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Histologic Subtypes of Cutaneous Basal Cell Carcinoma Diagnosed in Federal Medical Centre Umuahia, Abia State, Nigeria

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Abstract

The most prevalent malignant tumor in humans is basal cell carcinoma (BCC), and its frequency has been rising over time. This study examined the histological subtypes of cutaneous BCC identified at the Federal Medical Centre, Umuahia, Nigeria. The study examined the histological subtypes of cutaneous BCC using a cross-sectional retrospective 7-year hospital-based approach. Out of 150 instances of cutaneous malignancies, a total of 42 (28%) cases of BCC were diagnosed. According to body regions, the head and neck account for 30 cases (71.4%), followed by the body (trunk) with 8 (19.0%), and the extremities with 4 cases (9.5%). Of the 42 BCC cases, 29 (69.0%) were detected in females, and 13 (31.0%) in men. The age group with the largest BCC occurrence was 50–59 years old (16 cases, or 38.1%), whereas the age group with the lowest incidence was 70–79 years old (1 case, or 2.4%). There were 17 nodular subtypes (40.5%), 9 superficial subtypes (21.4%), and 7 basosquamous subtypes (16.7%) of BCC detected. Infiltrating and morpheaform variants had 5 instances (11.9%) and 4 cases (9.5%), respectively. The data obtained from this study about the prevalence of BCC subtypes in the hospital may serve as a roadmap for future investigations into BCC management.

Keywords: *cutaneous basal cell carcinoma, histological subtypes, nodular, superficial, squamous, infiltrating and morpheaform variants*

Introduction

Basal cell carcinoma (BCC) was referred to as "ulcus rodens" by Jacob in 1827. However, Krompecher proposed the present terminology for the condition in 1903.¹ Since then, the cancer has continued to change, and in contrast to what was initially believed, certain aggressive variations have now been identified. It is the most prevalent malignant tumor in people, and during the past few decades, its frequency has increased. Despite the low death rates and infrequent occurrence of metastases, the disease is considered a public health concern due to the high frequency of BCC among Caucasians and the rate of recurrence

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even among Blacks, which heavily burdens the health system. $^{\rm 1,\,2}$

Approximately 75% of non-melanoma cutaneous cancers worldwide are basal and squamous cell carcinomas.^{3–5} The aggressive nature of some locales, histological subtypes, and tumor stages has persisted. These conditions can be locally invasive, return after treatment, and result in substantial morbidity and mortality.¹ When detected in its early stages, however, it has a good prognosis and a high rate of recovery.⁶ Although it was once thought that black people were less likely to develop basal cell carcinoma due to their darker skin, this is no longer the case due to the ongoing loss of ozone. Most tumors now develop in

sun-exposed areas of the body, such as the head, neck, and upper central region of the face. Trunk involvement is also increasing, accounting for 15–43% of BCC cases.⁷ Light-skinned people are more likely to develop basal cell carcinomas, which have a high yearly incidence in low-latitude nations.⁸

The incidence of basal cell carcinoma (BCC) varies by region in Nigeria. Research conducted in Markurdi by Ngbea *et al*, Samaila *et al* in Zaria, Adesuwa *et al* in Benin, Ganiyu *et al* in Oshogbo, Ngbea *et al* in Jos, and Ochicha *et al* in Kano revealed that the most common sites of basal cell carcinoma were the leg, foot, forearm, and face, with prevalence rates of 9.6%, 3.9%, 9.6%, 1%, 3.9%, and 4%, respectively.^{5, 9-12}

Another study in Benin revealed a higher prevalence of BCC among albinos, accounting for 72.2% of all BCCs.¹³ Brown *et al* that found that albinos account for 75% of BCC cases.¹¹ Black Africans with darker skin appear to be more resistant to skin cancer; nonetheless, a number of environmental factors, including burn scars and persistent leg ulcers, may contribute to the formation of cutaneous skin malignancies. The disparities in cutaneous skin cancer patterns between African Americans and Caucasians are most likely caused by differences in skin pigmentation as well as environmental variables.¹⁴

The spread of cutaneous basal cell carcinoma varies significantly between races, most likely as a result of melanin in darker-pigmented races providing protection from ultraviolet exposure.¹⁵ However, due to their proximity to the equator and increased exposure to solar UV radiation, African albinos are more likely than Caucasian albinos to develop skin malignancies. The difference in skin cancer prevalence between races is also reflected in the histological type of the disease.¹⁵

Among Caucasians in Europe, North America, and Australia, basal cell carcinoma is without a doubt the most prevalent dermatological cancer, making for 75% of all instances of non-melanoma skin cancer in this population.9, 13 Non-melanoma skin cancers (NMSC), primarily basal cell carcinoma, were the most frequently diagnosed malignancies in the US in 2008, accounting for more than 3.5 million cases annually. In Canada, NMSC incidence was documented at 73,000 new cases and 260 deaths.¹⁶ One in six Americans will acquire basal cell carcinoma at some point in their lifetime, based on current rates in the country.¹⁷ In several European nations, the incidence is likewise rising at a rate of three to seven percent.¹⁷

It's yet unknown how much NMSC affects people globally. In light of a recent study that projected 3.5 million cases annually in the United States, the World

Health Organization (WHO) estimated 2-3 million cases annually, which are most likely underreported. In 2009, Nora et al. from Germany reported that the annual number of new occurrences of non-melanoma skin malignancies was estimated to be 120,000, with basal cell carcinoma accounting for around 80% of these instances.¹⁸

The incidence rates in the United Kingdom seem to be rising faster than those in the rest of Europe.⁵ The incidence of NSMC is highest in Australia, where it affects 364,000 people, or 2% of the population. In 2001, the total cost of treating NSMC was \$264 million, making it the most expensive cancer.¹⁹

Basal cell carcinoma (BCC) has an incidence rate of >1000/100 000 person-years in Australia and 21.7% in India. It has a metastasis rate of 1 case per 14,000,000 and a death rate of 2 patients per 14,000,000 from locally advanced BCC.²⁰⁻²¹ A large financial burden for public health services has resulted from rising treatment costs caused by both rising incidence and increasing prevalence. The direct expenses of medical care plus the indirect costs related to lost productivity and life years make up the quantifiable financial cost. With a population of 23.13 million, Australia is expected to incur gross cumulative costs of \$511 million in 2010 for BCCs, diagnosis, therapeutic care. including and histopathology, and up to \$703 million by 2015. Similarly, the anticipated total annual cost of medical care for non-melanoma skin cancers reached \$650 million in the US, a country of 318.9 million people.²²

Thus, the goal of the current study was to look into the histologic subtypes of cutaneous basal cell carcinoma that were found during routine biopsies at the Federal Medical Center Umuahia in Abia State, Nigeria.

Materials and Methods

Study design

This was a seven-year (January 1, 2012–December 31, 2018) cross-sectional retrospective study conducted in the Department of Anatomical Pathology, Federal Medical Centre (FMC) Umuahia, Abia State, Nigeria to investigate the histological subtypes of cutaneous basal cell carcinoma. FMC Umuahia is one of the top tertiary healthcare facilities in Southeast Nigeria with 327 beds capacity and rotates between 850 and 1000 patient tissue specimens annually.

Study population

The study included all diagnosed cases of cutaneous basal cell carcinoma at the Department of Anatomical Pathology, FMC Umuahia, Abia State, between January 1, 2012, and December 31, 2018, with a histologic diagnosis of cutaneous basal cell carcinoma.

Inclusion and exclusion criteria

Haematoxylin and Eosin (H&E) slides and formalinfixed paraffin embedded (FFPE) tissue blocks of histologically identified cases of cutaneous basal cell carcinomas that were received in the Department during the study period were used in the investigation. Cases that had damaged or missing blocks were not included in the analysis.

Data collection

Duplicate copies of histopathologic reports published during the study period, formalin-fixed paraffinembedded tissue blocks, histopathology request cards, and related archive slides were among the materials that supplied data for this investigation. These resources provided demographic information, such as age and sex, specimen type, and histopathological diagnosis.

Microtomy and tissue preparation for staining

Fresh sections of the representative histologically confirmed cutaneous basal cell carcinoma tissue blocks were cut from formalin-fixed, paraffinembedded tissue blocks in situations where the slides had faded. Thin sections measuring 4 μ m were cut using a microtome, floated on charged slides, and incubated for 10 minutes at 55°C to melt the wax.²³ The sections were then de-paraffinized for 10 minutes in two xylene changes. The amount of xylene used was limited to 50ml per fifty slides in order to avoid wax artifacts. To get rid of the xylene, the tissue pieces



were run through two changes of 100% ethyl alcohol each for three minutes. The tissue sections were then immersed in 95% and 70% ethyl alcohols for three minutes each, followed by five minutes in an aqueous wash buffer. Hematoxylin and Eosin (H & E) was used to stain the slides and a light microscope was used for review and confirmation.²³

Data analysis

Data entry and validation were done using IBM SPSS Statistical software for Windows version 25.0 (IBM Corp., Armonk, N.Y., USA). The data were expressed as percentages.

Ethical considerations

Ethical approval for this study was obtained from the Health and Research Ethics committee of Federal Medical Centre Umuahia Abia State, Nigeria with the approval number: FMC/QEH/G.596/Vol.10/421

Result

Region-based distribution of cutaneous basal cell carcinoma

The cases of cutaneous basal cell carcinoma recorded in this study based on regions of the body shows the highest occurrence in the head and neck region with 71.4 % (30 cases) of the population. Next to the head and neck region in the incidence of BCC is the body (trunk) with 19.0 % (8 cases) prevalence. The least cases of BCC were recorded in extremities 4 cases only constituting 9.5 % of the 42 cases of cutaneous basal cell carcinoma observed in this study (Figure 1).

Figure 1: Region-based distribution of cutaneous basal cell carcinoma

Age	Sex			Total				
(years)								number of cases
	Male	Female	Nodul	Superfici	Basosquamo	Infiltrati	Morpheafo	
			ar	al	us	ng	rm	_
20-29	1	-	2	-	-	-	-	2
30-39	-	6	1	2	-	1	1	5
40-49	3	3	3	-	2	1	-	6
50-59	3	13	3	6	4	2	1	16
60-69	4	5	6	1	1	1	1	10
70-79	-	1	-	-	-	-	1	1
80-89	2	1	2	-	-	-	-	2
Total	13	29	17	9	7	5	4	42

Table 1: Age and sex distribution of histologic variants of cutaneous basal cell carcinoma

Age and sex distribution of cutaneous basal cutaneous carcinoma (BCC) and variants

The age range of BCC was 28 to 80 years, with a mean of 52.9 ± 13.5 years. Out of the 42 cases of BCC, 31.0% (13 cases) were found in males while 69.0% (29 cases) were in females, with a male to female ratio of 0.5:1 (**Table 1**). The highest frequency of BCC was at age range 50-59 years, with a frequency of 38.1% (16 cases) while the lowest frequency of BCC was noted at 70-79 years with just 2.4% (1 case). The second and

eight decades had frequencies of 4.8% (2 cases) each. The commonest variant of BCC was Nodular variant which accounted for 40.5% (17 cases) of BCC and it was mostly found at sixth decade. This was followed by superficial variant with a frequency of 9 cases (21.4%). Basosquamous variant of BCC constituted 16.7 % (7 cases) of the diagnosed cases. Infiltrating basal cutaneous carcinoma variant formed the penultimate distributed variant with 11.9% (5 cases) of the population. The least common variant of BCC was Morpheaform BCC with a frequency of 9.5% (4 cases).

Table 2:	Site distribution	of histologic	variants of	cutaneous	basal	cell carcinoma
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Anatomic Region	Histologic Variants of Cutaneous Basal cell carcinoma								
	Nodular	Superficial	Basosquamou	Infiltrating	Morpheaform	Total	Chi-	P-	
			S				square	value	
Head and	12	6	6	3	3	30	6.0	0.2	
Neck									
Body	4	1	1	1	1	8			
Extremities	1	2	-	1	-	4			
Total	17	9	7	5	4	42			

P-value less than 0.05 is taken to be significantly different.

Site distribution of cutaneous BCC and variants

Out of the 42 cases of BCC, 71.4% (30 cases) were seen in the head and neck region, 19.0% (8 cases) were in the body while 9.5% (4 cases) were seen in the extremities. The highest frequency among the variants of BCC in the head and neck region was nodular variant with 12 cases. This is followed by superficial and basosquamous variant with frequencies of 6 cases each. The infiltrating and morpheaform variants recorded 3 cases each in the head and neck region. There was no significant association between the

anatomic regions and the prevalence of histologic subtypes of cutaneous basal cell carcinoma (p>0.05) (**Table 2**). The face was the most frequently affected part in the head and neck region accounting for 53.3% (16 cases) of BCC as against the posterior auricular area which constituted the least affected part in the head and neck region (3.1% (1case)). Other areas of the head and neck affected by BCC in order of frequency included the scalp 23.3% (7 cases) and the neck 20% (6 cases) (**Table 3**).

In the body, the highest occurring variant was also nodular variant which amounted to 4 cases, while the superficial, basosquamous, infiltrating and morpheaform variants recorded 1 case each

(Table 2). The peri-anal site was the most common site for the truncal BCC with 50% (4 cases) frequency while the chest, vulva and back accounted for 25% (2 cases), 12.5% (1 case) and 12.5% (1 case) respectively

(Table 3). The extremities had the lowest number of cases and superficial variant was the most frequently occurring tumour with 2 cases. The nodular and infiltrating variant recorded 1 case each (Table 2). Other variants recorded no case in the lower and upper limbs. The most affected part in this anatomical site is the arm with a frequency of 50% (3 cases), while the foot and hand accounted for 33.3% (2 cases) and 16.7% (1 case) respectively (Table 3). However, there was no significant association (p>0.05) between the anatomic sites and the cases of the histologic subtypes.

Anatomic sites	Number of cases Chi-square	P-value
	(%)	
Head and Neck	12.0	0.21
Neck	6 (20)	
Scalp	7 (23.3)	
Face	16 (53.3)	
Posterior Auricular	1 (3.3)	
Body	8.0	0.24
Peri-Anal	4 (50)	
Vulva	1 (12.5)	
Back	1 (12.5)	
Chest	2 (25)	
<u>Extremities</u>	6.0	0.12
Arm	3 (50)	
Foot	2 (33.3)	
Hand	1 (16.7)	

Table 3:	Specific Site distribution of cutaneous basal cell carcinoma
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P-values less than 0.05 is significantly different.



Figure 2: Histologic variants of cutaneous basal cell carcinoma

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Histologic variants of cutaneous basal cell carcinoma

Five different histological subtypes of cutaneous basal cell carcinoma were recorded from the study population. The most common being the nodular variant with a frequency of 17 (40.5 %). Superficial variant constituted 21.4% (9 cases) whereas basosquamous variant amounted to 16.7 % (7 cases) of the histologically diagnosed variants of BCC. Others were infiltrating and morpheaform cutaneous basal cell carcinoma constituting 11.9 (5 cases) and 9.5 % (4 cases) respectively of the prevailing variants of BCC (**Figure 2**).

Discussion

The aim of this study was to determine the prevailing diversities of cutaneous basal cell carcinoma in Federal Medical Centre (FMC), Umuahia, South east, Nigeria. This study evaluated 97 cases of basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) which accounted for 64% of all cutaneous malignancies in FMC Umuahia over the 7 year period. The prevalence of cutaneous BCC accounted for 28% of all the cutaneous malignancies. Previous studies on cutaneous malignancies with emphasis on cutaneous BCC in some Teaching Hospitals in Nigeria by Ganiyu et al., Ngbea et al., Adesuwa et al., and Samaila et al., across the different regions within the country revealed a prevalence far lower than that found in this study.^{5, 10, 11, 12} Nonetheless, comparable research conducted in Egypt, Germany, and South Africa by Mahmoud and Nora et al. found prevalences of BCC as high as 80%, 77%, and 80%.26,18

Even though this hospital-based study may not accurately reflect the frequency of cutaneous BCC in South East Nigeria, it is interesting that the study's location is a referral center for Abia state indigenous people with skin illnesses. With a range of 28 to 80 years, the population's mean age was 52.9 ± 13.5 years, and the BCC peaked in the sixth decade of life. Studies carried done in the South-South region of Nigeria revealed that BCC peak age incidence occurred in the fifth and sixth decades.^{1, 19} Mahmoud in Egypt noted a peak in the seventh decade, and comparable peaks in age incidence were noted by Lear *et al* and David *et al* in Australia and Northern Europe. ^{7, 26, 8}

Male to female ratio of 0.5:1 indicated a higher prevalence of cutaneous BCC in females than in males. Ngbea *et al.*'s observation in Makurdi, where they reported an average male to female ratio of 1.4:1 in BCC, is in contrast to the observed ratio of BCC.¹⁰ The most frequent location of BCC in this study was

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on the head and neck, which includes the sunexposed regions of the face, ears, chin, and scalp, despite the fact that cutaneous BCC can occur anywhere on the skin. Reports from much of Nigeria, Africa, and the Caucasus also indicated that these areas were the most frequently observed locations.^{27,} 8, 18

The nodular, superficial, infiltrating, basosquamous and morpheaform were the most frequently encountered histologic variants of BCC in descending order in the present study with nodular variant being the commonest. Global estimates indicated that nodular variant was the commonest subtype of BCC with a reported prevalence of 60-80%.⁸ This is in-keeping with the high prevalence of 40% in this study. The frequency of 21.4% for superficial variant is comparable to the report by David et al.⁸ The third most frequent variant in this study was basosquamous with afrequency of 16.7% which is slightly higher than 5-8.4% that was documented in WHO 2018.8 The infiltrating variant is more prevalent than basosquamous in Caucasians and this variant tends to be more aggressive than that of basosquamous.6,8

There was a 9.5% morpheaform variety of cutaneous basal cell carcinoma, and nothing is known regarding the global and regional incidence of this type of BCC. Based on reports from Mahmoud *et al.*, basal cell carcinoma accounts for 77% of all malignant cutaneous malignancies and is the most common type of skin cancer in Egypt. In a related study conducted in South Africa, a frequency of up to 80% was shown.²² Another study by York *et al.* in the Cape region of South Africa looked at 4270 biopsies and found 13 cutaneous malignancies, with basal cell carcinoma ranking second among all cutaneous cancers with a percentage of 27.8%.²⁵

Conclusion

The commonest subtypes of cutaneous BCC in FMC Umuahia was Nodular basal cell carcinoma which accounted for 40%. This study has provided data on the histological variants of cutaneous basal cell carcinoma in Federal Medical Center, Umuahia, Abia State, South Eastern Nigeria which could be explored for further research in the management of the menace.

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