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Original Article

Histomorphological Pattern of Malignant Skin Tumors – A Cross-sectional Study in a Teaching Hospital

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ABSTRACT

Introduction: The incidence of skin cancer is increasing exponentially around the world. This study aims to analyze different malignant skin tumors concerning age pattern, gender, and site-wise distribution.

Materials and Methods: This is a descriptive cross-sectional hospital-based study carried out in the Department of Pathology, a tertiary care center for over ten years from April 2011 to March 2021. All malignant skin tumors arising from the epidermis along with melanocytic and adnexal tumors were included in the study.

Results: A total of 208 cases of skin malignancies among which 117 (56.3%) cases were males and 91 (43.8%) females with a male to female ratio of 1.3:1. Overall, the majority were seen in the sixth decade 49 (23.6%) with head and neck region 113 (54.3%) being the commonest site of involvement. Basal cell carcinoma 79 (38%) was the most frequent non-melanoma skin cancer followed by squamous cell carcinoma 75 (36.1%). A maximum number of basal cell carcinoma were observed in the sixth decade 19 (24.1%) whereas squamous cell carcinoma in the seventh decade 21 (28%) cases. Other skin cancers were malignant melanoma 31 (14.9%), verrucous carcinoma 13 (6.3%), trichilemmal carcinoma five (2.4%), sebaceous carcinoma two (1%), and one case each of eccrine carcinoma, malignant nodular hidradenoma, and malignant proliferating trichilemmal tumor.

Conclusions: Skin malignancies were seen in the sixth decade with male preponderance. Overall, the head and neck region was the commonest site of involvement. Basal cell carcinoma was the most frequent non-melanoma skin cancer followed by squamous cell carcinoma.

Keywords: Basal cell carcinoma; Malignant melanoma; Non-melanoma skin cancer; Squamous cell carcinoma.

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INTRODUCTION

Skin is the largest and heterogeneous organ of the body with varied elements of ectodermal and mesodermal origin, capable of producing various types of skin tumors.[1,2] The incidence of skin cancer is increasing exponentially around the world.[3] Three most frequent primary skin cancers are basal cell carcinoma (BCC), squamous cell carcinoma (SCC), in combination referred to as non-melanoma skin cancers (NMSC), and malignant melanoma (MM).[4]

The number of new cases of NMSC was found to be almost 3.7 times higher than MM.[5] The incidence of skin tumors varies widely in different parts of the world. The incidence of MM was highest in Europe (50.1%) whereas NMSC (46.3%) was highest in North America.[5] BCC was more common in Finland.[6] Asia showed an almost similar incidence of both NMSC and MM.[7] In Nepal, the true incidence of skin cancers is not established.[2]

Skin adnexal tumors (SAT) are of a vast and varied group that exhibits morphological differentiation towards one of the different types of adnexal epithelium present in normal skin i.e., pilosebaceous unit, eccrine and apocrine.[8] Establishing a diagnosis of malignancy in SAT is important for therapeutic and prognostic purposes and it solely relies on the histological examination.[9]

This study aims at the analysis of different malignant skin tumors according to World Health Organization (WHO).[10] Frequency distribution of age pattern, gender, and site of different types of skin cancers can be an important source of etiological clues and thus was included in this study.[11]

MATERIALS AND METHODS

This is a descriptive cross-sectional hospital-based study of malignant skin tumors carried out in the Department of Pathology at Manipal Teaching Hospital, a tertiary care center in Pokhara, Nepal. The study included data collected over a period of 10 years, from April 2011 to March 2021. Prior ethical approval from Institutional Review Committee (IRC) was taken with Ref no MEMG/IRC/438/GA. The histopathology slides of the cases within the study period were retrieved and reviewed from the departmental data bank. The relevant clinical data (age, gender, and site) were obtained from the histopathology requisition forms. The study included all the histopathologically diagnosed cases of malignant skin tumors arising from the epidermis along with melanocytic and adnexal tumors. All the benign and non-neoplastic skin lesions along with mesenchymal tumors, hematolymphoid tumors, neural tumors, cystic lesions, and skin secondaries were excluded from the study. The skin biopsies without adequate demographic profiles and where proper sites were not mentioned were also excluded from the study.

The skin biopsies received in the histopathology section were fixed in 10% buffered formalin for 24 hours. After noting the gross features of the specimen, multiple sections were taken. Then, they were processed and embedded in paraffin wax. Thin sections of 3-5 microns were made and stained with Hematoxylin and Eosin stain as per the standard protocol. Special stains like Masson-Fontana were employed wherever necessary. The histopathological analysis was done under light microscopy and histological classification of the tumors was done according to WHO classification guidelines of skin tumors (2018).[10] The data collected were entered in Microsoft Excel sheet and analyzed by using Statistical Package for the Social Sciences (SPSS) version 25 software. Descriptive statistics like mean and frequency were used to organize and analyze the data.

RESULTS

This study included 208 cases of histologically diagnosed malignant skin tumors which comprised 35.9% of the total 580 cases of skin neoplasms received during the study period. There were 117 (56.3%) males and 91 (43.8%) females with a male to female ratio of 1.3:1. The age ranged from 8 years to 96 years with a mean of 63.24 years. The malignant skin tumors were most frequent among the age group 61-70 years comprising of 49 (23.6%) cases followed by age group 71-80 years with 45 (21.6%) cases (Table 1).

Table 1: Frequency distribution of various skin malignancies according to age group and gender

DIAGNOSIS		AGE GROUP (Yrs)									GENDER (n)		Frequency (n)	Percentage (%)
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	>80	M*	F†		
Keratinocytic (n=167)	**Basal cell carcinoma**	0	4	2	7	4	17	19	13	13	36	43	79	38.0
	Squamous cell carcinoma	1	1	1	5	6	11	13	21	16	52	23	75	36.1
	Verrucous carcinoma	0	1	0	0	0	3	5	4	0	10	3	13	6.3
Melanocytic (n=31)	**Malignant melanoma**	0	2	2	3	1	5	9	5	4	16	15	31	14.9
Adnexal (n=10)	**Trichilemmal carcinoma**	0	0	0	0	0	0	1	1	3	2	3	5	2.4
	Sebaceous carcinoma	0	0	0	0	1	0	1	0	0	1	1	2	1.0
	Eccrine carcinoma	0	0	0	0	0	0	1	0	0	0	1	1	0.5
	Malignant nodular hidradenoma	0	0	0	0	0	0	0	1	0	0	1	1	0.5
	Malignant PTT‡	0	1	0	0	0	0	0	0	0	0	1	1	0.5
	Total	1	9	5	15	12	36	49	45	36	117	91	208	100.0

*M - Male, †F - Female, ‡Malignant PTT – Malignant Proliferating Trichilemmal Tumor.

Overall, the head and neck region was the most common site for malignant skin tumors 113 (54.3%) followed by lower extremities 51 (24.5%) (Table 2).

Table 2: Frequency distribution of skin malignancies according to the site of involvement

DIAGNOSIS	SITE (n)							
	head & neck	lower extremities	Ano-genital	trunk	upper extremities	Supra-clavicular	gluteal region	Total (n)
Basal cell carcinoma	75	1	0	2	0	1	0	79
Squamous cell carcinoma	29	21	18	2	2	1	2	75
Malignant melanoma	1	24	0	1	5	0	0	31
Verrucous carcinoma	3	5	2	3	0	0	0	13
Trichilemmal carcinoma	3	0	1	1	0	0	0	5
Sebaceous carcinoma	0	0	0	1	1	0	0	2
Eccrine carcinoma	1	0	0	0	0	0	0	1
Malignant nodular hidradenoma	0	0	0	1	0	0	0	1
Malignant PTT*	1	0	0	0	0	0	0	1
Total	113	51	21	11	8	2	2	208

*Malignant PTT – Malignant Proliferating Trichilemmal Tumor.

In the current study, category-wise distribution of malignant skin tumors showed that the majority were keratinocytic 167 (80.3%) followed by melanocytic 31 (14.9%) and adnexal 10 (4.8%) origin. The incidence of BCC was more among the keratinocytic tumor comprising 79 (38%) cases followed by SCC with 75 (36.1%) cases. There was a female predominance of 43 (54.4%) in the BCC whereas males were 52 (69.3%) in cases of SCC. The majority of BCC were observed in the age group of 61 – 70 years 19 (24.1%) whereas SCC was more common in the age group of 71 – 80 years with 21 (28%) cases. In the current study, both the BCC and SCC were commonly seen in the head and neck region comprising 75 (94.9%) and 29 (38.7%) respectively whereas the majority of the MM were encountered in the lower extremities 24 (77.4%). Histologically, 61 (81.3%) cases of SCC were diagnosed as well-differentiated SCC and 14 (18.7%) cases as moderately differentiated SCC. Nodular or solid type (63.3%) was the predominant histological type of BCC in the current study. A total of 13 (6.3%) cases of verrucous carcinoma were observed with male predominance and mainly seen in the sixth decade (38.5%) of life.

In this study, there were a total of 31 (14.9%) cases of MM with male preponderance 16 (51.6%) and were commonly encountered among the age group of 61 – 70 years 9 (29%). Histologically, the majority of the cases were of nodular type (48.4%). Among the 31 cases, Breslow thickness was mentioned only in 21 cases. The majority of the cases were of high-risk category 11(52.4%) followed by intermediate risk 9 (42.9%) and one (4.7%) case was of low-risk category.

With regard to the malignant adnexal tumor, trichilemmal carcinoma was the most common tumor comprising of five (2.4%) cases followed by sebaceous carcinoma two (1%) cases. There was one case each of eccrine carcinoma, malignant nodular hidradenoma, and malignant proliferating trichilemmal tumor (PTT) respectively.

DISCUSSION

Skin cancers are relatively uncommon malignancies worldwide but their incidence has increased dramatically over the last few decades.[5,12] BCC and SCC, which are commonly referred to as NMSC, and MM are the three most frequent primary skin cancers.[4] Though the incidence of skin cancers varies widely in different parts of the world,[5,6] its true incidence in Nepal has not been established.[2] The incidence of NMSC is more than three times that of other cancers in Australia[13] and is higher than that of any other cancers in the USA.[14] The incidence of NMSC (BCC and SCC) is much more common than melanoma in this study and other studies of Nepal.[2,15,16]

Malignant skin tumors occur mainly in the sixth, seventh, and later decades which coincide with the present study where the majority were in the sixth decade (23.6%) of life followed by the seventh decade (21.6%).[17-19] The frequency of skin cancers in men and women is different. The current study shows male preponderance comparable to other studies.[1,18-20] This may be due to certain risk factors for males such as increased outdoor activity, prolonged exposure to sunlight, trauma, and occupation such as farmers.[21] Skin cancers occur mainly in the sun-exposed areas and the face and neck areas of the body.[18-20,22] The current study also shows 54.3% of the reported skin cancers in the head and neck region which demonstrate the major influence of sun exposure in the development of skin cancers.

In this study, BCC was the most frequently diagnosed skin cancer followed by SCC and this finding is consistent with the studies done in other parts of Nepal[2] and other Asian countries[23-26] as well as Caucasian populations,[27] Whereas, various other studies found SCC as the most prevalent skin malignancy.[11,12,20,28,29]

The majority of BCC were observed in the sixth decade of life 19 (24.1%) whereas SCC was more common in the seventh decade

21 (28%). Rajbhar et al. and Laishram et al. found maximum cases of BCC in the seventh decade with occurrences of 44.44% and 30% respectively.[1,7] Furthermore, in the study of Adinarayan and Krishnamurthy, the majority of cases of BCC were encountered in the seventh and eighth decades.[30] Similar to this study, Rajbhar et al. and Laishram et al. also found a majority of cases of SCC in the seventh decade.[1,7]

There was a female preponderance of BCC in the present study which is similar to the observations of other studies done by Laishram et al.,[1] Rajbhar et al.,[7] Souza et al.,[31] Kumar et al.[32] and Saldanha et al.[33] In this study, SCC was commonly observed in the male which is consistent with the studies done by few other studies.[1,7,30,34,35] Concerning the site of involvement, both BCC and SCC were found commonly in the skin of the head and neck region of the body similar to other studies done in Nepal and other Asian studies.[2,24,25] In contradiction to this study, Rajbhar et al. reported lower extremities as the commonest site of involvement for SCC.[7] This area of the body is the most sun-exposed area which is the main environmental etiological factor for these tumors. Ultraviolet rays act by inducing DNA mutations and immunosuppressants, leading to uncontrolled growth and tumor formation.[36]

In the current study, 81.3% of SCC cases were diagnosed as well-differentiated SCC histologically similar to the study done by Rajbhar et al. where among 21 cases of SCC, 80.95% were diagnosed as well-differentiated.[7] Laishram et al. in their study of 40 cases found 65% cases as well-differentiated SCC.[1] Nodular or solid type (63.3%) was the predominant histological type of BCC in the current study as observed by other studies by Rajbhar et al.,[7] Adinarayan and Krishnamurthy,[30] Saldanha et al.[33] and Malhotra et al.[37] In addition, Laishram et al. and Souza et al. also reported nodular type as the most common type.[1,31] There were 12 cases of basosquamous carcinoma in the current study whereas in the study done by Rajbhar et al. and Saldanha et al. there were two and three cases respectively.[7,33]

Melanoma is the most lethal cutaneous malignancy. Although it comprises about 3% of all skin cancers, it accounts for about 75% of all skin cancer deaths.[38] In the present study, it was the third most common lesion similar to the study done by Laishram et al.[1] Whereas, Adhikari et al. observed MM as the fifth common skin cancer comprising 3.3%.[2] The sixth decade (29%) was the presenting age group in the current study similar to the studies done by Katalinic et al.[39] and Mukhopadhyay et al.[40] In contrast, Laishram et al.,[1] Rajbhar et al.,[7] Chaya et al.[34] and Gundalli et al.[41] reported melanoma most frequently in the seventh decade. In this study, a majority (51.6%) of MM cases were observed in males similar to the study done by Sharma et al.[42] whereas Talley et al.[43] (63.9%) and Gundalli et al.[41] (66.7%) found female preponderance in their studies. Similar to the other studies, the current study also showed lower extremities as the commonest site of involvement for melanoma.[2,41,40,44-46] Other studies stated that the frequency of melanoma was more in higher socioeconomic groups and indoor workers where the most common site was found to be back in men and lower limbs in women.[47,48] This may be due to the nature of exposure to sunlight necessary for the development of melanoma which appears to differ from that of NMSC. Breslow thickness of the tumor is the single most important factor in predicting survival of patients in MM and is measured from the granular layer to the deepest tumor cell.[7] In the current study, out of 31 cases, Breslow thickness was studied in 21 cases and the majority was found to be of high-risk category 11 (52.4%). Whereas in the study done by Soong et al., 60% of the patients had tumor thickness of more than 2.5 mm and none had thin melanoma.[49]

There were a total of 13 (6.3%) cases of verrucous carcinoma with male predominance and mainly seen in the sixth decade (38.5%). The majority showed involvement of the lower extremities (38.5%). In contrast to our study, Adhikari et al. observed one (1.7%) case of verrucous carcinoma in a female patient involving the lower extremity.[2] Adhlakha et al. reported five (10.9%) cases of verrucous carcinoma.[12]

The skin adnexal malignancies are relatively rarer and most of them arise in the head and neck region as this area is rich in appendages.[1] In contrast to the other studies, the maximum number of trichilemmal carcinoma (2.4%) was observed in the current study.[12] There were two cases of sebaceous carcinoma in the current study similar to the study done by Radhika et al.[50] Vani et al. observed four cases of sebaceous carcinoma.[51]

CONCLUSIONS

The majority of the skin malignancies were encountered in the sixth decade with male preponderance. Overall, the head and neck region was the most common site of involvement. BCC was the commonest NMSC followed by SCC. A maximum number of BCC were observed in the sixth decade whereas SCC was in the seventh decade. BCC showed female predominance while SCC was mainly seen in males. MM was the third common skin cancer with male predominance and was mainly seen in the sixth decade of life. Both BCC and SCC were commonly seen in the head and neck region. Trichilemmal carcinoma was the commonest skin adnexal tumor followed by sebaceous carcinoma.

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