



Evolution, Morphological and Clinical Characteristics of Skin Cancers in Albinos Patients in Douala

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Abstract

Introduction: The risks of developing skin cancer and other skin conditions are extremely high in people with albinism and studies estimate that most of these people die from skin cancer between the ages of 30 to 40 years. In Sub-Saharan Africa, this genetic skin condition is 4 to 5 times superior (partly due to endogamy) to what we observe in the rest of the world and the lack of information on skin cancers within this population group does not permit to evaluate the gravity of skin condition. The objective of our work is to conduct a study analyzing the epidemiology, clinical aspects and evolution of skin cancer in albino in patients in the city of Douala.

Methodology: It was a retrospective, transverse and analytical multicentric study conducted in 3 health centers in the city of Douala (Douala General Hospital, Laquintinie Hospital, Douala, and Bonassama District Hospital) over a period of 10 years (2010-2019). All the medical files of albino patients who presented with skin cancer histologically confirmed were gathered consecutively. Data on socio-demographic, clinical, pathology, treatment types and therapeutic response were analyzed with the help of the SPSS software version 20.0.

Results: A total of 59 albino patient medical files were analyzed. The average age at diagnosis was 35.37 (min-max: 15 to 75) years. Malignant tumors were mainly distributed into basal cell carcinoma (28; 50.2%) and squamous cell carcinoma (26; 44.1%). The majority (28; 47.5%) of the patients presented tumors which were larger than 5 cm and the tumor lesion was unique in 62.7% of cases, a clinical lymph node invasion was found in 16.9% of patients and 6.8% amongst them presented with distant metastases. The malignant lesions were mainly located on the face (62.7%) and the histoprognotic factors found were the Breslow index ≥ 4 mm (59.3%) and the Clark level ≥ 2 (29.2%). Radiotherapy (81.3%) and surgery (29.2%) were the most used therapeutic methods. A bad observance was found in 20.8% of the patients. 79.2% of the patients either had a complete or partial therapeutic response, 20.8% were non respondent and 18.7% presented local recurrence after an average time of treatment of 22.4 months. The histological type "squamous cell carcinoma" (OR=1.2; IC 95% 1.9 to 152.7; p-value =0.01), the stage of the tumor (OR=11; IC 95% 1.78 to 67.9; p-value =0.03), Clark's level ≥ 4 (OR=19.5; IC 95% 2.2 to 171.8; p-value =0.007) and the non-respect of the treatment (OR=27.2; IC 95% 4.5 to 16.7; p-value =0.001) were the factors that significantly influenced the variable response to treatment.

Conclusion: Skin cancer in albinos population develops mainly on body parts exposed to UV radiations from the sun and in most cases is diagnosed at stage 2 of its evolution. A predominance of the histologic type basal cell carcinoma was observed and locoregional cancer treatment was found to be the main therapeutic arms with objective responses although they don't protect albino patients from a new skin cancer.

Keywords: Albinism; Skin cancer; Cameroun; Treatment

Introduction

Albinism is an illness that regroups hereditary affections related to an anomaly of the biosynthesis of melanin (a pigment produced in the specialized skin, hair, iris, retinal epithelium and internal ear hair) associated to a number and a normal structure of melanocytes [1]. The synthesis default of melanin in albino patient is due to the deficit of the activity or the absence of an enzyme called tyrosinase [2]. The reduction of this photo protective pigment is responsible for an accrued

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sensibility to UV radiations and a predisposition to skin cancer for albinos [3]. Although rare with a ratio of 1 out 17,000 albinos in the world, albinism is more frequent in Africa where the ratio is estimated at 1 out of 4,000 births [4,5]. Looking at the histopathology of Africa, squamous cell carcinoma is the most frequent in albinos population [6,7] and the average age of occurrence varies from 31 to 36 years old [8-10]. The main locations include the forehead (35%), the head scalp (19.6%) and the temporal zone (14.2%) [8].

In Cameroon, like in many other countries, the climatic conditions expose albinos to the risks of skin cancer. Due to insufficient data in our context and with the need to highlight the particularities associated with skin cancer in the albinos' population, we decided to conduct a study on the epidemio-clinical and evolution characteristics of skin cancer on albino patients in Douala.

Patients and Methods

We conducted a retrospective, descriptive and analytical study in 3 hospitals in Douala, the economic capital of Cameroon (Douala General Hospital, Laquintinie Hospital, Douala, and Bonassama District Hospital) from January 1st, 2010 to December 31st, 2019 (10 years).

We consecutively and non-probabilistically included the medical files of patients with a positive pathology report confirming of skin cancer who came to consult in the hospitals mentioned above during the period of study.

Data collection was done through clinical folders, consultation registers and pathology exam results registers from the following services: Oncology, radiotherapy and anatomopathology in the 3 hospitals mentioned above.

The following data was collected:

- Sociodemographic characteristics: age, sex, profession, education level;
- Clinical characteristics: tumor height, TNM stage, location of the lesion, lymph node involvement and distant metastases
- Pathologic characteristics: histology type, histoprognostic factors (Breslow index, Clark's Level, degree of differentiation);
- Therapeutic modalities such as chemotherapy, radiotherapy, surgery, therapeutic schemas;
- Evolution: Treatment response evaluation based on RECIST criteria, respect of the therapeutic project, appearance of recurrent disease, relapse time (which was equivalent to the duration between the end of the treatment and a recurring local appearance), appearance of new lesions, average response time calculated from the relapse time of patients who had a recurring local, locoregional or distant appearances.

The RECIST criteria allowed classification of the patients based on their response to the specific anticancer treatments implemented in the following ways [11]:

- Complete Response: Disappearance of all lesions. In addition, all lymph nodes whether targeted or not must have reached a dimension less than 10 mm in their smallest axis
- Partial Response: A reduction of at least 30% of the sum of the diameters of the targeted lesions, from the sum of the initial diameters

- Stabilization: Neither a complete, a partial nor a progressive response

- Progression: An increase of more than 20% of the sum of the diameters observed during the study including the Baseline visit. In addition, this sum must increase by at least 0.5 cm. The appearance of one or more lesions is equally considered as progressive.

The data collected was registered with the help of an input mask from Epi info version 7.1. The open-end questions were treated, and the qualitative variables were modified into dichotomic variables. The statistical analysis was conducted with the SPSS software version 20.0.

The statistical analysis was made up of two parts: A descriptive part describing frequencies, means and standard deviations; determining sociodemographic characteristics of albinos' patients who consulted in oncology services, to identify and characterize the different types of cancer and to locate and describe the therapeutic methods used to treat them. The second part of the statistical analysis consisted of developing a Logistic (LOGIT) model to determine the factors that influence the variable treatment response.

Prior to data collection, we obtained an ethical clearance from the ethical and institutional committee of the University of Douala of research and human health.

Results

Sociodemographic characteristics

During the period of study, 67 medical files of albino patients were gathered and 59 of them met our selection criteria. The gender ratio (male to female) of the population under study was 1.1:1 in favor of men. The average age of diagnostic was 35.37 years old, \pm 10.97 years old with outliers of 15 and 75 years old. The most represented age range was that of 25 to 35 with proportion of 45.8% as shown on Figure 1 below. The majority of the patients in the study were either unemployed (39%) or employed in the informal sector (37.3%) and two thirds of them had a high school level of education.

Clinical characteristics

In our study, malignant lesions were mainly located on the face (62.7%, n=37), the upper limbs and the back occupied the second (11.9%, n=7) and third (11.9%, n=7) respectively. Sixty-two-point seven percent of the patients showed up to consultation with a unique lesion and altogether, the average number of lesions was 1.59 with outliers 1 and 5. Figure 2 and 3 present images of facial and dorsal locations of skin carcinoma on albinos' patients.

Lesions of >5 cm were predominant with a proportion of 47.5%, followed by cells of height between 2 and 5 cm in 42.4% of cases

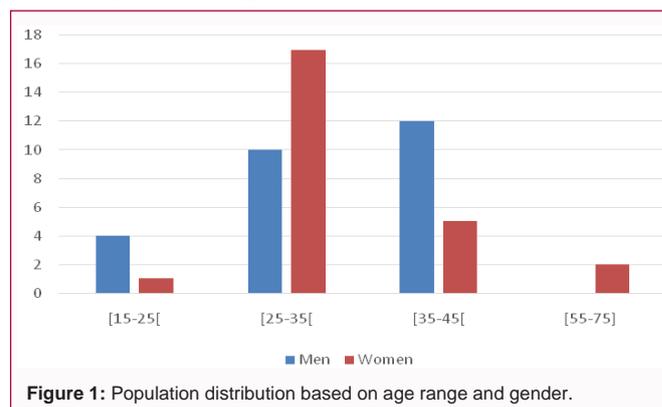


Figure 1: Population distribution based on age range and gender.



Figure 2: Photograph of a squamous cell carcinoma of the cheek in a Cameroonian albinos' patient (Dr Dina Bell).



Figure 3: Photograph of a basal cell carcinoma of the back in a Cameroonian albinos' patient (Dr. Mouelle Mbassi).

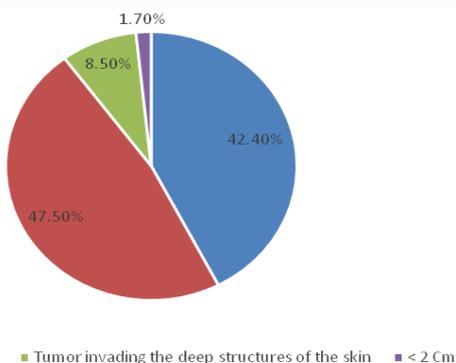


Figure 4: Population distribution based on the height of the tumor.

(Figure 4). Seventy-six-point three percent of the patients under study were diagnosed with stage 2 based on the UICC classification version 9. 10 out of 59 patients (16.9%) showed clinical lymph node involvement and the distant metastatic invasion showed in 4 patients out of 59, a proportion of 6.8%. Two patients showed bony secondary locations and two pulmonary secondary locations.

Morphologic characteristics

In our population, the basal cell carcinoma was the most represented histologic type with 50.2% of cases followed by the squamous cell carcinoma with 44.1% of cases. Figure 5 and 6 present histologic images of the squamous cell and basal cell carcinoma. Three patients presented multiple lesions with different histologic types either basal or squamous cell (Table 1). Fifty-nine-point three percent of the patients presented a Breslow index greater than 4mm and 29.2% of the patients presented a Clark's level greater than or equal to 4. Table 2 presents patients distribution based on the degree

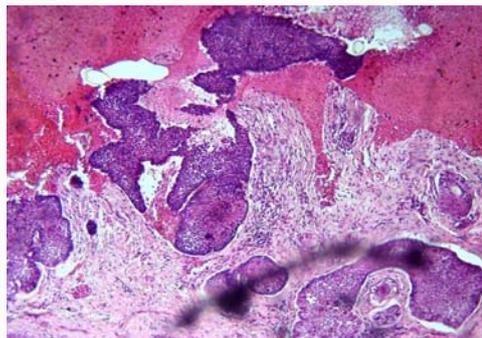


Figure 5: Histopathologic photograph of basal cell carcinoma in a Cameroonian albinos' patient (Dr. Ateba).

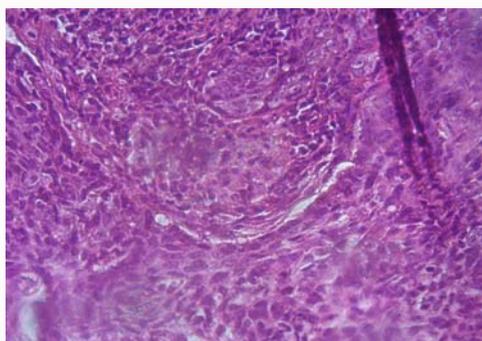


Figure 6: Histopathologic photograph of squamous cell carcinoma in a Cameroonian albinos' patient (Dr. Ateba).

Table 1: Distribution based on the histologic type.

Histologic Type	Effectives N=59	Percentage %
Basal Cell Carcinoma	28	50.2
Squamous Cell Carcinoma	26	44.1
Basal + Squamous Cell Carcinoma	3	5.1
Adenosquamous Carcinoma	1	1.7
Eccrine Carcinoma	1	1.7

Table 2: Distribution based on histopronostic factors.

Other histo pathologic Factors	Effectives N=59	Percentage %
Breslow >4 mm	35	59.3
Clark 4	21	29.2
Degree of Differentiation		
Well differentiated	3	5.1
Averagely differentiated	5	8.5

of differentiation, the Breslow index and Clark's level.

Therapeutic characteristics

Forty-eight out of 59 patients' folders benefited from a specific anti cancer treatment. Local treatments occupied the first place in the therapeutic arsenal of skin cancer in albinos. They were radiotherapy (81.25%, n=39) and surgery (29.17%, n=14). Chemotherapy was used in 18.75% (n=9) of patients as seen on the Table 3. Sixty-point four percent of the patients (n=29) benefited from an exclusive radiotherapy and 12.5% of the patients benefited from sequential surgery-Radiotherapy (Table 4). Prescribed treatment plans were not achieved in 20.8% of the patients due to financial hardship.

Most of the patients in the study responded to the prescribed

Table 3: Distribution of patients based on specific anticancer treatments.

Variables	Effectives	Percentage %
Surgery	14	29.17
Tumor Excision	12	25
Excision of the left peri-orbital mass with the exenteration of the left eye	1	2.08
Excision of the skin + total reconstruction by skin graft	1	2.08
Radiotherapy	39	81.25
Chemotherapy	9	18.75
Type of Chemotherapy		
Adjuvant	4	8.33
Neo Adjuvant	5	10.42
Protocole Applied		
CDDP-5FU	8	16.67
Paclitaxel	1	2.08
CDDP+Adriablastine	1	2.08
Number of cycles received		
3	6	12.5
4	2	4.16
2	1	2.08
5	1	2.08

Table 4: Distribution of patients based on the instituted therapeutic project.

Variables	Effectives N=48	Percentage %
Radiotherapy	29	60.4
Surgery + Radiotherapy	6	12.5
Surgery	4	8.33
Chemotherapy	3	6.25
Radiotherapy + Chemotherapy	2	4.2
Surgery + Radiography + Chemo	2	4.2
Surgery + Chemotherapy	2	4.2

therapeutic protocols with 54.2% of complete responses and 25% of partial responses. Tumor progression was observed in 10 patients (20.8%). A local recurrence was found in 18.7% of the treated patients. Eleven out of the 48 treated patients presented new lesions on different sites, a proportion of 22.9%; the main locations were the face and the neck with the respective frequencies of 12.5% and 6.25%. The average response time was 22.44 months ± 6.227 with outliers of 12 months and 30 months.

In bi-variable analysis, the risk of being a bad responder was 11 times greater in patients at stage 3 with a significant statistical difference (p-value =0.03). The other factors that significantly influenced the treatment response was the histologic type squamous cell, a Clark index greater than or equal to 4, the non-respect of therapeutic projects (Table 5).

In addition, the patients who were treated by radiotherapy exclusively had a response greater than those treated by surgery. However, the difference was not statistically significant (Table 6). The total dose delivered, hypo fractionation, hyper fractionation and normal fractionation don't have a significant statistical influence on the response treatment. Nonetheless, the objective responses were mainly observed on lesions treated with a dose between 50 and 65 GY (Table 7).

Discussion

Skin cancers are affections frequent in albinos' patients with a prevalence of 23.4% [12]. In 10 years, we collected 59 medical files of albino patients who were treated for skin cancer in 3 health centers in Douala. This number which seems small is representative of the burden of this illness in the Cameroonian albinos' population. It should also be noted that, the radiotherapy service of the Douala General Hospital has been the only operational functional radiation oncology unit in Cameroon for the past 10 years.

The gender (Male to Female) ratio was 1.1:1 in favor of Males. Mabula et al. [9] in Tanzania equally found males to predominate with a sex ratio 1.5:1. However, in Congo, Nsonde et al. [10] found females to predominate. This difference could be explained by differences in the effectives collected in our series, indeed our total number of files (n=59) is closer to the one used by Mabula in Tanzania (n=64), while that of Nsonde is inferior to ours (n=10).

With regards to the data on the professional status, 76.3% of our patients were either unemployed, employed in the informal sector as supported by Mabula et al. [9] in Tanzania who in his series found that 84% of the patients worked in sectors that did not necessarily require a specific qualification. It would be necessary to question ourselves on the access to education and a special medical follow-up during secondary education of albinos' patients who by their sight handicap should benefit from a particular social status. This sight handicap would help explain the weak academic performances and the premature end of studies justifying the preponderance of workers in the informal sector in the population of our study.

In our series, the average age of the patients at the time of their diagnosis was 35.37 years old ± 10.97 years, with outliers of 15 and 75 years old. The most represented age range was 25 to 35 years old (45.8% of cases). Based on the studies published by other African and concurring with the results of our series, the average age of cancers in the albinos population is situated around 30 years old, indeed, Nsonde et al. [10] in Congo, Mabula et al. [9] in Tanzania and Gbery et al. [8] in Côte d'Ivoire respectively found an average age of 36 years old, 30 years old and 31 years old.

This suggested that the phenomenon of malignant skin transformation would evolve over a decade and more. Indeed, the majority of the patients in our study signaled the appearance of first lesions in their teenage days.

Skin carcinomas are generally the consequences of successive and cumulative lesions of the DNA due to a repetitive exposure to solar UV radiations [13].

Hence, the first appearance of DNA lesions probably occur in childhood while the albinos child socializes with the community, thus exposing him/her to solar UV radiations at times without any protection and the multi stage cancerization process with the 3 known phases: Initiation, promotion and progression will follow its lead until the appearance of the first suspicious lesions on the skin.

The majority of the patients presented lesions with tumoral sizes >5 cm, that is in 47.5% of the patients under study, 42.4% of the patients presented tumors between 2 and 5 cm and 8.5% of the patients had tumors classified T4 with a profound invasion of the structures of the skin. The most represented stages were stages 2 and 3. This included patients presenting large tumors with ulcer characters, unaesthetic or painful motivated patients to consult. The

Table 5: Bi-Variable analysis of factors associated to the treatment to the response.

Associated factors		Treatment response				OR (IC 95%)	p-value
		Non		Yes			
		N	%	N	%		
tumor stage	stage 1	0	0.0%	1	2.6%	-	0.999
	stage 2	3	30.0%	33	86.8%	Ref	1
	stage 3	4	40.0%	4	10.5%	11 (1.78-67.9)	0.03*
	stage 4	3	30.0%	0	0.0%	-	0.999
Degree of differentiation	Well differentiated	3	75.0%	0	0.0%	Ref	1
	Moderately differentiated	1	25.0%	4	100.0%	-	0.999
Histological type	Other	0	0.0%	3	7.9%	-	0.999
	Basal cell carcinoma	1	10.0%	23	60.5%	Ref	1
	Squamous cell carcinoma	9	90.0%	12	31.6%	17.2 (1.9-152.7)	0.01*
index of Breslow ≥ 4 mm	Non	0	0.0%	13	34.2%	Ref	1
	Yes	10	100.0%	25	65.8%	-	0.999
Niveau Clark ≥ 4	Non	1	10.0%	26	68.4%	Ref	1
	Yes	9	90.0%	12	31.6%	19.5 (2.2-171.8)	0.007*
Compliance with treatment	Non	7	70.0%	3	7.9%	27.2 (4.5-163.7)	0.001*
	Yes	3	30.0%	35	92.1%	Ref	1
Number of factors	No	0	0.0%	11	28.9%	-	0.999
	1 factor	2	20.0%	14	36.8%	0.4 (0.04-5.5)	0.555
	2 factors	7	70.0%	10	26.3%	2.3 (0.1-34.8)	0.539
	3 factors	1	10.0%	3	7.9%	Ref	1

Table 6: Population distribution based on the response and therapeutic modalities.

Type of treatment	Therapeutic response				P Value
	Non		Yes		
	N	%	N	%	
Chemotherapy	3	30.0%	0	0.0%	0.999
Radiotherapy	3	30.00%	26	68.40%	OR (IC 95%) 0.423
Surgery	1	10.00%	3	7.90%	REF 1
Chemotherapy + Surgery	0	0.00%	2	5.30%	- 0.999
Surgery + Radiotherapy	0	0.00%	6	15.80%	- 0.999
Surgery+Radiotherapy +Chemotherapy	1	10.00%	1	2.60%	3 (0.08-107.5) 0.102
Radiotherapy + Chemotherapy	2	20.00%	0	0.00%	- 0.999

Table 7: Population distribution based on the therapeutic response and the irradiation dose received.

Response to treatment		Partial		Progressive		Complete		p-value
		n	%	n	%	n	%	
		Dose	<50	1	9.1	2	22	
50-65	7		64	6	67	13	57	
>65	3		27	1	11	4	17	
Number of fractions	<20	0	0	0	0	3	13.0	0.122
	20-30	11	100	9	100	16	70	
	>30	0	0	0	0	4	17	

precarious financial conditions of the patients under study help to explain their delay to consult.

Sixty-three percent of the patients had a unique lesion and thirty-seven percent (37.3%) presented more than one lesion; Seyed et al. [14] in Kenya equally found some albino patients with more than one

lesion location. In our population, the malignant lesions were mainly located on the face (62.7%), the upper limb (11.9%), the back (11.9%), the neck (10.2%), and the head scalp (10.2%). These results were similar to those of Seyed et al. [14] who found as main locations the hands (20.52%), the face (19.2%), the head (18.18%), the shoulders (14.56%) and the neck (7.94%). Kiprono et al. [6] in his study based

on the histologic aspect of cancers in albinos patients after analyzing 134 biopsies made in 86 patients, found that the head and the neck are the most cancer affected lesion locations (N=75.56%).

Indeed, this cartography finds its explanation in the fact that these are often the most exposed (uncovered) parts of our body. The climatic conditions in tropical regions motivate uncovered dressing outfits; to add the weak education and sensibilization of parents of albinos who do not take early basic precautionary measures for their children such as large end hats, long dresses are factors justifying the cartography of lesions in our patients.

The use of recommended sun creams for protection against UV solar radiations is often onerous for parents who live in African countries with limited resources where poverty is high.

Clinical lymph node invasion was observed in 16.9% of our observations that is 10 patient, and metastatic invasions in 6.7% of our population, that is 4 patients. Two patients presented pulmonary metastatic and two bony metastatic. Distant metastatic were found in patients with squamous cell carcinoma. Mabula et al. [9] equally found a distant metastatic invasion in 9.4% of the population in his study that is 6 patients, 3 with pulmonary metastatics and one with bony metastatics. In his study, he describes a lymph node invasion in 12.5% that is 8 patients, slightly inferior to ours (16.9%). The weak distant swarming proportion observed in our study.

Could be explained on the one hand by the preponderance of basal cell carcinoma whose malignity is more local or locoregional, and on the other had by the fact that squamous cell carcinoma develops from pre-cancerous lesions induced by UV solar radiations will be developed more slowly compared to squamous cell carcinoma that developed from chronic ulceration or novo squamous cell carcinoma [15-17].

Basal cell carcinoma was the most represented histologic type with a proportion of 50.2%, followed by squamous cell carcinoma (44.1%). Among the patients who presented more than one lesion, three of them had different histologic types per site, one lesion of histologic type basal cell carcinoma and one squamous cell carcinoma. Our results concord with those of Seyed et al. [14] in Kenya who equally found the preponderance of basal cell carcinoma. On the other hand, Kipronoe et al. [6] and Luande et al. [7] in Tanzania found the predominance of squamous cell carcinoma in albinos' patients. It is important to note that unlike the case of brown in Nigeria and Kromberg et al. [12] in South Africa, our study didn't find any case of melanoma [18]. The occurrence of melanomas in albinos' patients was described in a few studies, however, this is a rare histologic type in this population [7,9,19].

Indeed, exposure to sunlight and the photo type are the main risk factors of the occurrence of skin carcinomas. The cumulative exposition to sunlight throughout life plays an important role in the occurrence of basal cell carcinoma. This explains the occurrence of lesions on exposed photo zones such as the face and the decollete as described above. Aside exposure to sunlight, some authors argue that the incidence of the basal cell carcinoma on albino's patients in Africa is the consequence of post traumatic ulcerations due to their daily hard work to earn some money [14]. Locoregional treatments such as radiotherapy (81.25%) and surgery (29.17%) ranked first in the therapeutic arsenal of skin cancers in albinos. Oparah and Jiburum [20] in Nigeria and Mabula et al. [9] in Tanzania equally used locoregional treatments first in skin cancer treatment in albinos

patients, except that in their study, surgery followed by radiotherapy was more practiced, unlike our practice where radiotherapy only was the most used therapeutic method (60.4%).

The use of radiotherapy first could be explained by the preponderance of tumors of large heights (at least T3), hence not always permitting the use of surgery at first. Chemotherapy was used in 18.75% of patients at an advanced stage and the basic protocols on salt and Fluoro Uraccile were the most administered. Chidothe and Massamba [21] in Malawi found a benefit to do neo adjuvant chemotherapy in therapeutic treatment of advanced cancers in albinos. In our study 20.8% of patients (n=10) did not respect the instituted therapy for financial reasons; in Nigeria and in Tanzania, this proportion is higher compared to our study with proportions of 70% and 42.2% respectively [9,20]. In Cameroun, the subvention of radiotherapy permits the realization of this treatment which costs 180,000-franc CFA could explain this difference. In our series (N=48 treated patients), progression after treatment was observed in 20.8% of cases (n=10), meanwhile 79.2% of patients were respondent, that is 54.2% of complete responses and 25% of partial responses. A local recidivism was observed in 18.7% of treated patients, they occurred on average after 22.4 months (outliers 12 and 30 months). In his series, Mabula et al. [9] in Tanzania (N=64) the occurrence of recidivism was observed in 9.4% of patients (6 out of 64 patients). Although the proportion of local recidivism in Mabula's study was inferior to ours, this author used surgery as first treatment choice in 93% of cases described the occurrence of complications post operations in 31.3% of the patients with 4 deaths. To add, the difference in strength (sample height) of both studies would explain this difference in the occurrence of recidivism.

Eleven patients, that is, 22.9%, of the 48 treated patients, presented new lesions on locations different from the first one. The zones exposed to ultra-violet solar radiations such as the face in 12.5% of cases and the necks in 6.25% of cases were more affected.

In the bi-variable analysis, the factors that had a significant influence on treatment response were the tumoral stage, specifically stage 3 with an odd ratio of 11, the histologic type squamous cell carcinoma with an odd ratio of 17.2, Clark's index was greater than or to 4 with an odd ratio of 19.5 and the non-respect of the therapeutic project by patients with an odd ratio of 27.2.

Unlike our study in which no factor was significantly associated to the occurrence of a recidive, Mabula et al. [9] found a significant association between consultation time, the non-respect of the therapeutic project and the occurrence of recidives. According to the "National Comprehensive Cancer Network" the tumor's height and Clark's level greater than or equal to 4 are factors that influence the occurrence of a recidive skin cancer.

This work however presented some limits linked to its retrospective recruitment mode, which had as consequence insufficient information in the medical files of patients thereby not permitting the collection of all data in some patients.

Conclusion

Skin cancer is a pathology that mainly affects young albinos. A predominance of basal cell carcinoma in our study developed on the body parts exposed to UV solar radiations was, observed and the locoregional anticancer all treatments such as surgery and radiotherapy were found to be the main therapeutic responses to

this pathology. Objective responses are frequent; however, they were mainly influenced by therapeutic project, the histologic type, Clark's level and tumoral stage. Preventive and sensible measures to reduce albinos' exposure to sunlight from their childhood would be a solution to limit the appearance of this pathology.

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