant ($p < 0.001$), indicating a higher predilection of cutaneous lesions for sun-exposed areas, particularly the head and neck.

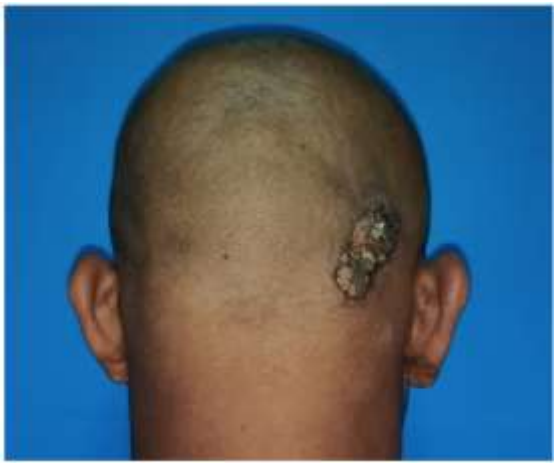

Figure 1: Gross photograph showing a well-defined, verrucous, yellowish-brown plaque over the occipital scalp- Nevus Sebaceous in an adult male

Figure 2: Clinical image showing a solitary, firm nodule over the scalp- Pilomatrixoma

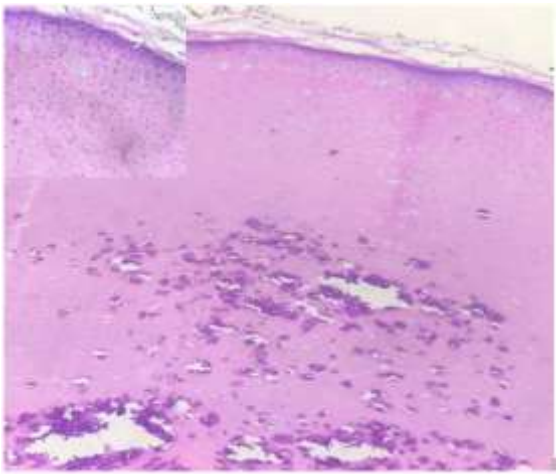

Figure 3: Trichilemmal cyst: showing a cyst lined by stratified squamous epithelium lacking a granular layer, with abrupt keratinization and compact eosinophilic keratin in the lumen- (H&E stain, 40×). Inset- High power view highlighting the stratified squamous epithelial lining of the cyst wall, lacking a granular cell layer, with abrupt keratinization.

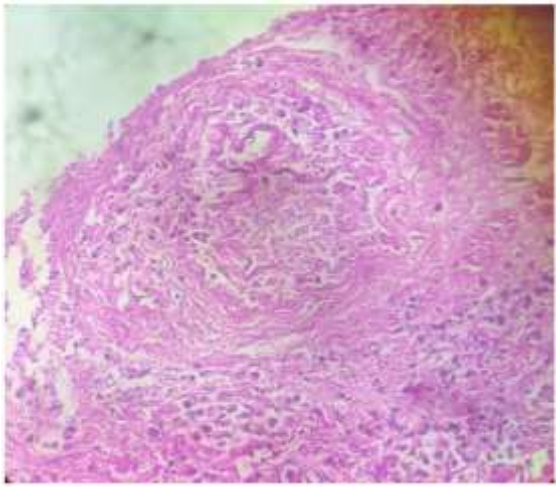

Figure 4: Cutis laxa showing dermis with markedly decreased and fragmented elastic fibers, resulting in loosely arranged, pale-staining collagen bundles with a disorganized architecture. There is mild perivascular lymphocytic infiltrate. (H&E 100x)

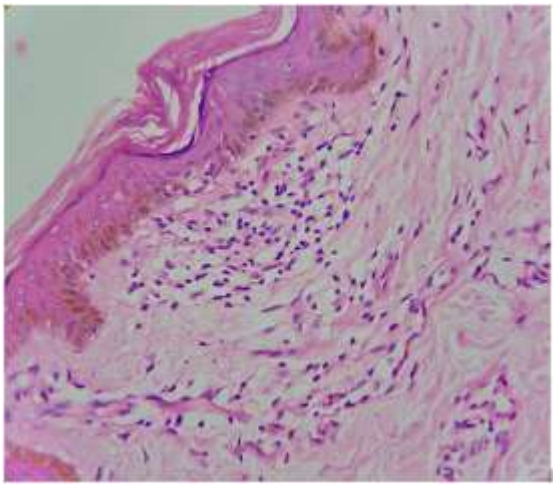

Figure 5: Lepromatous leprosy showing epidermal atrophy with effacement of rete ridges. The dermis reveals a dense, diffuse infiltrate of foamy macrophages. These macrophages are interspersed with lymphocytes and plasma cells, particularly around neurovascular bundles. (H&E 400x)

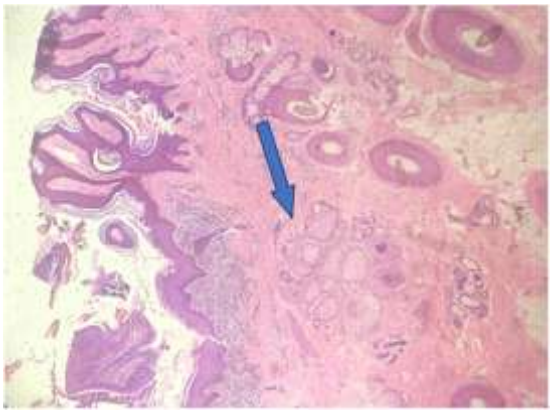

Figure 6: Nevus sebaceous with Syringocystadenoma papilliferum showing papillomatous epidermal hyperplasia with underlying sebaceous gland hyperplasia and apocrine differentiation. Dermis reveals cystic invaginations lined by double-layered epithelium with papillary projections. (H&E, 40x)

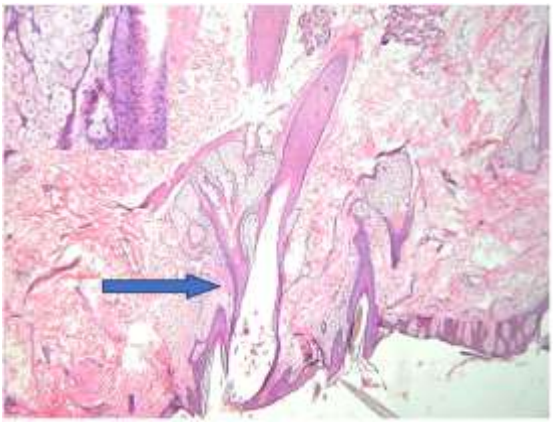

Figure 7: Nevus Sebaceous of Jadassohn showing papillomatous epidermal hyperplasia with prominent sebaceous glands. (H&E, 40x).

Inset shows epidermal hyperplasia with increased sebaceous glands.

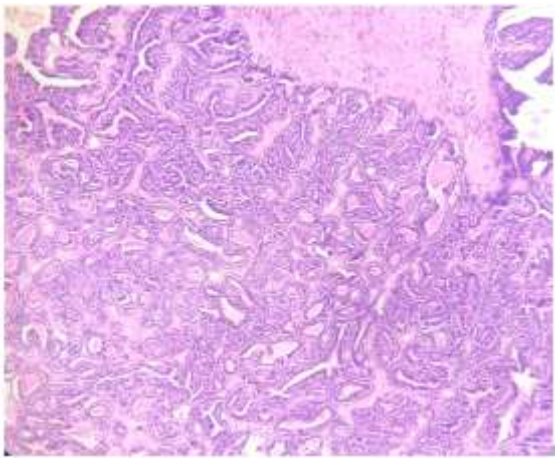

Figure 8: Hidradenoma Papilliferum showing complex papillary and tubular structures lined by a dual cell layer, an inner columnar layer and an outer myoepithelial layer. (H&E, 100x)

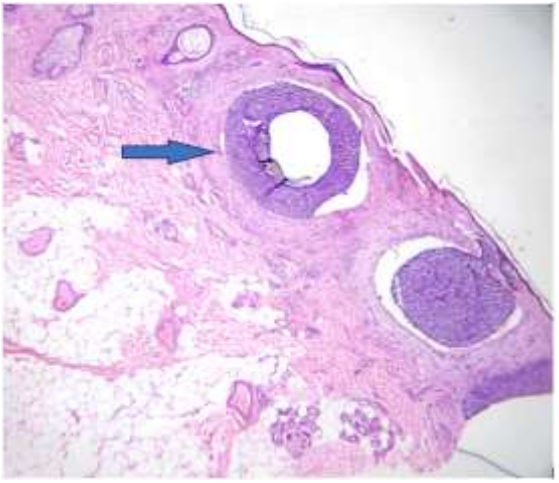

Figure 9: Nodular Basal cell carcinoma showing well-circumscribed basaloid tumor nests located in the dermis, some with central cystic degeneration. The nests are composed of basaloid cells with peripheral palisading of nuclei. The overlying epidermis is thinned and does not show connection with the tumor nests. (H&E, 40x)

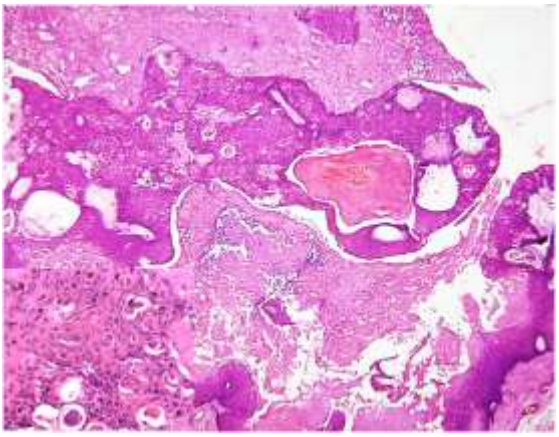

Figure 10: Proliferating trichilemmal tumor showing well-demarcated dermal-based lobulated epithelial proliferation with abrupt trichilemmal keratinization (keratinization without a granular layer). The lobules display squamous proliferation with peripheral palisading and pushing borders. Areas of central keratinous material, calcification seen. (H&E, 40x) Inset shows large keratinized cells with dense eosinophilic cytoplasm and absence of a granular layer.

DISCUSSION

The present study evaluated the histopathological spectrum of 250 cutaneous lesions over a two-year period in a tertiary care hospital. The mean age of patients was 42.8 ± 16.4 years, which is comparable to the findings of Singh et al. (2020),[6] who reported a similar mean age in their clinicopathological evaluation of skin lesions. Similarly, Nagayach et al. (2022),[7] observed that the majority of cases occurred in the fourth and fifth decades of life. The predominance of lesions in middle-aged individuals in the present study (36.8% in 41–60 years age group) may be attributed to cumulative environmental exposure, occupational hazards, and age-related degenerative changes.

A mild male predominance (56.8%) was observed in this study, which was statistically significant ($p = 0.041$). This finding is consistent with Goswami et al. (2022),[3] who reported 58% male cases, and Shehwar et al. (2021),[4] who documented a male predominance in their study of non-neoplastic skin lesions. The higher male involvement may reflect greater outdoor activity, occupational exposure to ultraviolet radiation, and sociocultural factors influencing healthcare access.

With respect to lesion type, non-neoplastic lesions constituted 66% of cases, significantly higher than neoplastic lesions (34%) ($p < 0.001$). This observation aligns with Ndukwe et al. (2022),[5] who reported predominance of non-neoplastic lesions in their tertiary hospital study, and Parvez et al. (2023),[8] who found inflammatory and infectious dermatoses to be the most common category in histopathological evaluation. The high burden of non-neoplastic lesions in developing regions is often associated with climatic factors, infections, and chronic inflammatory conditions.

Among neoplastic lesions, benign tumors (24.8%) were more common than malignant tumors (9.2%), and this difference was statistically significant ($p = 0.002$). Similar results were noted by Vyas et al. (2023),[9] who reported that benign tumors formed the majority of neoplastic skin lesions. Likewise, Nagar et al. (2021),[10] observed that benign adnexal tumors and melanocytic nevi were more frequent than malignant cutaneous malignancies in their retrospective audit. The relatively lower proportion of malignant tumors in the present study may reflect early detection, timely biopsy, and improved screening practices.

Age-wise analysis demonstrated that the highest frequency of lesions was in the 41–60 years age group (36.8%), followed by 21–40 years (31.2%). This distribution was statistically significant ($p < 0.001$) and is in agreement with findings of Kaul et al. (2023),[11] who also reported peak incidence of skin lesions in middle-aged populations. Pediatric cases (<20 years) constituted only 12.8%, which is comparable to the proportions observed in similar hospital-based studies.

Sex distribution across lesion type showed that non-neoplastic lesions did not have a statistically significant gender difference ($p = 0.084$), whereas neoplastic lesions demonstrated significant male predominance (63.5%, $p = 0.032$). This finding is comparable to the study by Sarkar et al. (2023),[12] who reported higher rates of cutaneous tumors in males, possibly due to increased ultraviolet exposure and occupational risk factors.

Anatomical site-wise distribution revealed that the head and neck region was the most commonly involved site (34.4%), followed by lower limb (24.4%) and upper limb (20.8%), with statistically significant distribution ($p < 0.001$). These findings are consistent with Dawande et al. (2023),[1] who also observed maximum lesions in sun-exposed areas, particularly the head and neck region. The predominance in these regions may be attributed to chronic sun exposure, especially in tropical climates. The genital region showed the least involvement (4.8%), similar to observations in tertiary care hospital-based studies.

CONCLUSION

The present study highlights the diverse histopathological spectrum of cutaneous lesions encountered in a tertiary care hospital over a two-year period. Non-neoplastic lesions constituted the majority of cases, emphasizing the significant burden of inflammatory and infectious dermatoses in routine dermatopathology practice. Neoplastic lesions formed a substantial proportion, with benign tumors being more common than malignant tumors. The peak incidence of lesions was observed in the middle-aged population, with a mild male

predominance, particularly in neoplastic cases. The head and neck region emerged as the most frequently involved anatomical site, likely reflecting the impact of chronic sun exposure.

Histopathological examination remains the cornerstone for accurate diagnosis, classification, and management of cutaneous lesions. Periodic audits of skin biopsies at tertiary care centers are essential to understand regional disease patterns, improve diagnostic accuracy, and guide clinical management strategies.

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