

Histopathological Spectrum of Eyelid Tumors in Northeast India: A 6-Year Retrospective Study

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Background: Eyelid tumors present with a diverse histopathological spectrum, varying across geographic and ethnic groups. In Asia, sebaceous gland carcinoma (SGC) often rivals basal cell carcinoma (BCC) in incidence. This study evaluates the clinicopathological profile of eyelid tumors from Northeast India.

Objective: To analyse the histopathological distribution, demographic profile, and malignant versus benign ratio of surgically excised eyelid tumours over six years at a tertiary care centre.

Methods: A retrospective review was conducted on histopathologically diagnosed eyelid tumors excised between March 2008 and February 2014. Clinical and demographic data were retrieved. Routine H&E staining was performed, with immunohistochemistry as needed. Tumours were classified according to the WHO 5th edition classification.

Results: Of 132 excised eyelid lesions, 124 were neoplastic (81.5% benign, 18.5% malignant), and 8 were inflammatory chalazia. Benign tumors included epidermal cyst (23.8%), dermoid cyst (21.8%), haemangioma (14.9%), and squamous papilloma (11.9%). Among malignancies, basal cell carcinoma (BCC) predominated (39.1%), followed by squamous cell carcinoma (SCC) (30.4%), Sebaceous gland carcinoma (SGC) (21.7%), and malignant melanoma (8.6%). Malignant tumors showed a female preponderance. Comparative analysis with regional and global studies demonstrated higher proportions of SGC and SCC in this cohort.

Conclusion: Benign lesions remain predominant in eyelid tumors. However, sebaceous carcinoma and squamous cell carcinoma constitute a significant malignant burden in this Northeast Indian population. Early biopsy and histopathological diagnosis are essential for timely intervention.

Introduction

The eyelids are the most visible and accessible part of the eye; therefore, any mass lesion occurring in the eyelids can be detected and treated at an early stage. However, ignorance, poverty and inaccessibility to proper health care result in late diagnosis, which has adverse aesthetic side effects and may result in loss of vision [1, 2].

The eyelids contain numerous histological elements that can give rise to a host of benign and malignant lesions. Most eyelid tumours are benign, and cutaneous neoplasms are the most common. Among the malignant tumours, geographic and ethnic diversity is noted. BCC is the most common malignant eyelid tumour among Caucasians and sebaceous gland carcinoma in Asians [3].

Materials and Methods

This is a retrospective study carried out in the pathology department at the Regional Institute of Ophthalmology, Guwahati, Assam, Northeast India. The study included all cases with a histological diagnosis of eyelid tumours that were surgically removed in the Department of Ophthalmology from March 2008 to February 2014. The medical records of these patients were thoroughly studied regarding age, gender, lesion location, clinical diagnosis, and type of surgery.

Only patients who underwent surgical excision at our centre were included. Cases requiring extensive surgery, such as orbital exenteration or advanced reconstructive procedures, were referred to higher centres and excluded from the present analysis. Inflammatory lesions such as chalazia were excluded from the neoplastic analysis.

Tissue specimens were submitted to the pathology department in 10% formalin, processed and embedded in paraffin. Hematoxylin and eosin (H&E) staining was performed for all specimens. In selected cases, immunohistochemistry (IHC) was performed to aid in histopathological diagnosis. HMB-45 and S100 were used to differentiate malignant melanoma from pigmented Basal cell carcinoma (BCC), while epithelial membrane antigen (EMA) was employed to distinguish Sebaceous carcinoma from BCC with Sebaceous differentiation. All tumours were classified according to the World Health Organisation (WHO) 5th edition classification of eye tumours (Figure 1 and 2).

Figure 1. Clinical Picture Showing BCC in the Lower Lid of the Eye.

Figure 2. Low Power View of H and E Staining of Eyelid Mass Showing Adenoid Basal Cell Carcinoma.

Results

A total of 132 eyelid lesions were excised during the study period. Of these, 124 were neoplastic and 8 were inflammatory chalazia. The analysis included only the neoplastic lesions. The cohort consisted of 67 males (54%) and 57 females (46%), with ages ranging from 3 to 80 years (median: 34 years).

Benign tumours accounted for 101 of the 124 neoplastic cases (81.5%). The upper eyelid was affected in 59 (58%) of benign cases. The most common benign entities were epidermal inclusion cysts (24 cases; 23.8%), dermoid cysts (22; 21.8%), hemangiomas (15; 14.9%),

and squamous papillomas (12; 11.9%) (Table 1, 2 and 3).

Parameter	Value
Total lesions excised	132
Inflammatory/reactive lesions (chalazion)	8 (reported separately)
Tumours analysed	124
Gender (all tumours)	Males 67 (54%); Females 57 (46%)
Tumour type	Benign 101 (81.5%); Malignant 23 (18.5%)
Most common benign lesions	Epidermal cyst 24; Dermoid cyst 22; Haemangioma 15; Squamous papilloma 12
Most common malignant lesions	BCC 9; SCC 7; SGC 5; MM 2

Table 1. Clinicopathological Characteristics of Eyelid Tumours (n = 124).

WHO category	Benign (n)	Malignant (n)
Cystic lesions	52	
Vascular tumours	15	
Keratinocyte tumours	17	16
Sebaceous gland tumours	3	5
Follicular adnexal tumours	2	
Melanocytic tumours	8	2
Peripheral nerve sheath tumours	3	
Sweat gland tumours	1	

Table 2. WHO 5th-edition Eyelid Tumour Categories Represented in the Study.

Study	Study Period	Most Common Lesion	2nd Most Common	3rd Most Common
Present Study - India	2008-2014	Epidermal cyst	Dermoid cyst	Haemangioma
Krishnamurthy H et al., India [4]	2002-2011	Epidermal cyst	Nevus	Dermoid cyst
Çakici O et al., Türkiye [5]	2016-2020	Xanthelasma	Squamous papilloma	Chalazion
Huang Y et al., China [6]	1995-2015	Intradermal nevus	Seborrhoeic keratosis	Xanthelasma
Chang CH et al., Taiwan [7]	1994-1998	Nevus	Squamous papilloma	Inclusion cyst

Table 3. Comparative Distribution of Common Benign Eyelid Lesions in Regional and International Studies.

Malignant lesions comprised 23 cases (18.5%). Basal cell carcinoma (BCC) was the most common malignancy, accounting for 9 cases (39.1%), followed by squamous cell carcinoma (SCC) with 7 cases (30.4%), sebaceous gland carcinoma (SGC) with 5 cases (21.7%), and malignant melanoma with 2 cases (8.6%).

A chi-square test of independence was conducted to evaluate the association between patient gender and type of malignant eyelid tumor (Table 4).

Sex	BCC	SCC	SGC	MM	TOTAL
Male	3	3	1	-	7
Female	6	4	4	2	16
Total	9	7	5	2	23

Table 4. Gender Distribution of Malignant Tumours.

The result was not statistically significant ($\chi^2 = 1.68$, $df = 3$, $p = 0.642$), indicating that the distribution of tumor types did not significantly differ between male and female patients.

Similarly, a chi-square test was applied to assess the relationship between tumor type and eyelid location (upper vs lower lid) (Table 5).

Lid location	BCC	SCC	SGC	MM	TOTAL
Upper	2	4	4	2	12
Lower	7	3	1	0	11
Total	9	7	5	2	23

Table 5. Location Distribution of Malignant Tumours.

While the test yielded a higher chi-square value ($\chi^2 = 6.69$, $df = 3$), the result was not statistically significant at the conventional 0.05 level ($p = 0.082$).

Among 23 malignant eyelid tumors, all cases had negative surgical margins with cut margin distances ranging from 0.4 to 0.8 cm. Perineural invasion (PNI) was observed in 1 case of squamous cell carcinoma (SCC), while lymphovascular invasion (LVI) was seen in 1 SCC and one malignant melanoma (MM). No PNI or LVI was identified in basal cell carcinoma (BCC) or sebaceous gland carcinoma (SGC). Overall, high-risk histopathological features were infrequent and limited to SCC and MM (Table 6 and 7).

Histopathological Diagnosis	Total Number of cases	Nearest cut margin distance from tumour	Perineural Invasion (PNI)	Lymphovascular Invasion (LVI)
Basal Cell Carcinoma (BCC)	9	0.5 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.4 cm	Not seen	Not seen
		0.6 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.6 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
Squamous Cell Carcinoma (SCC)	7	0.6 cm	Not seen	Not seen
		0.5 cm	Seen	Not seen
		0.4 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.7 cm	Not seen	Not seen
		0.5 cm	Not seen	Seen
		0.6 cm	Not seen	Not seen
Sebaceous Gland Carcinoma (SGC)	5	0.6 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.4 cm	Not seen	Not seen
		0.5 cm	Not seen	Not seen
		0.6 cm	Not seen	Not seen
Malignant Melanoma (MM)	2	0.8 cm	Not seen	Not seen
		0.5 cm	Not seen	Seen

Table 6. Important Histopathological Findings in Malignant Tumours of the Eyelid.

Study	BCC (%)	SCC (%)	SGC (%)	MM (%)
Present Study	39.1	30.4	21.7	8.6
Wang L et al., China (2021) [8]	48.7	12.4	34.2	2.9
Nguyen NH, Vietnam (2025) [9]	46	31	15	8
Kiran Kumar BR, India (2024) [10]	50	30	10	10
Wu Y et al., China (2025) [11]	74.3	7.1	11.4	2.1
Kaliki S et al., India	24	18	53	-

(2015) [12]

Table 7. Comparative Histological Distribution (%) of Malignant Eyelid Tumours in Various Studies.

Discussion

In our study, benign tumours accounted for the majority of eyelid lesions, 101 out of 124 (81.4%). This is consistent with most authors, both in India and other Southeast Asian countries [7, 8]. Recent studies provide valuable insights into the evolving epidemiology of eyelid tumours worldwide. Our study showed 18.5% malignant cases, which aligns with several recent Asian studies. The Turkish study (2018–2023) reported a slightly higher malignancy rate (24.2%) [5], whereas Wang et al. (China, 2000–2018) reported a rate of 14.9% [8]. The Vietnamese study reported a 12.5% rate of malignant cases [9]. In contrast, a study by Gundogan et al. Al, the percentage of malignant cases was only 1.5% [13].

Histologic distribution varies internationally. In our series, BCC accounted for 39.1% of malignancies, while SCC and SGC represented 30.4% and 21.7%, respectively. Comparative data reveal interesting trends: in Turkey (2025), BCC comprised 82% of eyelid cancers [5], and Wu et al. (China, 2025) reported 74.3% BCC [11]. Wang et al. (China, 2021) found BCC at 48.7% [8], Belaid A et al. in a study from Tunisia found a significantly higher proportion of BCC in 81.5% cases [14]. In comparison, our cohort displays a notably higher proportion of SCC and SGC, emphasising regional diversity.

Crucially, several Indian studies published after 2005 also reflect dominant SGC prevalence:

Kaliki et al. (2015) reported that among 191 Indian SGC cases, SGC was the most frequent malignant subtype in eyelid lesions [12]. Their 2019 study of 536 malignant eyelid tumours found SGC in 53%, versus BCC (24%) and SCC (18%) [15]. A multicenter Indian study conducted around 2019 reported 42.6% SGC and 36.4% BCC [16]. In a study by Kiran BR et al., the proportion of involvement of the lower eyelid was significantly higher than that of the upper eyelid in basal cell carcinoma ($P = 0.045$) [10]. In our study, there is a trend toward statistical significance, suggesting an association between BCC and lid location ($p = 0.060$), with BCC more commonly observed in the lower eyelid. However, the result does not reach conventional significance ($p < 0.05$).

A larger sample size may help clarify this relationship.

These figures align with our findings; SGC constitutes a significant proportion of eyelid malignancies in Indian cohorts (21.7%), although it often does not exceed half, as seen in larger tertiary studies. Conversely, BCC and SCC remain substantial but less prominent relative to SGC.

This study has several limitations. The number of malignant cases was relatively small ($n = 23$), reflecting the nature of our institution as a regional ophthalmology referral centre rather than a dedicated oncology facility. Consequently, patients requiring extensive surgical interventions, neoadjuvant chemotherapy, or adjuvant treatment were referred to tertiary oncology centres, contributing to the underrepresentation of advanced malignancies. Being a single-institutional study, the findings may not be generalizable to broader populations. The study was cross-sectional and focused on clinicopathological correlation; hence, longitudinal data regarding recurrence, survival, and treatment outcomes were not available.

Thus, our findings contribute important regional data while broadly aligning with emerging global trends. The persistent burden of SGC in our series underscores the need for clinician awareness and early histopathologic evaluation, particularly in Asian populations.

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