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ORIGINAL ARTICLE

Clinico-Pathological Profile of Basaloid Skin Tumors—Experience from a Tertiary Care Center of Eastern India

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Abstract

Basaloid tumors comprise a wide spectrum of benign and malignant tumors like basal cell carcinoma, seborrheic keratosis, pilomatricoma, basosquamous carcinoma, trichoblastoma, and cylindroma. Among them, basal cell carcinoma is the most common type which constitutes about 90% of all malignant skin tumor. This study was aimed at analyzing the clinico-pathological profile of basaloid skin tumors attending radiotherapy and surgery OPD of our institution and compares them with those of the reported literature from rest of the country as well as outside world. All cases of basaloid skin tumors presented at radiotherapy, surgery, and dermatology OPD between January 2020 and June 2021 with or without a histological diagnosis were evaluated. Those without a histological diagnosis underwent biopsy and categorized according to standard histological criteria. After histological confirmation, we collected demographic, clinical, and pathological data of the cases. Among 106 patients analyzed, 54.7% (58) cases were diagnosed as basal cell carcinoma followed by seborrheic keratosis (17.9%), pilomatricoma (13.2%), basosquamous carcinoma (9.4%), trichoblastoma (2.8%), and cylindroma (1.8%). Mean age of presentation was 57.03 (±7.435) years, and head-neck region was the most common site of involvement for basal cell carcinoma. Twenty-two cases required immunohistochemical assessment for confirmation of diagnosis. To conclude, this study is one of its first from Eastern India and will act as a stepping stone for future studies concentrating on clinico-pathological profile, early diagnosis and treatment of basaloid skin tumors.

Keywords Basaloid skin tumors · Clinico-pathological profile · Basal cell carcinoma · Tertiary health care center

Introduction

Basaloid tumors comprises a wide spectrum of benign and malignant tumors like basal cell carcinoma (BCC), seborrheic keratosis, pilomatricoma, basosquamous carcinoma, trichoblastoma, and Cylindroma [1]. Basaloid tumors consist of basal cells of the epidermis that appears more blue than pink on hematoxylin and eosin (H&E) staining. Basophilia is a consequence of a high nuclear—cytoplasmic ratio and relatively condensed nuclear chromatin.

BCC is the prototypical basaloid tumor of the skin but may show various patterns simulating other cutaneous non-neoplastic lesions, such as seborrhic keratosis, benign follicular tumors (such as trichoblastoma, trichoepithelioma, pilomatricoma, cylindroma, spiradenoma, or basaloid follicular hamartomas), and malignant tumors (such as sebaceous carcinoma, squamous cell carcinoma, or merkel cell carcinoma) [2]. Histopathology and immunohistochemistry (IHC) are extremely valuable adjunct to standard morphological diagnosis in

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diagnostic pathology. But, there is very limited amount of data available regarding the spectrum of basaloid tumors in India more specifically from Eastern India.

So, in this study, we analyzed the clinico-pathological profile of basaloid tumors attending our Institution and compare them with the data from other available literature.

Materials and Methods

It was a prospectively done observational and cross-sectional study among patients attending radiotherapy, surgery, and dermatology OPD of our institution and was diagnosed histologically as basaloid tumor between January 2020 and June 2021. Study was initiated after getting the Institutional Ethics Committee approval.

Inclusion Criteria

All patients with a primary basaloid tumor diagnosed by histopathological examination are included in this study.

Exclusion Criteria

1. Patients with skin tumors other than primary basaloid tumors are not included in the study.
2. Metastatic and mucosal basaloid tumors have been excluded in the study.

The sample size was calculated using the following formula:

$$n = Z^2 \times pq/e^2$$
$$= 1.96^2 \times 0.50 \times 0.50/0.1^2$$
$$= 96.04 \text{ (equivalent to 97)}$$

where, n = minimum required sample size $Z = 1.96$ at 95% confidence interval (CI), p = prevalence taken as 50% for maximum sample size calculation, e = margin of error, 10%.

Calculated sample size was 97. However, we included all the patients meeting the inclusion and exclusion criteria in this study. Convenience sampling was used.

Study Technique

All cases of basaloid skin tumors presented at radiotherapy, surgery, and dermatology OPD during the stipulated time period (January 2020 to June 2021) with or without a histological diagnosis were evaluated and their detailed clinical history was and demographic data were collected. Those without a histological diagnosis underwent biopsy from the lesion and categorized according to standard histological criteria.

We collected demographic data like age, sex, as well as the clinical data including site of disease, presenting symptoms, exposure to risk factors etc. Histological data were collected to categorize the lesion as well as IHC markers in terms of Ber EP-4, CK5/6, CD10, BCL-2, and EMA were recorded in selected cases. There is no source of financial grant or other funding.

Statistical Analysis

Data were analyzed and compared according to appropriate statistical tests using SPSSv.20 software and Microsoft word and Microsoft excel. Data were summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables. All tests were analyzed with a 95% confidence interval.

Results and Analysis

A total of 106 patients presenting with basaloid skin tumors were analyzed in this study. Lesions were categorized according to histological characters. Majority of the cases were diagnosed as basal cell carcinoma (54.7%) followed by seborrheic keratosis (17.9%), pilomatricoma (13.2%), basosquamous carcinoma (9.4%), trichoblastoma (2.8%), and cylindroma (1.8%) (Table 1).

Analysis was done on predominant disease entities namely basal cell carcinoma, seborrheic keratosis, pilomatricoma, and basosquamous carcinoma.

Demographic Characteristics

Most of the basal cell carcinoma patients (74%) were above the age of 50 years, and among them, 55% of the patients belongs to 51–60 years of age group. Mean age of presentation was 57.03 (±7.435) years. Eighty percent of basosquamous carcinoma patients were above 50 years of age.

Seborrheic Keratosis also had maximum number of patients (52.6%) in the age group of 51–60 years with the mean age of 51.5 (±6.734) years.

Pilomatricoma was more common in age group of 11–20 years (50%). Around 35% of the patients were below 10

Table 1 Distribution of basaloid tumors according to histology

Histological categorization	Number of cases (%)
Basal cell carcinoma	58 (54.7%)
Basosquamous carcinoma	10 (9.4%)
Cylindroma	02 (1.8%)
Pilomatricoma	14 (13.2%)
Seborrheic keratosis	19 (17.9%)
Trichoblastoma	03 (2.8%)
Total	106 (100%)

years of age. Mean age of presentation was 15.6 (±6.2) years.

Overall, there was a male (55%) predominance among all the cases of basaloid tumors with a male: female ratio of 1.2:1 (Table 2).

Clinical Characteristics

Basal cell carcinoma cases were most common in the face, head, and neck region (72.41%). Among them, 42% (18) cases were found in nasolabial region, 28.07% (12) cases in the cheek, 16.5% (7) in the ear and 11.9% (5) in the forehead.

Seborrheic keratosis was most commonly (58%) found in the upper extremity, whereas the scalp and the face was the most common site for pilomatricoma contributing 78% of cases.

Basosquamous carcinoma was almost equally common in the face and neck (50%) and the upper extremity (40%) region (Table 3).

As far as the clinical presentation concerned, nodular swelling was the most common manifestation constituting around 88% of the total cases. Among them, ulcerated nodules were most common (37%) especially in basal cell carcinoma cases. Other clinical presentations include pigmented plaque (8%) and plaque like lesion (4%).

Almost 53.4% of the patients with basal cell carcinoma and 60% of the patients with basosquamous carcinoma had a history of prolonged sun exposure. Saeborrheic keratosis had the highest number (35%) of cases with a history of pre-existing naevus followed by basal cell carcinoma (24.1%).

53.45% patients of basal cell carcinoma and 60% of basosquamous carcinoma patients had a history of prolonged sun exposure. Only 21.79% of the patients had a history of pre-existing naevus. Among the study population, 41.5% of the patients were smoker, and among them, 67% had basal cell carcinoma (Table 4).

Histological Characteristics

In our study, we found only 22 cases where histological findings were not sufficient to reach the confirm diagnosis. In such cases, immunohistochemistry (IHC) played an important role to ascertain the final diagnosis. The diagnostic dilemma occurred between basal cell carcinoma and basosquamous carcinoma (transition between basal cell carcinoma and squamous cell carcinoma). We employed the markers CK 5/6, CD 10, EMA, Ber-EP4, and Bcl-2 for further categorization. Basal cell carcinoma showed strong positivity for CK 5/6, weak positivity for CD10, diffuse positivity for Bcl-2, negative for EMA, and diffuse strong positivity for Ber-EP4. Whereas, basosquamous carcinoma showed strong positivity for CK 5/6, strong positivity for CD10, weak positivity for Bcl-2, positivity for EMA, and scattered positivity for Ber-EP4 (Table 5).

Discussion

A total of 106 subjects were studied in this case. Among these cases, we found majority of the cases to be as basal cell carcinoma (54.7%) followed by seborrheic keratosis (17.9%), pilomatricoma (13.2%), basosquamous carcinoma (9.4%), trichoblastoma (2.8%), and cylindroma (1.8%) (Table 1).

In our study, majority of the cases with basal cell carcinoma was in the age group of 51–60 years (55%) with the mean age (in years) of the cases being 57.03 (±7.43). This finding is consistent with the findings of Solanki et al. (mean age 54 years) and Kumar S et al. (mean age 60.9 years)[3, 4]. Majority of the cases of basal cell carcinoma patients were male (68.9%) with the male:female ratio being 2:1. This finding is consistent with the findings of Solanki et al. (1.26:1), Zargaran M et al. (1.65:1), and Malhotra P et al. (1.6:1) [3, 5, 6].

Table 2 Distribution of patients according to general characteristics

Characters		Histological diagnosis				Total
		Basal cell carcinoma	Seborrheic keratosis	Pilomatricoma	Basosquamous carcinoma	
Age (in years)	≤10	00 (0%)	00 (0%)	05 (35.71%)	00 (0%)	05
	11–20	00 (0%)	00 (0%)	07 (50%)	00 (0%)	07
	21–30	00 (0%)	00 (0%)	02 (14.28%)	00 (0%)	02
	31–40	03 (5.1%)	02 (10.5%)	00 (0%)	00 (0%)	05
	41–50	12 (20.6%)	06 (31.5%)	00 (0%)	02 (20%)	20
	51–60	32 (55.2%)	10 (52.6%)	00 (0%)	06 (60%)	48
	≥60	11 (18.9%)	01 (5.2%)	00 (0%)	02 (20%)	14
	Total	58	19	14	10	101
Gender	Female	18 (31.03%)	07 (36.84%)	06 (42.85%)	03 (30%)	46
	Male	40 (68.9%)	12 (63.15%)	08 (57.14%)	07 (70%)	55
	Total	58	19	14	10	101

Table 3 Distribution of patients according to site of lesion

Characters		Histological diagnosis				Total
		Basal cell carcinoma	Seborrheic keratosis	Pilomatricoma	Basosquamous carcinoma	
Site of lesion	Face and neck	42 (72.41%)	06 (31.5%)	11 (78.57%)	05 (50%)	05
	Upper extremity	12 (20.68%)	11 (57.89%)	03 (21.42%)	04 (40%)	02
	Lower extremity	04 (6.89%)	02 (10.52%)	00 (0%)	01 (10%)	05
	Total	58	19	14	10	101

In our study, we found that majority (53.45%) of the basal cell carcinoma patients had previous exposure to sun for a prolong period, and 20% of the patient had history of pre-existing naevus at the same site which is comparable with the study of George RM et al. [7].Many patients had exposure to more than one risk factor. Seventeen patients (29.31%) did not have any excessive exposure to the sun but gave a history of exposure to heat and fumes. These findings are nearly similar to the findings of George RM et al. (35%) and Raina RK et al. (32.5%) [7, 8]. 48.2% patients also gave positive history for smoking which is comparable to the findings of study conducted by Smith J et al. [9].

In our study, the head, neck, and face regions were the most (86.67%) common regions involved by basal cell carcinoma followed by 10% cases in the upper extremities and 3.33% cases in the lower extremities. This finding is consistent with the findings of Zargaran M et al. (84.8% in the head, neck, and face), Malhotra P et al. (91% in the head, neck, and face), and George RM et al. (92% in the head, neck, and face) [5–7].

Nodular swelling was the most common manifestation constituting around 88% of the total cases. Among them, ulcerated nodules were most common (37%) especially in basal cell carcinoma cases, which is comparable with the study of Solanki et al. (56.7%) [3].

We found 10 (9.43%) cases of basosquamous carcinoma in our study. As basosquamous carcinoma is the prototypical of basal cell carcinoma, we found similar pattern of distribution as per age, gender, site of lesion, and predisposing factor. The maximum number of patients having basosquamous carcinoma was in the age group of 51–60 (60%). The mean age of basosquamous carcinoma in years was 56.4 (±6.58). This was consistent with mean age of Nair SP et al. [10]. Majority of the cases of basosquamous carcinoma were male (70%) with the male:female ratio being 2:1. This finding is consistent with the findings of Ciążyńska M et al. [11].

In our study, majority of the basosquamous carcinoma occurred in the head and neck regions (50%) followed by the upper extremity (40%) echoing the study results of Alsaad KO et al. [12]. In our study, we found majority of basosquamous carcinoma patients had prolong exposure to the sun as the maximum patients were farmer and outdoor worker (60%). Twenty percent of the patients had history of pre-existing naevus at the same site which is also consistent with the findings of George RM et al. (20.7%) [7]. Some patients also gave positive history

Table 4 Distribution of patients according to exposure to risk factors

Characters		Histological diagnosis				Total
		Basal cell carcinoma	Seborrheic keratosis	Pilomatricoma	Basosquamous carcinoma	
Prolonged sun exposure	Yes	31 (53.45%)	06 (31.5%)	03 (21.43%)	06 (60%)	46
	No	27 (46.55%)	13 (68.42%)	11 (78.57%)	04 (40%)	55
	Total	58	19	14	10	101
Pre-existing naevus	Yes	14 (24.13%)	05 (26.31%)	01 (71.42%)	02 (20%)	22
	No	44 (75.8%)	14 (73.68%)	13 (92.85%)	08 (80%)	79
	Total	58	19	14	10	101
Exposure to fumes	Yes	17 (29.31%)	05 (26.3%)	00 (0%)	03 (30%)	25
	No	41 (70.68%)	14 (73.68%)	14 (100%)	07 (70%)	76
	Total	58	19	14	10	101
Smoking	Yes	28 (48.2%)	10 (52.63%)	01 (7.14%)	03 (30%)	42
	No	30 (51.72%)	09 (47.36%)	13 (92.85%)	07 (70%)	59
	Total	58	19	14	10	101

Table 5 Further categorization as per immunohistochemistry

Differential diagnosis	Immunohistochemistry markers				
	CK5/6	CD10	EMA	BCL2	Ber-EP4
Basal cell carcinoma	Strongly positive	Weakly positive	Negative	Diffuse positive	Diffuse strong positive
Basosquamous carcinoma	Strongly positive	Strongly positive	Positive	Weak positive	Scattered positive (squamous area does not take up stain)

for smoking (30%).This finding is contradictory to the findings of the study conducted by Smith J et al. [9].

In our study, we found only 22 cases, among the total 106 cases, where histological findings were not sufficient to reach the confirm diagnosis. In such cases, IHC played an important role to ascertain the final diagnosis (Table 5). The diagnostic dilemma occurred between basal cell carcinoma and basosquamous carcinoma (transition between basal cell carcinoma and squamous cell carcinoma). We employed the markers CK 5/6, CD 10, EMA, Ber EP4, and Bcl-2 for further categorization. We found that CD 10 is weakly positive in basal cell carcinoma and strongly positive in basosquamous carcinoma. This is consistent to the studies conducted by Patil DT et al., Ramezani M et al., and Panse G et al. [13–15]. Bcl-2 showed diffuse positivity in basal cell carcinoma and weak positivity in basosquamous carcinoma similar to the findings of Cerroni L et al. [16].

Fourteen cases of pilomatricoma were noted accounting for 13.2% of the total cases with the male: female ratio of 1:1.5. In the studies conducted by Solanki et al., male: female ratio was 1:1 which was comparable to our study [3], but Shaikh S et al. had a male: female ratio of 1:3 which was contradictory to our study findings. The majority of the cases were in the age group of 11–20 years (50%) with the mean age (in years) of presentation being 15.66 (±6). Most of the cases were found in the face and neck region (78.57%) and was similar to the study by Solanki et al. [3].

We found 19 cases of seborrheic keratosis in our study accounting for 20% of the total cases with the male: female ratio of 1.7:1. In the study conducted by Shaikh S et al., male: female ratio was 1.5:1 which was comparable to our study, but Rajesh G et al. concluded that it was 1:1.04 with a female preponderance which was contradictory to our study findings [17]. The majority of the cases were in the age group of 51–60 (52.6%) with the mean age of presentation (in years) being 51.58 (±6.73) which was consistent to the findings of Alapatt GF et al. and Rajesh G et al. [17, 18]. No relevance of exposure to predisposing factors was found in the studies by Alapatt GF et al. and Rajesh G et al. [17, 18], but we found smoking in 52% cases and history of sun exposure in 31% cases. So, smoking and history of sun exposure can be considered as a risk factor for seborrheic keratosis. Pigmented plaque lesion was mostly found in our cases consistent with the observations by Alapatt GF et al. [18].

Limitations of the Study

It is a short-time based single institutional study having a limited number of cases. Only six variants of basaloid tumors were recorded in our study so proper categorization of complete spectrum of basaloid tumors could not be performed.

Conclusion

The diagnosis of basaloid tumors presents with unique difficulties related to the close resemblance among the wide variety of tumors, so clinico-epidemiological profile and detailed histopathological examination with immunohistochemical correlation is of utmost importance. This study is one of its first from Eastern India which can act as a stepping stone for future studies concentrating on clinico-epidemiological profile, prevention and early diagnosis of basaloid skin tumors. Malignant basaloid tumors have a good prognosis if diagnosed early, so proper histopathological examination is essential for preventing complications and recurrence. Strategies should also be made for improvement of treatment delivery, co-ordination between different departments and ensuring treatment completion and regular follow up for each patient by counseling, rehabilitation and support.

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Author Contribution Sampriti Puitandi:conceptualization, writing—original draft preparation.
Shiladitya Misra: data curation, investigation.
Koustav Biswas: methodology, visualization, validation.
Linkon Biswas: formal analysis, writing—reviewing and editing.
Uma Banerjee: supervision, writing—reviewing and editing.

Data Availability All the data are available with the authors. If required it can be provided.

Declarations

Ethics Approval This is an observational study. The Institutional Ethics Committee of Kolkata Medical College and Hospital has given the ethical approval required for this study (Reference Number: MC/KOL/IEC/NON-SPON/526/01/2020 Dated 25/01/2020).

Conflict of Interest The authors declare no competing interests.

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