# Basal Cell Carcinoma - a Descriptive Single-institution Study

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**Background:** Basal cell carcinoma (BCC) is the most common nonmelanoma skin cancer. Although there has been a noticeable increase in incidence over the last decades, the exact incidence is difficult to establish, because data and cancer registries are heterogeneous among countries. **Objective:** The study aimed to analyze the recent clinical trends of basal cell carcinoma by reviewing a six-year single institution's experience. **Methods:** A total number of 582 patients with histologically diagnosed BCC were included in the study. All relevant data were collected from medical records and patients, using short questionnaire. **Results**: BCC was slightly more common among the male population with female to male ratio of 1:1.24. At the time of diagnosis, male patients were statistically significantly older (70.47±11.9 years) compared to female patients (67.64±12.22 years) (p=0.005). The most common types of BCC were nodular (51.64%) and superficial (25.95%), affecting most commonly the head and neck region (71.2%). Relative risk (RR) for development of BCC is 2.79 times higher in sun-exposed skin areas (p<0.001). **Conclusion:** Sun exposure remains one of the most important risk factors for the development of BCC, with episodes of sunburns, occupational and recreational risks noted among the majority of patients. Although non-fatal disease, due to morbidity and high frequency, prevention and early diagnosis are important to prevent further increase in the incidence of BCC among the population.

**Keywords: basal cell carcinoma, histologic subtypes, incidence, recurrence rate.**

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## 1. BACKGROUND

Basal cell carcinoma (BCC) is the most common malignant neoplasm in humans with increasing incidence over the last decades (1). Mortality is low as basal cell carcinoma rarely metastasizes, but causes considerable morbidity and places a huge burden on healthcare services worldwide (2). BCC usually originates from interfollicular or follicular epithelium (3). It is a complex disease because the likelihood of developing this tumor depends on the interplay between constitutional predisposition, genotypic and phenotypic characteristics and subsequent exposure to environmental risk factors. Because BCC is a complex disease, most risk factors studied have small effect sizes and it is very possible that several of the observed associations are false-positive and/or clinically irrelevant (4).

Exposure to ultraviolet radiation is the main causative factor in the pathogenesis of basal cell carcinoma. However, the precise relation between the risk of basal cell carcinoma and the amount, timing, and pattern of exposure to ultraviolet radiation remains unclear (5). Studies conducted decades earlier showed that intense intermittent UV exposure (e.g. outdoor recreational activities and beach holidays), in particular during childhood and adolescence, leads to a significant increase in the risk of BCC (6).

On clinical examination, BCC usually appears as flesh or pink-colored, pearly papules with overlying ulceration or telangiectatic vessels (7).

BCC is most commonly located on the head and neck, followed by the trunk and extremities. There are many distinctive clinicopathologic types of BCC, and the most common are: nodular, adenoid, micronodular, superficial, pigmented, morpheaform, infiltrative, basosquamous and fibroepithelial (also known as fibroepithelioma of Pinkus) (7, 8). Besides characteristic appearance and histology, these BCC types show an increased tendency to involve certain parts of the skin or appear commonly in specific age groups. Also, histologic type is an indicator of clinical behavior and different therapeutic approach, since micronodular, infiltrative, morpheaform and basosquamous types are considered aggressive ones (9).

## 2. OBJECTIVE

The study aimed to analyze the recent clinical trends of basal cell carcinoma by reviewing a six-year single institution's experience.

## 3. MATERIAL AND METHODS

A single center cross-sectional study was conducted at the Department of Dermatovenerology at the Clinical Center of the University in Sarajevo, over a six-year period (2016-2022). Medical records and pathological findings were included in the analysis. All participants were informed that they would participate in the study. After informed consent, relevant history was taken and a clinical examination was performed. Using short questionnaire, age, sex, personal and family history with emphasis on skin cancers were obtained. Also, environmental factors such as exposure to UV radiation, indoor or outdoor occupation, exposure to ionic radiation and chemical agents. The following factors were analyzed: sex, age, skin phototype according to Fitzpatrick's classification (10), personal factors of exposure, duration of disease and localization of lesions, clinical types of lesions and recurrence rate. The anatomical sites affected by tumors were classified as follows:

- Head:
  - Cheeks and forehead
  - Nose
  - Orbital and zygomatic area
  - Auricular area
  - Parietal area
- Trunk and abdomen:
  - Upper limbs
  - Lower limbs

Based on solar exposure levels, body areas were classified into three groups:

- Sun-protected sites
- Intermittently sun-exposed sites
- Permanently sun-exposed site

Face and neck were counted as the sun exposed skin areas, while non-sun exposed skin areas were chest, lower back or upper back, and intermittently exposed to the sunlight were upper and lower limbs.

Statistical analysis was done using IBM SPSS v26.0. Categorical data are represented in the form of frequency and percentage. Scalar data, as age is represented in the form of mean value with standard deviation. Number of BCCs in the patients with multiple BCCs is described as median value with interquartile range, due to the non-parametric data distribution. Correlation between sun exposure areas of the body and number of reported BCCs is represented with Spearman's correlation.

## 4. RESULTS

In total 582 patients were included in the study in the analyzed period, from which 322 (55.32%) were males and 260 (44.68%) were females. Based on the sex ratio for every female patient with BCC there would be 1.24 male patients; 1:1.24. Of these 582 patients, 794 BCC tumors were diagnosed.

The average age of all patients with BCC was 69.31±12.36 years. Male patients were statistically significantly older when they were diagnosed with BCC; with an average age of 70.47±11.9 years, while female patients had an average age of 67.64±12.22 years (p=0.005).

Personal history of previous BCC was positive in 37 (6.35%) of cases. Family history of BCC was positive in an additional 19 (3.26%) cases. In most cases, patients spotted change on the skin in the period between one and two years, with a range between one month and 122 months.

The most common symptoms that prompted patients to look for a doctor were tumor growth, ulceration and bleeding. Multiple basal cell carcinomas were found in 90 (15.46%) cases, with a median number of spotted BCCs being 3 (IQR=2-6). In most patients with multiple BCCs, localization was on the back or shoulder.

Positive history of solar exposure and at least two episodes of skin burning were found in 425 (73.02%) patients. Occupation was a cause for exposure in 311/425 (73.17%) patients, and others had recreational exposure mostly during the holiday season (26.83%). Usage of sunbeds is reported from 13 (2.23%) patients. The majority of patients were Fitzpatrick phototype II (73.04%) and phototype I (26.96%).

In terms of tumor location, most of the lesions were situated on the head and neck (71.2%). On chests, abdomen and back 25.5% of all tumors were diagnosed. On upper limbs, 2.5% of BCC were diagnosed, while on lower limbs only 0.8%. The distribution of tumors based on the body part and areas of body parts is shown in Table 1.

Based on the sun-exposed skin areas, using Spearman's correlation strong relationship was found between sun-exposure and the appearance of BCC (rho=0.681; p<0.001).

| Body part | Area | % |
|---|---|---|
| Head and neck | Cheeks and forehead | 27.7 |
| | Nose | 28.0 |
| | Auricular area | 4.6 |
| | Orbital and zygomatic area | 4.1 |
| | Parietal area | 0.9 |
| | Nasolabial area | 0.9 |
| | Neck | 5.0 |
| | Total | 71.2% |
| Trunk and abdomen | Chest | 4.0 |
| | Shoulder | 3.7 |
| | Abdomen | 1.4 |
| | Upper back | 9.6 |
| | Lower back | 6.8 |
| | Total | 25.5 |
| Upper limbs | | 2.5 |
| Lower limbs | | 0.8 |

*Table 1. Distribution of BCC according to localization.*

| Morphological type | N (%) |
|---|---|
| Nodular | 410 (51.64) |
| Superficial | 206 (25.95) |
| Pigmented | 92 (11.58) |
| Morpheaform (sclerosing) | 63 (7.94) |
| Combined (Nodular and superficial) | 23 (2.89) |

*Table 2. Distribution of BCC based on morphological type*

It is found that the relative risk (RR) for the appearance of BCC in sun-exposed areas is RR=2.79 times higher than in non-sun exposed skin areas ($p<0.001$).

Distribution of tumors (N=794) based on the morphology is shown on Table 2.

During the study period, 59 cases showed recurrence of the cancer as the overall recurrence rate was 10.14%.

## 5. DISCUSSION

The absolute incidence of basal-cell carcinoma is difficult to determine since nonmelanoma skin cancer is usually excluded from cancer-registry statistics. The task is further complicated by the marked geographic variability in the incidence of nonmelanoma skin cancer. However, the trend is clearly toward an increasing number of cases, due to population ageing and widespread sun exposure (11, 12). Australia has the highest incidence rate of basal-cell carcinoma in the world, with certain regions reporting an incidence of up to 2 percent per year (13). The annual growth rate of BCC in Europe is approximately 5% over the recent decades (14).

Based on the literature, basal cell carcinoma, as the most common nonmelanoma skin cancer, is a disease of older age and is more common in males (1, 15-17), as is the case in our study. The hereditary basis of BCCs is wide and can include targeted mutations in the Hedgehog signaling pathway to deficiencies of tumor suppressors and melanin synthesis. All mentioned can lead to DNA damage and promote BCC growth (18). Family history of BCC was positive in 3.26% of cases, while the prior history of BCC, as one of the strongest predictors for the development of BCC, was noted 6.35% of patients.

Sun exposure is one of the most important risk factors for the development of BCC. It typically takes between 15 and 20 years from exposure to the development of cancer (19). The amount of UVR exposure is positively associated with BCC risk, but this effect levels off or even decreases after a certain amount of exposure (5). Our study confirms these findings since we found that the relative risk for the appearance of BCC on sun-exposed skin is 2.79 times higher than on non-exposed skin areas. A systematic review and meta-analysis showed that indoor tanning is significantly associated with an increased risk of BCC, especially if used early in life (20). In our study, usage of sunbeds is reported by 2.23% of patients who developed BCC and the majority of them were Fitzpatrick phototype II and phototype I. The Fitzpatrick skin type is a good predictor of the relative risk of BCC among the Caucasian population (21).

Ionizing radiation (IR)-induced BCC risk appears to increase with a person's skin susceptibility to UVR and younger age at exposure (i.e. basal layer more sensitive to radiation carcinogenesis) (22). Patients included in this study reported no history of exposure to ionizing radiation.

The most common form of BCC is nodular, most commonly affecting the head and neck, accounting for 50-80% of the lesions, followed by the superficial type, which predominantly affects the trunk and extremities of younger patients, as well as the head/neck region (8, 23). Our results are in agreement with the results of previously conducted single-centered studies in our country (16, 17).

According to the literature, approximately 29% of patients with a first BCC will develop at least one more lesion during their lifetime. Increased risk factors for multiple BCCs include younger age, superficial subtype at the time of the first diagnosis, red hair phenotype, tumor location on the trunk or on the upper limbs, and male gender (24). In our study, multiple basal cell carcinomas were found in 15.46% of cases, most commonly localized on the back or shoulder. Basal cell carcinomas typically have a slow growth rate and tend to be locally invasive (25). However, because recurrences can occur, especially in high-risk types and positive margins these patients need long-term follow-up (26, 27). During the six-year study period, the overall recurrence rate was 10.14%.

## 6. CONCLUSION

Basal cell carcinoma is the most common malignancy with rising incidence worldwide. Due to its frequency, BCC represents a huge burden for health systems. Our study is consistent with previous studies, with higher prevalence between males, older age and exposure to the UV rays (both in recreational and in occupational form). Nodular BCC is still the most frequent type.

Although non-fatal disease, due to morbidity and high frequency, prevention and early diagnosis are important to prevent further increase in the incidence of BCC among the population.

- **Declaration of patient consent**: *The authors certify that they have obtained all appropriate patient consent forms.*
- **Author's contribution**: *MK-F, SP and NČ gave a substantial contribution to the conception and design of the work. SP and MK-F gave a substantial contribution to acquisition of data. SK-V and EK-H gave a substantial contribution to the analysis, or interpretation of data for the work. MK-F, SP, NČ, SK-V and EK-H had a part in article preparing for drafting or revising it critically for important intellectual content. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved..*
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