Epidemiological study of basal cell carcinoma in a community hospital

Virginia Mariana González[1], Santiago Pablo Busso[2], Rita Leitner[2], Gabriel Casas[3], Margarita Larralde[4]

Abstract

Introduction. Even though basal cell carcinoma (BCC) is the most frequent human neoplasm, there are no precise statistics on this entity. In order to learn about the epidemiologic characteristics of our population we conducted a prospective, descriptive and transversal study.
Objective. To determine clinical, histopathological and demographic characteristics, and known risk factors of BCC in our population.
Materials and methods. Complete clinical history and histopathologic confirmation were performed for all patients with BCC that consulted the Hospital Aleman Dermatology Department between June 2007 and May 2008.
Results. The sample size consisted of 125 patients and 222 lesions. Sixty eight percent had only one lesion. The ages ranged from 32 to 103 years of age, with an average of 66 years. Forty one percent were females and 59 percent were males, with a male:female ratio 1.4:1. Ninety three percent of patients had phototypes II and III, with intense recreational sun exposure and severe photodamage. Thirty four percent had personal history of skin cancer. The distribution of lesions was as follows: 46 percent in head and neck, 27 percent in trunk, and 17 percent in limbs. The superficial form was the most frequent clinical type seen in trunk and limbs. The infiltrative growth histopathological variant prevailed in head, neck and limbs (41 percent), and the superficial variant prevailed in trunk (54 percent).
Conclusion. In the studied population, the more affected age range was 60 to 69 years, with higher prevalence in male patients, except for those younger than 40 years. A high percentage of patients had a personal history of skin cancer, and showed multiple simultaneous lesions. Most patients were of phototypes II and III, with a high degree of photodamage and of intense intermittent sun exposure (73 percent). Nevertheless, only 20 percent used sun exposure protection measures. Unlike what has been published, we found a lower percentage of head and neck involvement (46 percent), and a higher number of aggressive clinical and histopathological forms. Finally, we stressed the importance of carrying out epidemiological studies as the one hereby presented, which provide relevant data about our population, taking into account that no prospective studies have been recently published (Dermatol Argent 2009; 15(1):37-43).

Key words: *basal cell carcinoma, skin cancer, epidemiology.*

Introduction

The term non-melanoma skin cancer (NMSC) is commonly used with reference to basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). BCC is the most frequent malignant neoplasm in the Caucasian population and accounts for 80-85 percent of all skin cancers. Risk factors for the development of this pathology include those related to the host, and those related to environmental factors.
In the last few decades, BCC, more than SCC, has undergone a sustained increase of incidence,[1,2] including young populations.[3] Among other factors, this is due to changes in the sun exposure habits of certain population groups, and to depletion of the atmospheric ozone level. Since BCC incidence increases with age, greater life expectancy, along with a majority of elderly people in the population, are yet other factors involved in the growing number of cases, which shall continue to increase in the next few decades.
In spite of this worldwide increase in cases, true incidence of BCC is difficult to establish, because no exact regional and glo-

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1. Fellowship in Oncology Dermatology.
2. Staff Physician of the Dermatology Department.
3. Medical Dermatopathologist.
4. Head of the Dermatology Department.
Hospital Alemán of Buenos Aires. Argentine Republic.

Correspondence
Virginia Mariana González: virginiagonzalez30@hotmail.com

TABLE 1. DISTRIBUTION BY AGE GROUP.

Age	n	percent
Up to 39 years	5	4
40-49 years	14	11.20
50-59 years	19	15.20
60-69 years	38	30.40
70-79 years	23	18.40
80 years or more	26	20.80

TABLE 2. R.G. GLOGAU'S CLASSIFICATION OF PHOTOAGING.

Grade I or mild	No clinical keratoses; no wrinkling; without/minimal discoloration.
Grade II or moderate	Early actinic keratoses; yellowish discoloration; early wrinkling; parallel smile lines.
Grade III or advanced	Actinic keratoses; obvious yellowish discoloration; telangiectasia; wrinkling while at rest.
Grade IV or severe	Multiple actinic keratoses w/wo skin cancer; severe discoloration and telangiectasia; actinic, gravitational or dynamic wrinkling.

bal statistical records exist. This relates to the difficulty in systematically recording a high frequency pathology, which requires great resource availability to be carried out.

As in most parts of the world, there is no national register of BCC in this country, although hospital records have been published recently,[5] mostly retrospective and based on histopathological data. This work was brought about by the need of beginning to know the epidemiological characteristics of our population.

Objective. To estimate frequency distribution of known clinical and histopathological characteristics and risk factor of basal cell epithelioma in our population.

Materials and methods

Design. A prospective, observational, descriptive and cross-sectional study on BCC was conducted.

Study population. The study was performed among BCC patients of the Dermatology Department of Hospital Alemán of Buenos Aires, Argentina, during one year, between June 2007 and May 2008. Of the 243 BCC patients observed in that period of time, included were those with complete clinical and epidemiological data, and incisional and/or excisional histopathological study was performed and assessed by dermopathologists.

Excluded from this study were BCC patients assessed and treated in other Departments of the hospital, and those individuals without complete data.

Clinical records were obtained in a form designed to such effect, specifying gender, age, eye and hair color, phototype (according to Fitzpatrick's classification), history of UVR exposure, photoprotection, photoaging (according to Glogau's classification), and sunburns. Exposure to carcinogenic chemicals such as hydrocarbons, arsenic, and tobacco, personal and family history of skin cancer and other malignant neoplasias, the presence of immunosuppresion and genodermatosis with skin oncogenic potential were also considered.

As regards patient lesions, number, body location, size, evolution time, clinical form (according to the Argentine Dermatology Society [*Sociedad Argentina de Dermatología*, SAD] Consensus),[4] the presence or absence of pigmentation and ulceration, and histopathological variant were taken into account (WHO classification 2006).

A total of 125 adult patients of both sexes were included.

The study was performed with approval of the Hospital Ethics Committee.

Statistical analysis. Data was entered in a database (Excel-type), and then analyzed using a Pentium 4, 2.4 Ghz microprocessor and an Epi Info version 6.04 statistical package. Adequate descriptive statistics were determined for each variable according to their measurement and distribution scale. Where necessary, 95 percent confidence interval, binomial, and Chi square estimation calculations were performed (with statistically significant $p < 0.05$).

Results

Population characteristics

The sample comprised **125 patients**, in whom **222** basal cell carcinomas were diagnosed. The number of tumors per patient ranged from 1 to 16, with an average of 1.76, similar in males (1.79) and females (1.74). Sixty-nine percent (n=86) of patients showed only one lesion, while 26.4 percent (n=33) showed 2 to 4 tumors, 4 percent (n=5) 5 to 9, and 1 percent (n=1), more than 10 simultaneous lesions.

A significant dominance was found in males (M), representing 59.2 percent (n=74), compared to 40.8 percent (n=51) females (F), with a male/female ratio of 1.4 / 1 (p=0.04).

At the time of diagnosis, patient **ages** ranged between 32 and 103 years, averaging 66 years (64 in females, and 67 in males). Highest prevalence (30.4 per cent) was found in the age range between 60 and 69 years. Noteworthy, 20.8 percent of patients were 80 years or older. The 5 patients younger than 40 years were females (**Table 1**).

All patients were caucasians, with **phototypes** (according to Fitzpatrick's classification) I to IV. The highest percentage (52 percent) belonged to phototype II, with 65 patients, and III (40.8 percent) with 51 patients. A total of 5.6 percent of patients were phototype I (n=7), and 1.6 percent (n=2) of phototype IV.

There were no statistically significant differences (p=0.92) between the number of patients with light-colored eyes (49.6 percent) and dark-colored eyes (50.4 percent). Identical figures appeared with regard to hair color.

With reference to **sun exposure** habits, 72.8 percent (n=91) of patients (95% CI: 64.9-81) had high recreational exposure

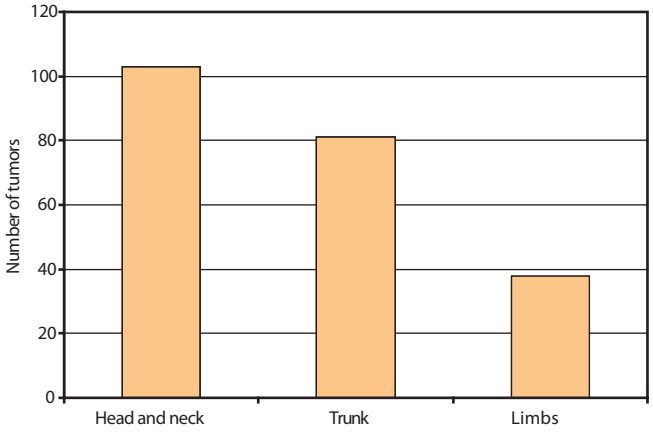

Chart 1. *Distribution by body site.*

TABLE 3. CLINICAL FORMS FOUND, AND DISTRIBUTION BY GENDER.

Clinical forms	Global (n=222 tumors)	Males (n=133 tumors)	Females (n=89 tumors)
	n (percent)	n (percent)	n (percent)
Superficial	70 (31.6)	40 (30)	30 (33.7)
Nodular	53 (23.8)	33 (25)	20 (22.4)
Morphocic	55 (24.77)	35 (26)	20 (22.4)
Papular	29 (13)	16 (12)	13 (14.6)
Ulcerated	11 (5)	7 (5)	4 (5)
Fibroepithelial of Pinkus	2 (0.9)	0 (0)	2 (2.24)
Keloidal	1 (0.45)	1 (0.75)	0 (0)
Cutaneous horn	1 (0.45)	1 (0.75)	0 (0)

(intense intermittent-type). Only 4.8 percent (n=6) of patients were exposed daily, for occupational reasons.

No significant use of **artificial tanning devices** was found in 97.6 percent (n=122) of patients, except in 3 cases (2.4 percent) (95% CI: 0.5-6.9), or **phototherapy** in 99 percent (n=124) of the cases (95% CI: 0.01-4.4).

A significant percentage of patients (58.4 percent; n=73) referred to a history of severe childhood and adolescence **sunburn** , where 41.6 ($p<0.0001$) did not.

No topical **photoprotection** was used in 87.2 percent (n=109) of patients, which is data of great statistical significance ($p<0.0001$). That is to say that only 20 percent of patients with previous skin cancer were currently using photoprotective measures.

Glogau's classification was used to assess **photodamage** (**Table 2**). Significant photodamage was found in 96 percent of the cases: 44 percent (n=55) of patients showed grade III of photoaging; 28 percent (n=35), grade II; 12 percent grade I; and 12 percent grade IV ($p<0.0001$).

With respect to other known BCC risk factors, frequent ocupational contact with *hydrocarbons* was only found in 4.8 percent (n=6) of the patients (95% CI: 1.76-10.17), *immunosuppression* in 8 percent (95% CI: 3.88-14.23), and no patient showed signs of *arsenicism or genodermatosis* with cutaneous oncogenic potential (Gorlin's syndrome, etc.) (95% CI: 0-2.9). *Radiotherapy* had been done in the involved area several years before in 3 cases as treatment for acnes, larynx cancer, and vascular malformation, respectively.

Only 4.8 percent (n=6) of patients referred significant or long-term tobacco smoking (95% CI: 1.76-10.17).

Of the 125 patients, 43 (34.4 percent) had **previous history of skin cancer** (95% CI: 26.1-46.4), of whom 58 percent had BCC exclusively. In these 43 patients there were 30 BCC, 9 SCC, 5 melanomas, and 4 epitheliomas of lineage unknown to the patient.

In 12.8 percent of the patients (n=16) there were extracutaneous neoplasias, without significant dominance of any type thereof.

Familial history of skin cancer was only recovered in 13 patients (10.4 percent). Of these, 5 were melanomas, 2 were NCC, and the rest were non-specified epitheliomas.

No statistically significant differences were found between genders in any of the variables analyzed before.

Lesion characteristics

Evolution time of carcinoma was less than 1 year in 46 percent (n=103), from 1 to 5 years in 42 percent (n=93), and from 10 to 20 years or more in 2 percent (n=4). This data was unknown to the patient in 10 percent of the cases.

As regards **body location (Chart 1)**, significant ($p<0.0001$) dominance was found in *head and neck*, with 46.3 percent (n=103), and the most involved area was the forehead (26 percent), followed by the cheeks (18.4 percent) and the nose (16.5 percent). Of these 103 cases, 60 (58 percent) were male, and 43 (42 percent) were female.

In 27 percent (n=81) lesions appeared on the *trunk*, with 49 percent on the back, and 47 percent on anterior thorax. Only 2 lesions appeared on the abdomen and 1 in the axilla. In this location, 49 lesions (60 percent) were on male patients, and 32 (40 percent) on female patients. Seventeen percent (n=38) appeared on the *limbs*. Of these, 58 percent involved lower limbs (with 77 percent dominance of the leg), and 42 percent to upper limbs (with equal dominance of shoulder and forearm in 37.5 percent). In limbs, 24 lesions (63 percent) were on male patients and 14 (36 percent) on female patients.

Tumor size was in 44 percent (n=98) of the cases 1 to 9 mm, 10 to 19 mm in 48.6 percent (n=108), 2 to 5 cm in 6.75 percent (n=15), and larger than 5 cm in 0.45 percent (n=1). Average size was 10 mm; largest size was found on the ulcerated clinical form (5 cm) (**Figure 1**).

The 4 most frequent **clinical forms** (93 percent) were: *superficial*, found in 70 patients (31.6 percent), *morphocic* (sclerosing) in 55 patients (24.7 percent), *nodular* in 53 cases (23.8 percent) and *papular* in 29 (13 percent). If the papular variant was included in the nodular form, this clinical presentation was the most frequent (37 percent) (**Figure 2**).

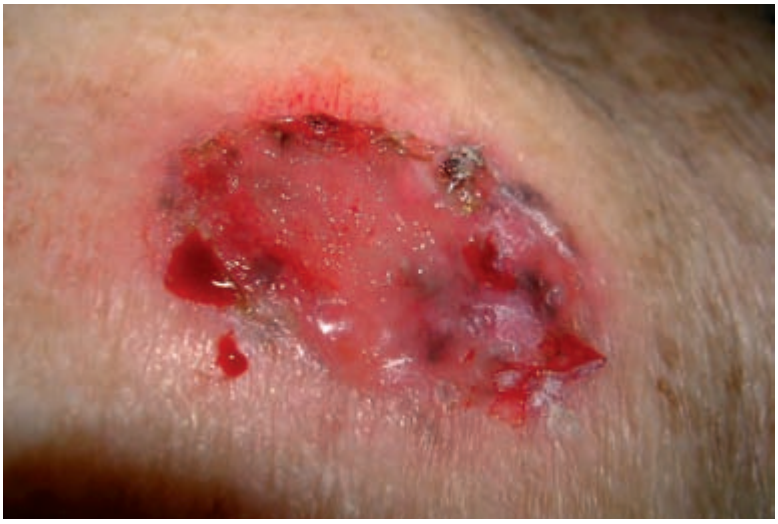

Figure 1. *Ulcerated clinical form: 5 cm lesion located on the back of an elderly patient.*

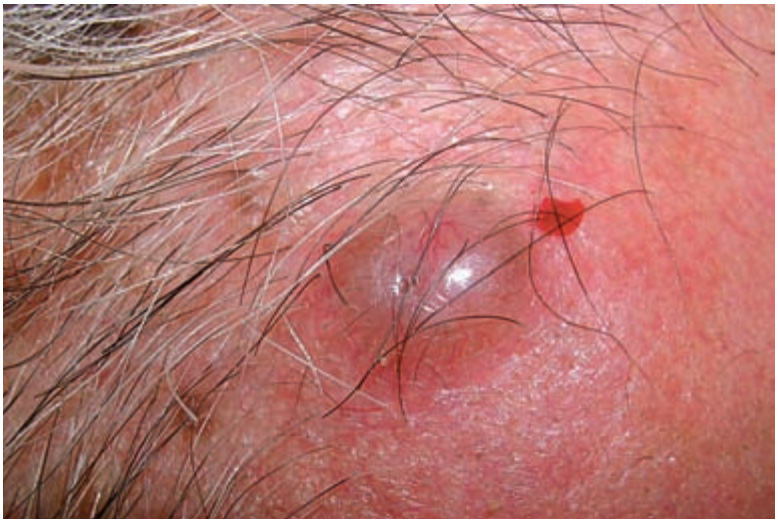

Figure 2. *Nodular lesion located on the forehead: this clinical form, taken together with the papular form, was the most frequent in our case-control study, and particularly in the head and neck area.*

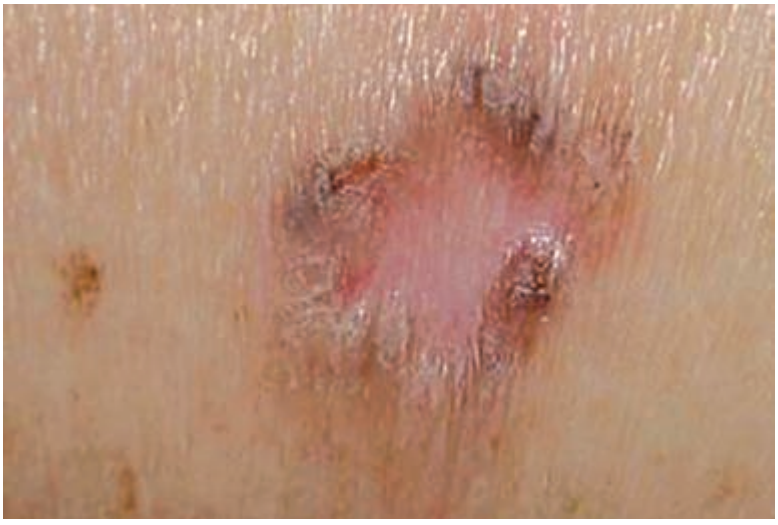

Figure 3. *Morphocic clinical form: highly frequent in head and neck.*

The rest of the clinical variants found were: ulcerated, terebrating, fibroepithelioma of Pinkus, cutaneous horn, and one keloidal case. There were no statistically significant difference between males and females (p=0.948) (**Table 3**). *Pigmentation* was found in 22.9 percent of the cases (95% CI: 17.6-29.1), similarly to *ulceration*, which was found in 22.5 percent of lesions (95% CI: 17.2-28.6).

As regards body location (**Table 4**): the most frequent clinical forms in *head and neck* were: morpheaform in 33 cases (32 percent) (**Figure 3**), nodular in 30 cases (29 percent) and papular in 25 cases (24 percent), with no statistical dominance (p=0.06), or by specific body area (forehead, nose, etc.).

In contrast, in trunk there was significant dominance of the superficial form (p<0.0001) (**Figure 4**), representing 49.3 percent of the cases (n=46), followed by nodular in 22 percent (n=16), and morphocic in 18.5 percent (n=5). Also found in trunk were 2 papular variants, 1 keloidal, and 1 fibroepithelioma of Pinkus (axilla).

Also dominant in limbs was the superficial form (p=0.05) in 44,7 percent (n=17), followed by nodular in 21 percent and morpheaform in 18.4 percent.

The patient with greatest number of lesions (16) was a 44-year-old female, and 2 of her BCC were fibroepithelial tumor of Pinkus (one in axilla and one in suprapopliteal region). The **histological variants** found in the 222 BCCs are shown in **Table 5**. The three subtypes found in greater numbers were infiltrative in 41.4 percent, followed by superficial, and nodular in 27.4 percent, respectively.

Variants found most frequently by body site were: in *head and neck*, infiltrative (cord-like) in 56.3 percent (n=58); in *trunk*, superficial in 54.3 percent (n=44); and in *limbs* infiltrating variant in 39.4 percent (n=15) followed by superficial in 34.2 percent (n=13). This predominance resulted statistically significant (p<0.0001).

As regards **therapeutics** applied on the 222 BCCs, 15 lesions were treated by photodynamic therapy, 2 by cryosurgery, 2 by imiquimod, and the rest (91.4 percent) by surgical excision.

Discussion

Incidence of BCC varies widely according to geographic area and race involved.[6,7] It is higher close to the equator and in caucasian populations that migrated to such latitudes, such as Australia and the Southwestern United States. In the latter, estimated incidence of BCC for 2008 was 1 million new ca-

ses,[8] and the incidence rate by race in males-females is 31-19.9 per 100,000 Caucasian inhabitants, 4.4-3.3 in Indians, and 5.8-5,9 in Hispanes.[9] Incidence in Europe ranges from 22 to 87 per 100,000 inhabitants, according to the country.[10] Highest rate is found in Australia, affecting 1 to 2 percent of the population.[11,12]

One of the major ethiologic factors of developing BCC is intense intermittent exposure to UVR, as continuous exposure (occupational) is for SCC.[6,13,14] Genetic susceptibility also plays a role in BCC development. A series of mutations and gene polymorphisms have been described in this pathology. Among them can be found those of melanocortin receptor 1 (MC1R),[15] p53,[16] Patched (PTCH) gen,[17] RAS, and others.

Although most worldwide cancer statistics exclude NMSC, as of the last decade some countries have created registers based on histopathological electronic databases. It is believed that there is an underereporting of 25-30 percent of tumors, because the system only requires registration of the first tumor for each patient, thus underestimating incidence of simultaneous or successive lesions of the same person (patient and not case incidence is recorded), which is frequent in these skin cancers.[10,18,19] Also relevant to this underecording is the fact that occasionally suspicious lesions are destroyed without histological confirmation, and many elderly patients do not seek medical care for these neoplasias.

The purpose of this work was to achieve a better understanding of BCC features in our setting. Although the number of observed patients during the year of study was limited, since it is prospective work, some relevant findings were obtained.

Our study showed a slight male dominance, with a 1.4:1 M:F ratio, similar to the usually referred,[20] as well as 66 years as average age at the time of diagnosis.[10,21] Since the Hospital has a significant elderly population, a remarkable percentage of tumors in patients of 80 years old or more was found. Although the number of cases is too low to attain statistical significance, the 5 patients under 40 years were female, which is consistent with recent publications.[3,22,23]

As usually found in BCC epidemiology, male gender, trunk location, superficial clinical form, and old age are predictors of multiple BCC.[10,24,25] In our series, of the 6 patients with five or more lesions, 5 were male, with an average age of 64 years.

All patients in our study were Caucasians, and most (93 percent) of phototypes II and III. Although the presence of light colored hair and eyes usually indicate BCC development risk factors,[13,26] in our patients such factors did not demonstrate statistical significance.

Most patients had a history of *sunburns* and *high exposure to natural sun* for recreation purposes all their lives, but not to artificial UVR sources for therapeutic or cosmetic purposes (PUVA, tanning beds, etc.). Also observed was high grade of photodamage, with multiple sun keratoses which, as acknowledged, increase risk of BCC.[27] However, the use of photoprotective measures was minor, even after diagnosis of previous skin tumor, which should alert us about the need for better education on this matter.

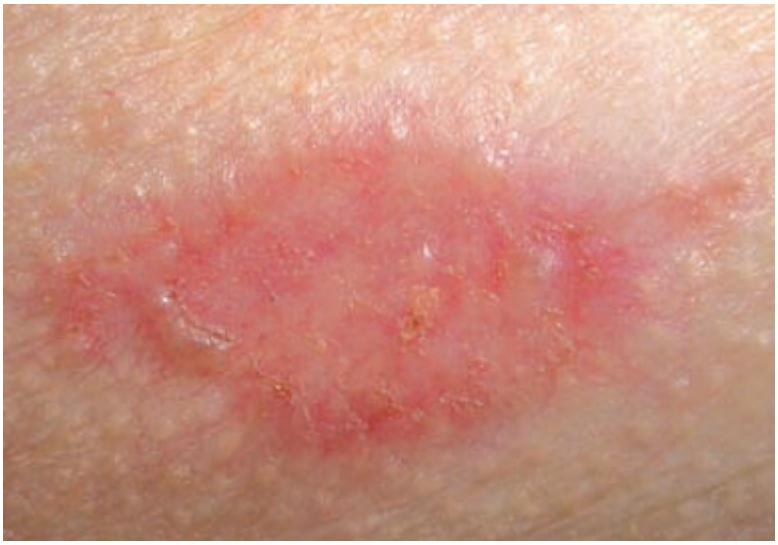

Figure 4. *Superficial variant: it represents the most common clinical form in trunk and limbs.*

TABLE 4. BODY LOCATION OF THE 222 DIAGNOSED BCCS.

Clinical forms found	Head and neck	Trunk	Limbs
	n (percent)	n (percent)	n (percent)
Superficial	7 (6.8)	46 (49.3)	17 (44.7)
Nodular	30 (29)	22 (16)	8 (21)
Morphocic	33 (32)	15 (18.5)	7 (18.4)
Papular	25 (24)	2 (2.4)	1 (2.6)
Ulcerated	7 (6)	0 (0)	4 (10.5)
Fibroepithelial of Pinkus	0 (0)	1 (1.2)	1 (2.6)
Keloidal	0 (0)	1 (1.2)	0 (0)
Cutaneous horn	1 (1)	0 (0)	0 (0)
Total of tumors	**103**	**81**	**38**

TABLE 5. DISTRIBUTION VARIATION OF HISTOPATHOLOGICAL FORMS FOUND PER BODY SITE.

Histologic subtype	Global	Head and neck	Trunk	Limbs
	n (percent)	n (percent)	n (percent)	n (percent)
Superficial	61 (27.4)	4 (3.8)	44 (54.3)	13 (34.2)
Nodular ()	61 (27.4)	38 (36.8)	14 (17.2)	9 (23.6)
Infiltrative (cord-like)	92 (41.4)	58 (56.3)	19 (23.4)	15 (39.4)
Micronodular	1 (0.45)	1 (0.9)	0 (0)	0 (0)
Fibroepithelial of Pinkus	2 (0.9)	0 (0)	1 (1.2)	1 (2.6)
Adenoid	2 (0.9)	1 (0.9)	1 (1.2)	0 (0)
Keloidal	1 (0.45)	0 (0)	1 (1.2)	0 (0)
Basosquamous	1 (0.45)	0 (0)	1 (1.2)	0 (0)
Keratinizing	1 (0.45)	1 (0.9)	0 (0)	0 (0)

History of previous skin cancer was significant (with 95% CI up to 46 percent) and most previous tumors were BCC, thus strengthening the concept that a BCC patient has between 30 and 70 percent probability of having others a posteriori.[28,12] No significant relationship was found with extracutaneous neoplasias.

Also no relationship was found in our series with other known BCC risk factors or with smoking, which is not an independent risk factor for BCC except in young patients, as referred by some authors.[22,29]

Most individuals had only one lesion. However, we found some with a remarkable number of simultaneous BCC, with no known predisposing pathology. Tumor size was less than 2 cm in 93 percent of patients. Evolution time was less than 5 years in 88 percent.

Consistent with the literature, the most frequently involved body area in our patients was the head, but in contrast to the statistics,[4] the percentage was lesser than the usually mentioned 80 percent,[25] and the most common area was the forehead, instead of the nose.

The second most frequent location was the trunk, in a percentage higher than the 15 percent mentioned in the literature. In this area, lesions were predominant in the back and the anterior thorax. As regards limbs, the upper limbs were more involved. The number of lesions found in abdomen, thighs, hands, and feet was insignificant.

In international statistics on Caucasian populations, the most common *clinical form* of BCC is nodular,[30] representing about 60 percent of the total. Globally, our study showed a lower incidence of nodular/papular variant (37 percent), which was predominant, as usual, in the head and neck.

The superficial variant appeared in a greater number of cases than described in the literature (of 15 percent), and prevailed in trunk and limbs, as usual.

We also observed a very high percentage of morphocic , up to 24.7 percent, and resulted more frequently in the head and neck. On the back we found a tumor of the clinical-pathological variant known as keloidal, recently described in the literature, and of which only 4 cases were published.

Pigmentation of the lesion, of 22 percent in our series, varies in different populations. In Caucasians, about 6 percent,[31] while in Asians it amounts to 69 percent.[21]

With reference to histopathological patterns, in contrast to the literature, in our population we found infiltrative growth (cord-like and micronodular) as the most frequent histological variant. This subtype was dominant in the head and neck, in contrast to usual publications of nodular variant as most frequent.

The superficial variant predominated in the trunk, and infiltrative and superficial variants in the limbs.

Conclusions

Although classically the importance of BCC is minimized due to its low mortality, the incidence is constantly growing, with an increasing involvement of older and younger patients, with a great number of successive or simultaneous lesions, and thus greater morbidity and higher health costs. These findings, added to the dominance of more aggressive clinical and histopathological forms, and the low level of patient photoprotection should motivate us to work more strongly on the matter.

Finally, we highlight the importance of carrying out epidemiological work such as the one submitted and providing relevant data on our population, taking into account the lack of recently published prospective studies.

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Conflicts of interests

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