

Histomorphological Analysis and Clinicopathological Correlation of Tumors and Cysts of Skin and its Appendages – A Retrospective Study at a Tertiary Care Center in Hyderabad

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ABSTRACT

Background: Skin tumors and cysts are a heterogeneous group of lesions that have varied presentations. It is difficult to diagnose them as benign or malignant lesions as their clinical manifestations tend to overlap. Therefore, histopathological examination serves as the gold standard for diagnosis and proper patient management. **Objectives:** Histomorphological spectrum of skin tumors and cutaneous cysts and their correlation with clinicopathological diagnoses was evaluated in a tertiary care hospital. **Materials and Methods:** A retrospective observational study conducted in the department of pathology at CMR institute of medical sciences and hospital, Hyderabad over a period of two and a half years (January 2023 to June 2025). A total of 130 excised skin tumors and cutaneous cysts that were subjected to histopathological examination were included in this study. Inflammation and infection related cases were excluded from the study. The clinical details of the patient were obtained from the pathology requisition forms. Formalin fixed, Paraffin-embedded samples were examined microscopically after hematoxylin and eosin staining. Data analysis was done in Microsoft excel software and Statistical Package for the Social Sciences version 25.0 (IBM Corp., Armonk, NY, USA). Results were presented in frequencies, percentage, mean, and standard deviation. **Results:** Among the 130 patients studied, 72 (55.4%) were male and 58 (44.6%) were female with a mean age of 37.5 ± 18.4 years (range 1–82 years). Most cases were in the 21–40 year age group (53.1%) and posterior chest region was the most common site involved (23.1%). Epidermoid cysts were the commonest lesions (47.7%), followed by infected epidermoid cysts (13.8%) and papillomas (11.5%). Malignant tumors constituted 7.7% of the total cases studied, with the most common being squamous cell carcinoma. Clinicopathological concordance was seen in 70% of cases while 30% of the cases showed clinicopathological discordance which mainly occurred due to misdiagnosis of epidermoid cysts as sebaceous cysts clinically. **Conclusion:** Epidermoid cysts were the commonest cutaneous lesions seen among young adults with a slight male predominance. High clinicopathological discordance in this study emphasizes the need for routine histopathological examination to make a precise diagnosis.

Keywords: Adnexal and skin appendage, Clinicopathological correlation, Epidermal cyst, Histopathology, Neoplasms, Retrospective studies, Skin neoplasms

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INTRODUCTION

Various types of diseases can occur in the skin, as it is a multifunctional organ. The skin tumors are usually classified into surface epidermal tumors and tumors of epidermal appendages. Tumors of the skin usually present as papules and nodules.

As the diagnosis cannot be established by the clinical findings alone, the histopathological examination becomes an absolute necessity.

There are various non-tumorous skin lesions, which can be difficult to distinguish clinically from the neoplasia especially when they are pigmented or inflamed, and hence, the histopathology of the biopsied lesion becomes necessary to reach a diagnosis.

Arrival at a correct diagnosis is very much needed so that a proper treatment could be provided to the patient. Hence, histopathology is considered to be the gold standard for diagnosis as well as classification of various tumors of the skin. This study was conducted to observe the different histopathological types of skin tumors and their clinical correlation.

Aims and Objectives

1. To study the incidence of the various cysts and tumors of the skin and its appendages in relation to age, sex, and location
2. To determine the incidence of various tumors of skin and make a clinicopathological correlation.

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MATERIALS AND METHODS

Design of the Study

Hospital-based retrospective observational study.

Duration of Study

2 1/2 years study from January 2023 to June 2025.

Study Setting

Histopathology section of pathology department at CMRIMS, Kandlakoya, Hyderabad.

Sample Size

All the cases during the study period which meet the inclusion criteria were included.

Inclusion and Exclusion Criteria

Tumors and tumors like condition of epidermis along with melanocytic tumors and tumors of skin appendages were included in the study. Patients who were diagnosed as inflammatory, infectious, and allergic lesions were excluded from the study.

Methodology

The skin biopsies which are received in the department of pathology, CMR hospital, are processed in automatic tissue processor after adequate grossing and fixation in formalin, embedded in paraffin wax and blocks were made. Tissue sectioning of the paraffin blocks is carried out at 3–4 microns thickness. Staining procedure includes routine hematoxylin and eosin stain.

Statistical Analysis Plan

Descriptive analysis with numbers and percentages were used for presentation of the results using the Statistical Package for the Social Sciences software version 25.0 (IBM Corp., Armonk, NY, USA).

Ethical Considerations

The study protocol was approved by the Institutional Ethics Committee of CMR Institute of Medical Sciences and Hospital before commencement of the study. IEC NO: CMRIMS/IEC/2025/SI.NO.09, dated: June 13, 2025.

RESULTS

In the study population overview, 130 skin tumors and cysts were examined. Gender distribution revealed 72 males, which represents 55.4%, and 58 females, which constitute 44.6%. This shows a relatively equal proportion of male-to-female representation in the study.

Table 1 provides distribution of individuals according to age groups.

Age of the individuals involved in the analysis ranged from 1 to 82 years, with an average age of 37.5 years. Interestingly, the age group mostly affected by these skin diseases was the individuals aged between 20 and 40 years.

The distribution of sites is provided in Table 2. Posterior part of the chest was the most common site for the development of these lesions, followed by face and extremities. Concordance between clinical and histopathology diagnosis is provided in Table 3. About 70% of clinical diagnoses were confirmed by histopathological examination. Clinical sebaceous cysts were often confirmed as epidermoid cysts on histopathology; papillomas are diagnosed as hidradenoma and other. Histopathological classification of skin tumors and cysts is provided in Table 4. In the present study,

Table 1: Age-wise distribution of different tumors and cysts of skin and its appendages

Age group (years)	Number of cases	Percentage
0–10	6	4.60
11–20	20	15.40
21–30	32	24.60
31–40	37	28.50
41–50	17	13.10
51–60	12	9.20
>60	6	4.60

Table 2: Anatomical site distribution of tumors and cysts of skin and its appendages

Location/site	Number of cases	Percentage
Back of chest	30	23.10
Face	25	19.20
Upper limb	20	15.40
Lower limb	19	14.60
Scalp	10	7.70
Ear/ear lobule/pinna	12	9.20
Neck	7	5.40
Others (Groin, Scrotum, Abdomen, Sternum)	7	5.40

Table 3: Concordance between clinical and histopathological diagnosis of tumors and cysts of skin and its appendages

Diagnosis status	Number of cases	Percentage
Concordant	91	70.00
Discordant	39	30.00

Table 4: Histopathological classification of tumors and cysts of skin and its appendages

Histopathological diagnosis	Number of cases	Percentage
Epidermoid cyst	62	47.70
Infected epidermoid cyst	18	13.80
Papilloma including verrucae vulgaris	15	11.50
Fibroma	2	1.50
Nodular hidradenoma	4	3.10
Seborrheic keratosis	6	4.60
Malignant melanoma	3	2.30
Squamous cell carcinoma	7	5.40
Dermoid cyst	5	3.80
Pilomatricoma	1	0.80
Trichilemmal cyst	1	0.80
Syringocystadenoma papilliferum	2	1.50
Eccrine spiradenoma	1	0.80
Basal cell carcinoma	1	0.80
Naevus	1	0.80
Malignant adnexal tumor	1	0.80

benign lesions were mostly represented by 102 epidermal tumors, 15 adnexal tumors, and 1 melanocytic tumor. Malignant lesions include eight epidermal tumors, one adnexal tumor, and three melanocytic tumors. Overall, 110 epidermal, 16 adnexal, and four melanocytic tumors were recorded.

In the group of benign lesions, the most common were epidermoid cysts, followed by papillomas and adnexal tumors including syringocystadenoma papilliferum and eccrine spiradenoma [Figures 1–3]. The most malignant tumors recorded in this study were squamous cell carcinoma, basal cell carcinoma, and malignant melanoma [Figures 4 and 5]. Verruca vulgaris was also seen among the epidermal tumors [Figure 6].

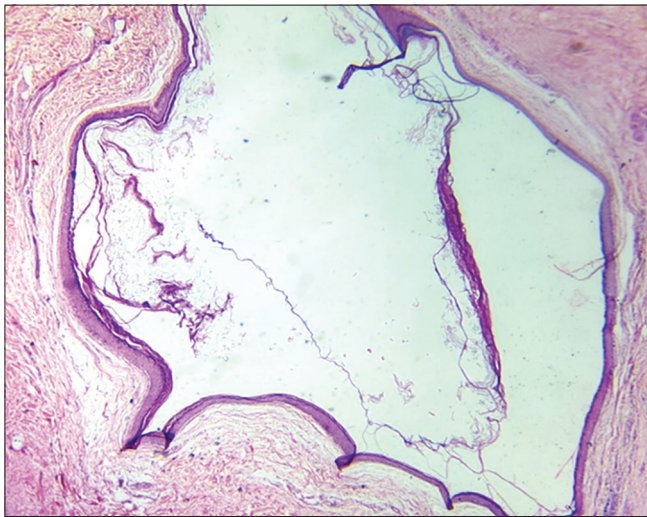


Figure 1: The hematoxylin and eosin stained section illustrates an epidermoid cyst ($\times 10$), which reveals a cystic structure filled with keratinous material

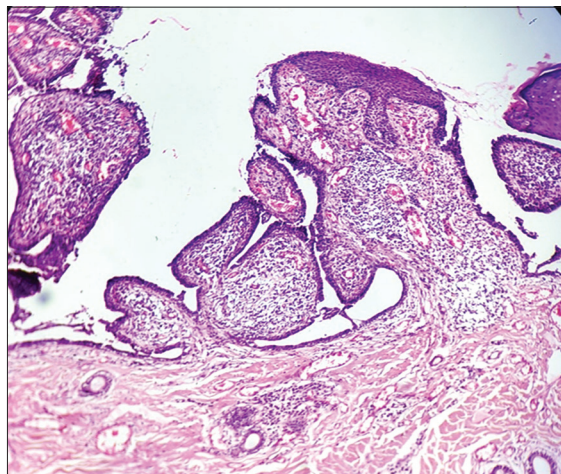


Figure 2: The hematoxylin and eosin stained section reveals a syringocystadenoma papilliferum ($\times 10$), characterized by a complex papillary structures

DISCUSSION

The present study presents a comprehensive clinicopathological analysis of skin tumors and cysts in terms of age distribution, gender predisposition, anatomic location, and clinicopathological concordance. The study not only provides new regional data on the epidemiology of skin appendageal tumors and cysts but also stresses the significance of histopathological examination in providing diagnostic accuracy.

Most of the cases occurred in the age group of 21–40 years old, the mean age being 37.5 years. It corresponds with previous findings, which show the highest incidence of benign cutaneous tumors, such as epidermoid cysts and papillomas in young and middle-aged adults.^[1,2] Epidermoid cysts have tendency to develop in the second to fourth decades of life, probably due to the highest functioning of sebaceous glands and trauma or follicle obstruction at that time.^[3] Malignant tumors were relatively few in number but more common in older people, which can be explained by

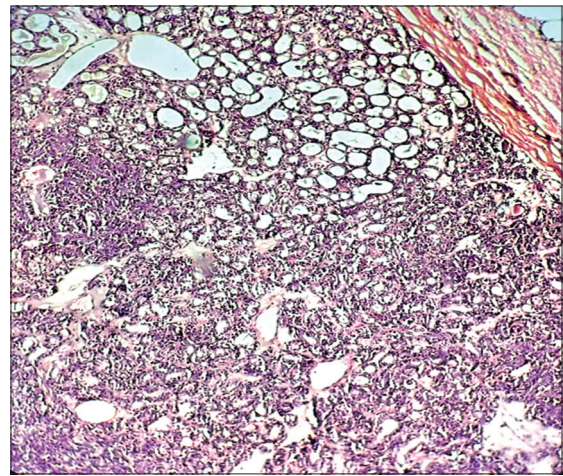


Figure 3: The hematoxylin and eosin stained section reveals eccrine spiradenoma ($\times 10$), the cells exhibit distinctive characteristics such as a clear cytoplasm, spherical nuclei, and a nested or glandular architectural arrangement

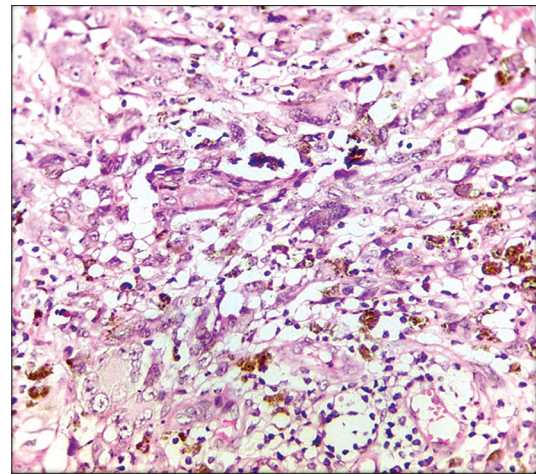


Figure 4: The hematoxylin and eosin stained section shows malignant melanoma ($\times 40$). Atypical cells are seen with intracytoplasmic melanin pigment and are surrounded by lymphocytic infiltrates

accumulation of ultraviolet irradiation and genetically based vulnerability.^[4]

The gender ratio in this study was fairly equal, with a slight predominance of males (55.4%). Several other studies also showed a slight male prevalence in epidermoid cysts and sebaceous lesions.^[5,6] It may be due to higher activity outdoors, occupation exposure and difference in skin adnexal physiology. However, there were also studies that revealed no difference in the incidence of adnexal tumors in men and women.^[7]

The most frequent localization was posterior chest wall, face, and extremities. This contradicts some other publications that stated the face and scalp as the most common localization of epidermoid cysts and adnexal tumors.^[8] Prevalence of posterior chest wall lesions may be caused by local referral bias, lifestyle factors, or the tendency to hide cosmetically disfiguring lesions in this area from dermatology specialists, which are managed in cosmetology clinics. Furthermore, lesions of extremities, scalp, and ear lobule were registered, which confirm previous findings

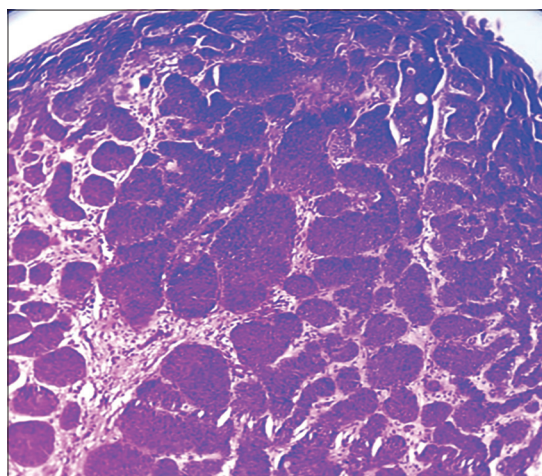


Figure 5: The hematoxylin and eosin stained section shows basal cell carcinoma (×10), characterized by basaloid cells exhibiting palisading nuclei. There is presence of clefts or spaces between the neoplastic cells and the stroma

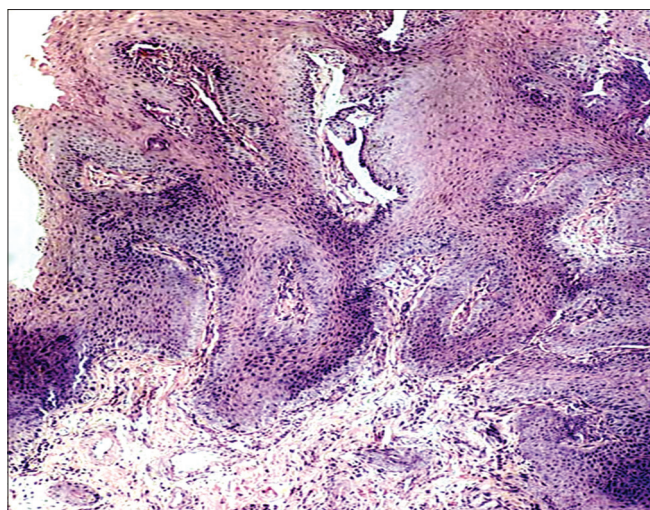


Figure 6: The hematoxylin and eosin stained section reveals verruca vulgaris (×10), with hyperkeratosis, acanthosis, and papillomatosis (presence of finger-like projections) is seen

of wide distribution of adnexal tumors almost at any hair-bearing sites.^[9]

Almost half of the cases (47.7%) consisted of epidermoid cysts, followed by infected epidermoid cysts (13.8%) and papillomas (11.5%). This distribution confirms the well-known statement about high prevalence of epidermoid cysts as the most common benign cutaneous cysts.^[10] Higher incidence of infected varieties may be associated with the problem of secondary bacterial invasion in humid climate regions with lack of early medical attention.^[11]

There were nodular hidradenoma, seborrheic keratosis, dermoid cyst and pilomatricoma as adnexal tumors. Furthermore, malignant tumors, such as squamous cell carcinoma (5.4%), and malignant melanoma (2.3%), were detected. Such proportion corresponds to the global epidemiology data, in which the ratio of benign lesions to malignant lesions is much higher.^[12] The presence of malignant tumors in apparently benign lesions in the

study emphasizes the necessity of histopathological examination to make correct diagnosis.

A specific aspect of this study is the analysis of clinicopathological concordance, which was established in 70% of cases. This result correlates with the previous studies, in which concordance rates varied between 65% and 80%.^[13,14] Most frequently clinicopathological discordance was observed in the cases that were clinically called as sebaceous cysts but turned out to be epidermoid cysts after histological examination. Such misdiagnosis is also described in other studies, in which the name “sebaceous cyst” is misused.^[15] Furthermore, sometimes papillomas were erroneously diagnosed as hidradenoma or other adnexal tumors.

The rate of discordance (30%) shows the risk of erroneous diagnosis in case of relying on clinical examination of cutaneous tumors and cysts. The finding stresses the necessity of histopathological examination of surgically removed lesions, even if clinical picture suggested benign etiology. Thus, the study confirms the statements of previous authors about the necessity of histopathology as the gold standard.^[16]

The results of the present study correlate with the results of other Indian studies, which showed the predominance of epidermoid cysts and younger age distribution of benign cutaneous lesions.^[17] At the same time, the prevalence of chest wall localization contradicts several western series, in which facial and scalp lesions were more common.^[18] It may be attributed to sociocultural and occupational differences. The proportion of malignant lesions in this study (7.7%) is relatively low, as it corresponds to the global epidemiology data in which malignant cutaneous tumors form minority of excised skin lesions.^[19]

Clinically, the study emphasizes the difficulties in making diagnosis in the case of cutaneous tumors. High rate of clinicopathological discordance confirms that histopathology should not be omitted, even in case of apparently innocuous lesions. Early and precise diagnosis is especially important in cases of malignant melanoma and squamous cell carcinoma, as delay in treatment may affect prognosis negatively.^[20]

Theoretical aspects of the findings reveal the diversity of morphologic features of adnexal tumors due to their pluripotent cellular basis of pilosebaceous-apocrine-ecrine unit. The study thus contributes to the literature evidences about the need for meticulous histomorphological analysis and, if required, immunohistochemistry for difficult cases.^[21]

The strengths of the study are large sample size and comprehensive comparison of clinical and pathological data. By including both benign and malignant tumors, the study provides comprehensive picture of skin tumors in a tertiary care facility.

Few limitations are present in the study. Firstly, being retrospective study, the results may suffer from the selection bias, as only surgically removed lesions were examined. Furthermore, the study is conducted in one center, so the findings may not be applicable to other populations, especially with different environmental exposures and healthcare facilities.

In addition, the economic analysis of histopathological examination of all excised cutaneous lesions may provide information for developing clinical guidelines in resource-limited settings.

CONCLUSION

The present study reveals that epidermoid cysts are the most common cutaneous lesion in a tertiary care setting, with

predominance in young to middle-aged adults and slight male prevalence. Although the posterior chest wall was the most frequent localization in this study, the lesions were localized at various anatomic sites. The relatively high percentage of clinicopathological discordance was detected, particularly between clinically diagnosed sebaceous cysts and histologically proved epidermoid cysts.

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