

Frequency and clinicopathological features of basal cell carcinoma: a ten-year retrospective study in Kurdistan, Iran

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Background: Basal cell carcinoma (BCC), the most common human malignancy, can cause significant morbidity through extensive tissue destruction. This study aimed to determine the frequency and clinicopathological features of BCC in an Iranian population.

Methods: Histopathological reports with a definitive diagnosis of BCC in all pathology centers of Sanandaj, Kurdistan province, during 2009–2019 were reviewed. Data on age, gender, site, size, and clinical and histopathological types of tumors were collected and analyzed using SPSS software. P-values < 0.05 were considered significant.

Results: We found 832 BCC lesions in 779 patients, including 453 males and 326 females aged 65.36 ± 14.35 years and 62.77 ± 13.79 years, respectively. The mean tumor size was 14.52 ± 10.08 mm in men and 11.79 ± 7.89 mm in women. The most common location was the head (95.23%), with the nose representing the most involved area. Males and females differed regarding age ($P = 0.012$), tumor size ($P < 0.001$), and the anatomical distribution of tumors on various parts of the head ($P < 0.001$). Ulcerative (58.36%) and nodular (54.45%) BCCs were the most frequent clinical and histopathological types, respectively, both in males and females, without a significant difference between the genders ($P > 0.05$).

Conclusions: Our findings suggest that age, gender, and the tumor site in various head areas could be risk factors for BCC. Appropriate knowledge of BCC and its risk factors can help design prevention strategies and provide the necessary training for healthcare staff and the public to identify the disease in susceptible individuals.

Keywords: Basal cell carcinoma (BCC), malignancy, skin neoplasms

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INTRODUCTION

Basal cell carcinoma (BCC) is the most common human malignancy ¹ and accounts for a significant proportion of the world's skin cancer patients ². This

malignancy, comprising around 80% of all non-melanoma skin cancers ³, originates from the epidermal basal cell layer or follicular structures ⁴. BCC's etiology is multifactorial, though chronic exposure

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to ultraviolet radiation (UV) of sunlight is the most important causative factor^{3,4}. Solar radiation can induce carcinogenesis in keratinocytes both directly via producing mutagenic photo-products (which cause mutations in DNA and the genes regulating cellular functions) and indirectly by generating cytotoxic and mutagenic free radicals. These processes can gradually lead to malignancy after several years or decades⁴. For this reason, most studies have reported BCC to be related to sun-exposed skin areas, especially in the head and neck of older people (generally > 50 years)³⁻⁵.

The clinical variants of BCC include nodular, superficial, cystic, morpheiform, and pigmented BCC. Each variant presents different clinical manifestations and histopathological features, with some showing aggressive behavior⁴. However, BCC is generally a low-grade and slow-growing tumor with almost no metastatic potential and a low mortality rate^{1,6}. Nevertheless, it can lead to significant morbidity due to local invasion and tissue destruction⁴. Therefore, if BCC is not detected early and treated, it can affect the patient's quality of life and inflict high financial burdens on the healthcare systems and economic plans of countries^{3,4,6}. This indicates the importance of awareness of its epidemiology and risk factors. Considering the lack of relevant data on BCC in Kurdistan province, Iran, this study aimed to determine BCC's frequency and clinicopathological features in this region.

METHODS

Participants and study design

In this retrospective cross-sectional study, all histopathology reports available at the Noor, Mother, Koch, and Rajeh private laboratories and pathology centers of Tohid, Kowsar, and Besat governmental hospitals in Sanandaj (capital of Kurdistan province, Iran) from 2009 to 2019 were reviewed. Inclusion criteria were a definitive histopathological diagnosis of BCC and the complete excision of the tumor. Incisional biopsies and recurrent or re-excised tumors were excluded^{5,7,8}. Each tumor was considered a separate case in reports with more than one lesion. Data on age, gender, site, size, and clinical and histopathological types of tumors were extracted from the patients' histopathology reports and medical files.

Ethical considerations

The Kurdistan University of Medical Sciences Research Ethics Committee approved this study (IR.MUK.REC.1398.044).

Statistical methods

Data were analyzed using SPSS version 23. Analytical tests included the t-test, chi-squared test, and Fisher's exact test when appropriate. A P-value of < 0.05 indicated statistical significance.

RESULTS

Overall, 832 BCC lesions were obtained in 779 patients, of which 493 tumors were from 453 (58.2%) males and 339 tumors were obtained from 326 (41.8%) females. The overall mean age of the patients was 64.27 ± 14.17 years (range 18–99 years). The mean age of females and males was 62.77 ± 13.79 and 65.36 ± 14.35 years, respectively, with a significant difference between the two groups ($P = 0.012$). Also, 307 (39.4%) and 134 (17.2%) of the patients lived in urban and rural areas, respectively, and the place of residence of 338 patients (43.4%) was not reported.

Tumor sizes were recorded for 821 BCCs, demonstrating a mean size of 13.41 ± 9.33 mm (range 2–85 mm). Tumor size was significantly larger among men (14.52 ± 10.08 mm) than among women (11.79 ± 7.89 mm) ($P < 0.001$).

The most common location of BCCs was the head (95.23%). There were no significant differences in tumor sites (including the head, neck, trunk, and limbs) between males and females ($P = 0.15$). The nose and chin were the most and least involved parts of the head, respectively (Table 1). The localization of tumors on various head parts was significantly associated with gender ($P < 0.001$). The ulcerative and plaque types were the most (58.36%) and least common (1.33%) clinical presentations of BCC, respectively. Nodular BCC was the main histopathological type in both males (55.00%) and females (53.60%) (Table 2). No significant difference in clinical ($P = 0.905$) and histopathological ($P = 0.123$) types was found between males and females.

Patient age, clinical type, and histopathological type of BCC did not vary by anatomical location, with P-values of 0.740, 0.415, and 0.09, respectively (Table 3).

Table 1. Age and anatomical distribution of basal cell carcinoma cases by gender, n (%)

| Variable (number of cases with available data) | Total | Men | Female | P-value Test |
|--|-------------|-------------|-------------|-----------------------|
| Age, years (n = 822) | | | | |
| <40 | 36 (4.37) | 21 (4.32) | 15 (4.45) | 0.102 X ² |
| 40-59 | 244 (29.68) | 129 (26.59) | 115 (34.12) | |
| 60-79 | 414 (50.36) | 252 (51.95) | 162 (48.07) | |
| >80 | 128 (15.57) | 83 (17.11) | 45 (13.35) | |
| Total | 822 | 485 | 337 | |
| Location (n = 819) | | | | |
| Head | 780 (95.23) | 454 (93.99) | 326 (97.02) | 0.15 X ² |
| Neck | 17 (2.07) | 14 (2.89) | 3 (0.89) | |
| Trunk | 12 (1.46) | 9 (1.86) | 3 (0.89) | |
| Limbs | 10 (1.22) | 6 (1.24) | 4 (1.19) | |
| Total | 819 | 483 | 336 | |
| Location on the head (n = 668) | | | | |
| Scalp | 99 (14.82) | 88 (23.59) | 11 (3.72) | <0.001 X ² |
| Nose | 339 (50.74) | 156 (41.82) | 183 (62.03) | |
| Cheek | 75 (11.22) | 42 (11.26) | 33 (11.18) | |
| Eye | 63 (9.43) | 33 (8.84) | 30 (10.16) | |
| Forehead | 43 (6.43) | 33 (8.84) | 10 (3.38) | |
| Lip | 22 (3.29) | 7 (1.87) | 15 (5.08) | |
| Nasolabial fold | 16 (2.39) | 8 (2.14) | 8 (2.71) | |
| Eyebrow | 8 (1.19) | 5 (1.34) | 3 (1.01) | |
| Chin | 3 (0.44) | 1 (0.26) | 2 (0.67) | |
| Total | 668 | 373 | 295 | |

Table 2. Frequency of clinical and histopathological types of basal cell carcinoma cases by gender, n (%)

| Variable (number of cases with available data) | Total | Male | Female | P-value Test |
|--|-------------|-------------|-------------|-------------------------|
| Clinical type (n = 526) | | | | |
| Nodular | 137 (26.04) | 78 (25.16) | 59 (27.31) | 0.905 Fisher's exact |
| Ulcerative | 307 (58.36) | 185 (59.67) | 122 (56.48) | |
| Pigmented | 75 (14.25) | 43 (13.87) | 32 (14.81) | |
| Plaque | 7 (1.33) | 4 (0.76) | 3 (1.38) | |
| Total | 526 | 310 | 216 | |
| Histopathological type (n = 314) | | | | |
| Nodular | 171 (54.45) | 104 (55.00) | 67 (53.60) | 0.123 Fisher's exact |
| Basosquamous | 60 (19.10) | 42 (22.22) | 18 (14.40) | |
| Mixed | 30 (9.95) | 17 (8.99) | 13 (10.40) | |
| Superficial | 12 (3.82) | 4 (2.11) | 8 (6.40) | |
| Adenoid | 9 (2.86) | 4 (2.11) | 5 (4.00) | |
| Pigmented | 9 (2.86) | 5 (2.6) | 4 (3.20) | |
| Keratotic | 14 (4.45) | 7 (3.7) | 7 (5.60) | |
| Morpheaform | 7 (2.22) | 6 (3.17) | 1 (0.80) | |
| Cystic | 2 (0.63) | 0 (0.00) | 2 (1.60) | |
| Total | 314 | 189 | 125 | |

DISCUSSION

Basal cell carcinoma (BCC) is the most common human malignancy, with the potential to cause significant morbidities and disabilities due to extensive tissue destruction ⁶. This retrospective study examined patients diagnosed histopathologically with BCC by private and governmental pathology centers in

Sanandaj, the capital of Kurdistan, Iran. In this 10-year study, 832 BCC tumors were recorded in 779 patients. The clinicopathological characteristics of the lesions were analyzed and reported.

Similar to several previous studies ^{1,4-6,8-10}, the rate of BCC was higher in males than females. However, Ciałżyńska *et al.* ³, Scrivener *et al.* ¹¹,

Table 3. Frequency of age, clinical and histopathological types of basal cell carcinoma cases by anatomical location

| Variable (number of cases with available data) | Total | Head | Neck | Trunk | Limbs | P-value Test |
|--|-------------|-------------|-----------|-----------|-----------|-------------------------|
| Age, years (n = 810) | | | | | | |
| <40 | 36 (4.44) | 34 (4.40) | 1 (5.88) | 1 (8.33) | 0 (0.00) | 0.740 X ² |
| 40-59 | 242 (29.87) | 229 (29.70) | 5 (29.41) | 4 (33.33) | 4 (40.00) | |
| 60-79 | 408 (50.37) | 392 (50.84) | 9 (52.94) | 3 (25.00) | 4 (40.00) | |
| >80 | 124 (15.30) | 116 (15.04) | 2 (11.76) | 4 (33.33) | 2 (20.00) | |
| Total | 810 | 771 | 17 | 12 | 10 | |
| Clinical type (n = 517) | | | | | | |
| Nodular | 133 (25.72) | 127 (25.70) | 3 (27.27) | 1 (16.66) | 2 (33.33) | 0.415 Fisher's exact |
| Ulcerative | 302 (58.41) | 288 (58.29) | 8 (72.72) | 2 (33.33) | 4 (66.66) | |
| Pigmented | 75 (14.50) | 72 (14.57) | 0 (0.00) | 3 (50.00) | 0 (0.00) | |
| Plaque | 7 (1.35) | 7 (1.41) | 0 (0.00) | 0 (0.00) | 0 (0.00) | |
| Total | 517 | 494 | 11 | 6 | 6 | |
| Histopathological type (n = 310) | | | | | | |
| Nodular | 169 (54.51) | 163 (54.88) | 4 (80.00) | 0 (0.00) | 2 (50.00) | 0.09 Fisher's exact |
| Basosquamous | 59 (19.03) | 57 (19.19) | 0 (0.00) | 1 (25.00) | 1 (25.00) | |
| Mixed | 30 (9.67) | 29 (9.76) | 0 (0.00) | 1 (25.00) | 0 (0.00) | |
| Superficial | 12 (3.87) | 8 (2.69) | 1 (20.00) | 2 (50.00) | 1 (25.00) | |
| Adenoid | 9 (2.90) | 9 (3.03) | 0 (0.00) | 0 (0.00) | 0 (0.00) | |
| Pigmented | 9 (2.90) | 9 (3.03) | 0 (0.00) | 0 (0.00) | 0 (0.00) | |
| Keratotic | 13 (4.19) | 13 (4.37) | 0 (0.00) | 0 (0.00) | 0 (0.00) | |
| Morpheaform | 7 (2.25) | 7 (2.35) | 0 (0.00) | 0 (0.00) | 0 (0.00) | |
| Cystic | 2 (0.64) | 2 (0.67) | 0 (0.00) | 0 (0.00) | 0 (0.00) | |
| Total | 310 | 297 | 4 | 4 | 4 | |

and Bariani *et al.*¹² reported contradictory results. The higher rate of BCC in men can be attributed to their outdoor work-related activities, associated with continuous exposure to solar UV radiation^{2,6}. However, due to social developments in modern societies and equal job opportunities for men and women, considering a major difference between men and women in terms of outdoor activities may no longer be applicable. Another reason for the observed difference may be the greater attention of women to the use of physical and chemical protectants, such as sunglasses, hats, and sunscreen creams/lotions, to avoid direct exposure to sunlight. Meanwhile, in Islamic countries like Iran, for cultural, governmental, and religious reasons, women cover themselves with scarves, long-sleeved clothes, and pants outside the house, protecting most body parts against sunlight.

The overall mean age of the participants in the current study was close to those reported by Zargarani *et al.*⁶, Ciężyńska *et al.*³, and Kasumagic-Halilovic *et al.*⁴. In line with some other studies^{5,6}, the mean age was higher in males, and similar to Zargarani *et al.*⁶, the difference between men and women was statistically significant. However, Al-Qarqaz *et al.*¹, Ciężyńska *et al.*³, and Bariani *et al.*¹²

reported a higher mean age of women, while Kasumagic-Halilovic *et al.*⁴ found no significant difference between men and women.

The lowest cases of BCC in the present study, in the study by Ciężyńska *et al.*³, and in the study by Zargarani *et al.*⁶ were reported in the age groups of < 40 years (n = 36), < 25 years (n = 3), and < 19 years (n = 2), respectively. In this study, the highest number of BCC cases (both total and stratified by sex) was reported in patients > 60 years, especially in the age range of 60–79 years. Consistently, Hakverdi *et al.*⁵ and Ciężyńska *et al.*³ found the highest number of BCC cases in the age groups of 50–80 and 70–75 years, respectively. Regardless of these differences, which might be due to variations in the definition of age groups, there is consensus regarding the higher occurrence of BCC among older adults. Direct and indirect DNA damage, decreased DNA regeneration capacity, and weakening of the skin's immune system due to the cumulative effects of chronic sun exposure may explain the increased rate of BCC at older ages^{4,6}.

In agreement with the results of a study by Zargarani *et al.*⁶, the mean lesion size was significantly smaller in women than in men, which might be due to the greater attention of women to their bodily

changes and, subsequently, their faster referral for diagnosis and treatment. Similar to Zargarani *et al.*⁶, our findings also indicated BCC's higher prevalence among urban residents. Although agriculture and animal husbandry (jobs with higher exposure to sunlight) are the most common occupations among villagers, people's places of residence and work may not necessarily be the same⁶. Another reason for this finding may be the delay and negligence of occupied villagers to visit healthcare centers for diagnostic and therapeutic purposes when faced with a lesion with no severe symptoms.

In most previous studies, the majority of BCC cases were reported in the head (or head and neck), while the minority were identified in the limbs^{1,4,6,8,13}, which is in agreement with our findings. In the current study, although the highest rate of BCC in all parts of the body (particularly the head area) was reported in patients > 60 years, there was no significant relationship between the tumor site and patient age. In agreement with our findings, Tan *et al.*⁸ reported that head and neck tumors were most commonly seen in elderly patients. However, truncal BCC was more common among people aged < 60 years⁸, which contradicts our results.

Most cases of BCC in the head area were identified in descending order on the nose, scalp, and cheeks. These sites were also among the most commonly involved areas in previous reports^{3,4,6}. Also, there was a notable difference in the occurrence of BCC in the scalp of males and females, and a significant relationship was found between the tumor site in the head area and sex. These findings, especially the differences in the scalp involvement of men and women, again reflect the importance of sunlight as the leading risk factor for BCC.

The most common clinical type of BCC is the nodular type^{3,4,6,14}; its central part expands and undergoes ulceration if left untreated (ulcerated nodular type of BCC). In this study, both in the total population and in men and women separately, the first and second most common clinical types of BCC were the ulcerative and nodular forms, respectively. The clinical type of BCC was significantly associated with neither sex (consistent with Zargarani *et al.*⁶) nor tumor location. Nevertheless, the ulcerative type was the most common clinical type of BCC in both sexes and most body parts, especially the head

area. This finding may be attributed to the tumor's appearance and signs like recurrent bleeding, leading to increased referrals for diagnosis and treatment.

Pathologists must identify and report the histopathological type of BCC as it can play an important role in tumor management^{5,6}. In agreement with most previous studies^{3,6,7,14,15}, our results showed that the nodular type was BCC's most common histopathological form. Also, consistent with the results of studies by Ciężyńska *et al.*³ and Ghanadan *et al.*⁷ and in contrast with Zargarani *et al.*⁶, our study recorded no significant relationship between the tumor histopathological type and the patient's sex.

The anatomical distribution and etiology of histopathological types of BCC are variable^{3,5}. The nodular type is often observed in areas chronically exposed to sunlight (i.e., head and neck)³, while the superficial type is mainly observed in the trunk (sun-protected area)^{3,7} and probably occurs due to intermittent sun exposure^{3,4}. In contrast with Ciężyńska *et al.*³, we found no significant relationship between the histopathological type and lesion site. However, similar to studies by Ciężyńska *et al.*³ and Ghanadan *et al.*⁷, nodular and superficial types were more common in the head and trunk, respectively.

CONCLUSION

Despite the limitations of the present study (such as its retrospective design and missing data), our findings suggest that age, gender, and the tumor site in various head areas could be risk factors for BCC. Appropriate knowledge of BCC and its risk factors can help design prevention strategies and provide the necessary training for healthcare staff and the public to identify the disease in susceptible individuals.

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Authors contribution

All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

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