

Histological and histopathological structural changes in the skin of the Basal Cells Carcinoma patients

Hala Yassen Kadhim ¹, Thekra Atta Ibrahim ², Ali Hafedh Abbas ³

¹ Department of Pathology and Forensic, College of Medicine, University of Diyala

² Department of Biology, College of Education for Pure Sciences, University of Diyala

³ Tropical – Biological Research Unit, College of Science, University of Baghdad

Correspondence: Hala Yassen Kadhim

Email: hala@uodiyala.edu.iq

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Abstract

Background: Basal Cell Carcinoma (BCC) is the most common type of skin carcinoma and is considered an epidemic disease due to its increasing frequency in many countries. The most important problem of BCC is local invasion. It grows in a “silent” way into immediately adjacent tissue. It rarely metastasizes. The early tumors are commonly small, translucent or pearly, raised and rounded areas located on a few dilated, superficial vessels. There are six subtypes of BCC that include nodular, pigmented, superficial, morphea form, cystic. The most important risk factor for basal cell carcinoma is exposure to UV-radiation. Outdoor workers with a long history of work-related UV-exposure are at increased risk of developing BCC. Other risk factors include family history of skin carcinoma, light skin phototypes, advanced age.

Objective: The current study investigated pathological and histological changes in tissue sections to identify the factors contributing to the infection frequency.

Patients and Methods: Thirty-three BCC patients' samples have been collected from the main care center at al-Baquba Teaching Hospital of Diyala Province, Iraq. All patient groups were clinically diagnosed as BCC by dermatologists.

Results: The study showed macroscopic and microscopic histological changes. An ulcerated macroscopic appearance of the lesion was shown. The tumor lesions are located on the face. It was noted that the percentage of patients was higher in men than women and higher in light skin than dark skin. The study also showed that the age group 66-74 years had a higher infection percentage, while the lower percentage was of the age group > 83 years.

Conclusion: These findings pave the way for future research endeavors aimed at prevention, early detection, and targeted treatment strategies for this prevalent skin carcinoma.

Keywords: Basal Cell Carcinoma, skin tumor, non-melanoma skin cancer

Introduction

Skin cancer is categorized into two main types: malignant melanoma (MM), which originates from melanocytes, and non-melanoma skin cancer (NMSC), where tumors derived from keratinocytes which are the most prevalent. Among NMSC, basal cell carcinoma (BCC) is the most common form. BCC accounts for approximately 77% of all skin cancer cases around world. It encompasses various subtypes, and classifying the tumor types is important for clinicians and pathologists to understand and predict their behavior (1). The primary histopathological types of basal cell carcinoma (BCC) consist of nodular BCC, which includes micronodular BCC; superficial BCC, appearing as multi-focal lesions; and infiltrative BCC, which encompasses the morphic type (2). The nodular type is the prevalent subtype, accounting for approximately 50% of basal cell carcinoma (BCC) cases worldwide. It is characterized by rounded tumor cell nests located in the dermis, exhibiting a distinct arrangement with nuclear palisading. On the other hand, the superficial type, comprising approximately 15% of BCC cases, manifests as small clusters of tumor cells that extend from the epidermis into the upper layers of the dermis (2).

The infiltrative type, comprising 10-20% of cases worldwide, is characterized by clusters of tumor cells with varying sizes, displaying an irregular shape and spiky projections. Unlike other types, peripheral palisading of nuclei is either absent or rare in this subtype. Typically, these lesions are observed on the face, ears, scalp, neck, or upper trunk. Basal cell carcinoma (BCC) often presents as a flat, firm, pale area that may be small, raised, pink or red, translucent, shiny, and waxy. Minor injuries to the affected area may result in bleeding. The size of the tumor can vary in diameter. BCC has a tendency to recur even after treatment, and the histopathological appearance and proliferative characteristics influence the recurrence rate. Furthermore, the likelihood of recurrence was

observed to be highest in the morphic type of basal cell carcinoma, which is influenced by both the specific treatment approach and the tumor subtype (3, 4). Metatypical carcinomas encompass the clinical and histological features of basal cell carcinoma (BCC) (5, 6). While metastasis is rare in BCC, local destruction and disfigurement are more commonly observed outcomes (7). The etiology of BCC involves various factors such as genetic predisposition, immune deficiency, and chronic sun exposure (8-10). Many countries have reported an increasing frequency of BCC cases worldwide. In the United States, it is considered the most prevalent cancer type according to reports from The American Cancer Society. The rise in incidence rates could be attributed to improved detection methods and increased awareness of skin cancer within healthcare policies. Furthermore, Increasing the lifespan of individuals may contribute to the higher incidence of BCC. Recent data also suggest an increasing occurrence of BCC among younger populations. While BCC can affect individuals of all skin types, it is more commonly seen in fair-skinned individuals (type 1 or type 2 skin types), while dark-skinned individuals are rarely affected (11, 12). Among genders, men are affected twice as often as women, potentially due to occupational sun exposure. The frequency of BCC also rises with age (13, 14). Exposure to UV radiation remains the most significant risk factor for developing BCC (15). Considering the limited available data on BCC in Diyala province and the need to understand the underlying causes for its prevalence, a macroscopic and microscopic histological study was conducted. The study demonstrated a significant occurrence of BCC cases and aimed to identify the factors contributing to the infection frequency.

Patients and Methods

Our study was conducted at the main care center at Baquba teaching hospital, spanning from March 2022 to December 2022. We enrolled a total of 33 patients diagnosed with basal cell carcinoma (BCC) through examination by a dermatologist. Following diagnosis and the assessment of macroscopic tumor findings, the affected area with BCC was sterilized using 70% alcohol and locally anesthetized. Dermatologists performed skin biopsies using the punch biopsy method, utilizing a punch tool to puncture the skin and collect 3-millimeter skin samples. The tumor samples were then preserved in a 10% neutral formalin solution for a minimum of three days. Subsequently, the samples underwent a series of alcohol solutions with increasing concentrations (50%, 70%, 80%, 95%, 100%). Afterward, they were immersed in a xylol solution in two stages before being embedded in paraffin wax. The embedded samples were cut into slices with a thickness of 5 mm using a microtome. Finally, the tissue slides were stained with the common hematoxylin and eosin stain and examined under a light microscope.

diaphragmatic hernia, and lobar emphysema (16, 17). Transient tachypnea of newborn (TTN) has shorter and milder clinical course (neonate needs 24 hours oxygen supplementation). Symptoms usually improve after 24 hours. CXR shows perihilar streaking, representing perihilar interstitial edema, or it may be normal (18).

Results

Basal Cell Carcinoma BCC lesions were grossly examined and the results observed in Figure 1 showed that the location of the infection in a different area of the face: in the nose (A and B), the cheek (C and D), and forehead (F). The morphological examination showed in the current study's BCC samples which diagnosed in nose, cheek, and forehead flat, red, scaly papules on the skin. Some of these papules were transparent, ulcerated masses with irregular edges (rolled border), while other pearly surrounding a central

papule. the examination also showed small red blood vessels telangiectasia present on the surface of the papule, especially in nodular BCC and there was melanin pigment in pigmented BCC. The result showed that the median age in the study group was 66 years, while the higher percentage was in patients aged 71 years (75%), the lowest percentage was in patients aged group 60 years (25%), as shown in Table 1. The result showed that the men percentage was higher than the women in the BCC groups (69.6% and 30%, respectively) Table 2. The result showed that the color of the skin had an effect on the appearance of BCC. IT increased in people with light skin (white and light skin) compared to people with dark skin as shown in Table 3. The results indicated that the infection increased with the increase in the age group. It showed that the highest percentage of the diseased patients' group was in the 66-74 years group (30.0%), while the lowest percentage of the aged group was in the >83 years group (3.0%) as shown in Table 4.

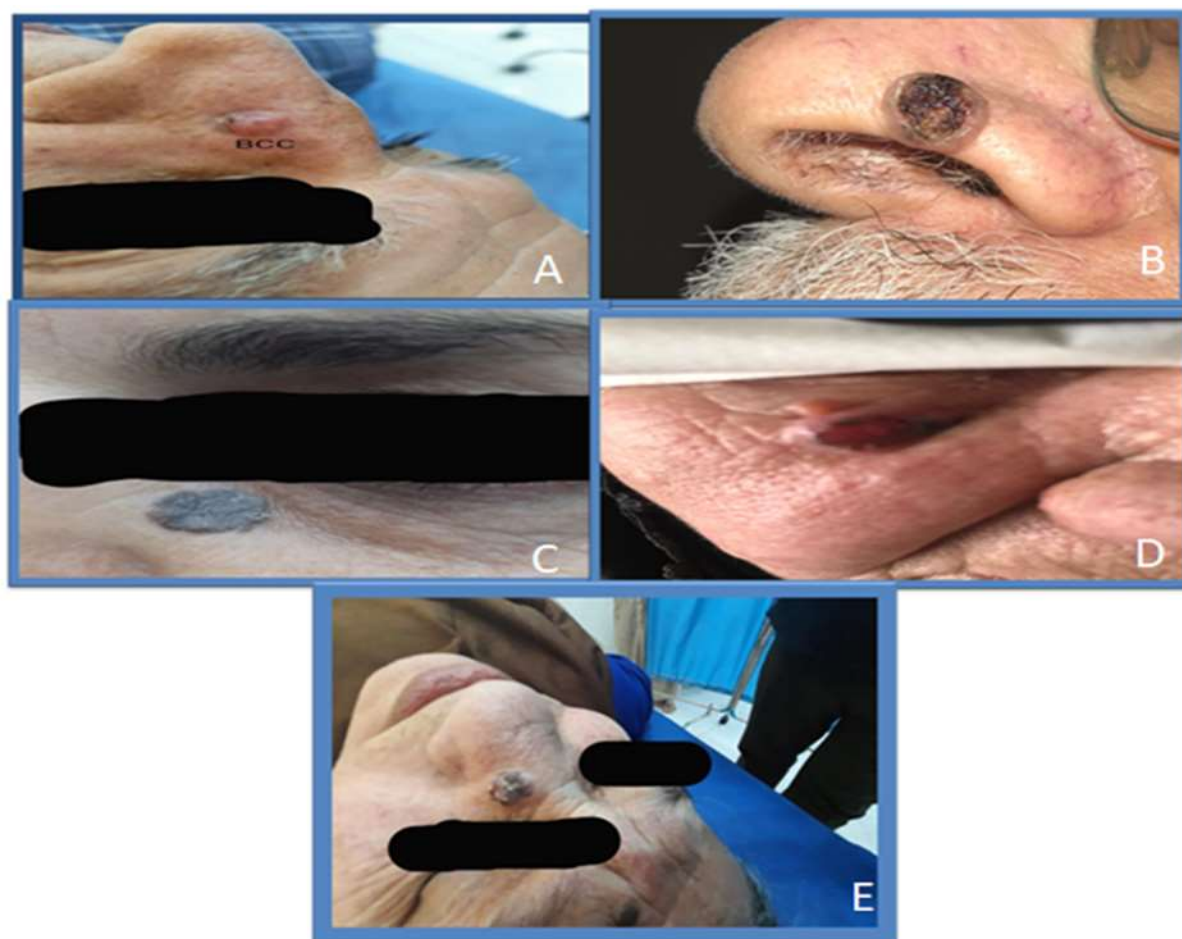


Figure (1): The location of BCC (A) in nose red, scaly papules on the skin. transparent, ulcerated masses with irregular edges (rolled border). (B) in nose there was melanin pigment. (C,D) in cheek irregular border and there was melanin pigment. (D) showed small red blood vessels telangiectasia present on the surface of the papule.

Table 1: The age of the study group

<i>Age (Years) percentage</i>	<i>Patients group</i>	<i>Control group</i>	<i>Probability</i>
<i>Median</i>	66.0	59	0.096 NS
<i>Percentile 25%</i>	60	35	
<i>Percentile 75%</i>	71	75	

Table 2: The infection percentage in the patients' group

<i>Gender</i>	<i>Patient no.</i>	<i>Percentage</i>	<i>Control group</i>	<i>Percentage</i>	<i>Probability</i>
<i>Male</i>	23	69.6%	37	41.8	0.165 NS
<i>Female</i>	10	30%	30	58.2	
<i>Total</i>	33	100%	67	100%	

Table 3: The percentage of infection according to the skin color

<i>Skin color</i>	<i>Patient no.</i>	<i>Percentage</i>
<i>Light skin</i>	26	78.7%
<i>Dark skin</i>	7	21.3%
<i>Total</i>	33	100%

Table 4: The percentage of BCC according to age groups

<i>Age groups</i>	<i>Patients group No. (%)</i>	<i>Control group No. (%)</i>
21 – 29	0 (0.0)	14 (20.9)
30 – 38	0 (0.0)	4 (6.0)
39 – 47	4 (12.1)	5 (7.5)
48 – 56	4 (12.1)	8 (11.9)
57 – 65	8 (24.2)	9 (13.4)
66 – 74	10 (30.3)	9 (13.4)
75 - 83	6 (18.2)	15 (22.4)
> 83	1 (3.0)	3 (4.5)
<i>Total</i>	33 (100.0)	67 (100.0)

Histological changes in BCC patients

The tissue samples that were stained with hematoxylin and eosin showed histological changes in the epidermal layer (Epidermis) of patients with basal cell carcinoma, as it was represented by the presence of cellular nests in varying sizes with pale cytoplasm, circular and oval nuclei with coarse chromatin known as hyperchromatic nuclei, and the cells of the border and peripheral layer were arranged in the palisading form. The melanin pigment was seen in separate areas of the tissue,

pigmented Basal Cell Carcinoma type. While cancer cells are arranged in other cases, especially in the Nodular Basal Cell Carcinoma, in the form of cords. It was noted that the basal cells were found in the dermis layer in groups or masses and are not related to the epidermis layer, as shown in the figures (2, 3, 4, 5).

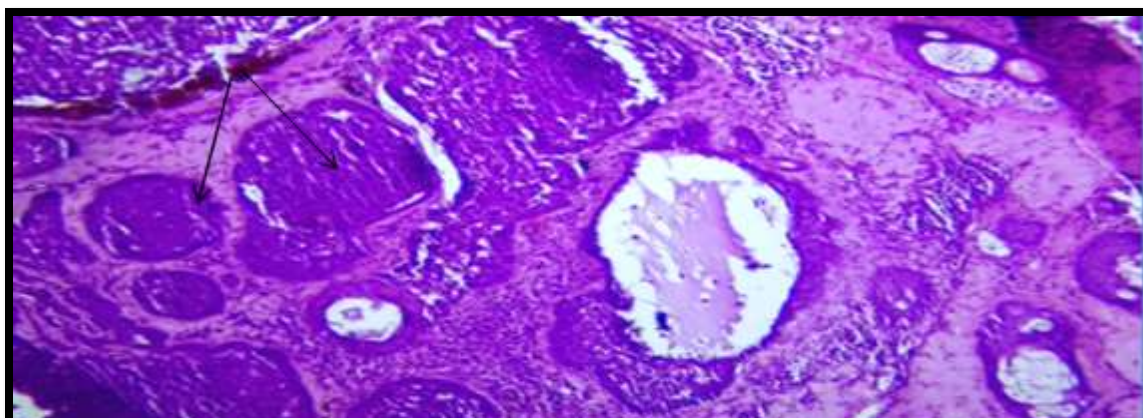


Figure 2: The histological changes of BCC showed masses or nodules aggregated of BCC in the dermis that pointed arrow and melanin pigment seen in the section which seen in the pigmented BCC (H&E stain, 40x).

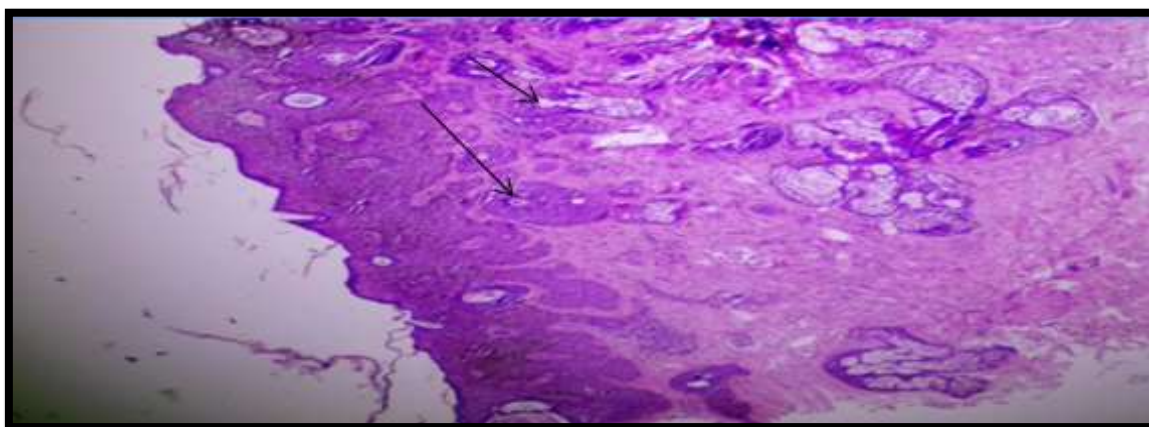


Figure 3: The histological changes of BCC showed epidermis and dermis, Masses or nodule of BCC seen in the dermis that pointed arrow (H & E stain, 10x).



Figure 4: The histological changes of BCC showed nest and cords or strands and masses of BCC in vary sizes in Dermis, (H & E stain, 40x).

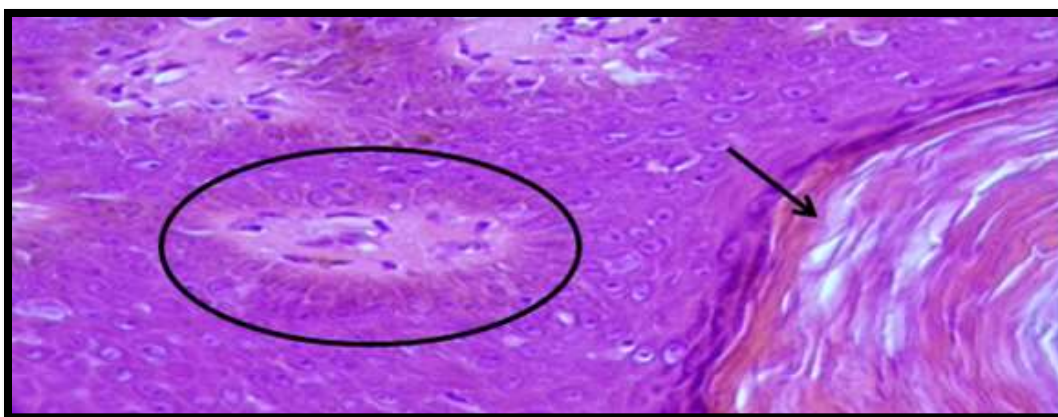


Figure 5: The histological changes of BCC showed keratotic pearl formation that pointed arrow and the cells of the border and peripheral layer were arranged in the palisade form which seen in circle.

Discussion

Human skin cancers are a disease that affects people at a high rate, and the pathological rate and public health are greatly affected by the pathological investigation of these tumors (16-19). Studies from various nations that demonstrated increased frequency in BCC globally were compared to local studies to find similarities in the rates of occurrence of skin malignancies. According to the American Cancer Society, it is the most prevalent cancer in the country. Almost 10,000 deaths (2% of all cancer deaths) and 1 million new cases are diagnosed each year. Several factors, including

awareness of skin cancer in health policy, could be to blame for this rise. Enhanced longevity could also effect the rising prevalence of BCC, and recent data also indicate that incidence is rising among the young population perhaps the increasing in temperature and the nature of peoples work due to their exposure to high temperatures for long time (20, 21). According to this study, males had a larger percentage of infection (69.6%) than females (30%). The increased occurrence among men may be related to their work-related exposure to the sun, and numerous

studies have demonstrated that ozone layer depletion increases the amount of UV radiation that reaches the earth (20). Since fair-skinned people are more likely to develop BCC than dark-skinned people, this result was consistent with many studies. The high percentage of infection in light skin (78.7%) and low result in dark skin (21.3%) explained that BCC is seen in all skin types, but dark-skinned people are rarely affected (22, 23). This color characteristic gives dark skin protection from damage to the skin due to sunlight. Table (3) demonstrated that the age group (66-74 years) had a greater percentage of infection at 36.3%, which was consistent with the numerous references that highlighted that BCC frequency rises with age (16). A macroscopic and microscopic inspection revealed that the tissue had changed (skin tissue affected by the disease). Patients with basal cell carcinoma frequently present with an ulcer that is sluggish to heal and has a variable duration. The lesions are frequently found on the face (Figure 1) in the nose (A, B), in the cheek (C, D) and in the forehead (E), and they revealed changes in tissue that resulted in ulceration, which was supported by other investigations (23, 24). Ulcer formation could indicate that the patient has been affected for a while before arriving. As a result, the majority of affected tissues turned into ulcerations over time.

The environmental pollution that our country was subjected to in the final decade of the 20th century as a result of the wars in which weapons were employed is one of the many causes of this malignancy that many researchers refer to as a primary reason for skin cancer. In addition to other elements like poor immunity and malnutrition. However, all research, including the rise in the occurrence of these cancer tumors, has shown that basal cells are the most susceptible to damage and that exposure to low amounts of sunlight is associated with an increased risk of BCC cancer (10, 25- 27).

Conclusion

Macroscopic and microscopic histological changes in the skin was observed in this study. An ulcerated macroscopic appearance of the lesion was shown. The tumor lesions are located on the face. Microscopic changes represented by the presence of cellular nests in varying sizes with pale cytoplasm, circular and oval nuclei, and the cells of the border and peripheral layer were arranged in the palisading form. It was noted that the percentage of patients was higher in men than women and higher in light skin than dark skin. The study also showed that the age group 66-74 years had a higher infection percentage, while the lower percentage was of the age group > 83 years.

Source of funding

No source of funding

Ethical clearance

Official approval has been obtained to use data and data were analyzed without the names to protect privacy. This study was conducted according to the approval of College of Medicine/ University of Diyala and in accordance with the ethical guidelines of the Declaration of ethical committee of the College (Document no. 2024HYK820).

Conflict of interest

The author acknowledges no conflict of interest in this study.

Recommendation

These findings contributed to a better understanding of the pathological and histological features of BCC and highlighted the demographic and phenotypic characteristics associated with this epidemic disease. Further research is warranted to explore preventive measures, early detection strategies, and targeted treatments for BCC.

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التغيرات النسجية والكيمونسجية المرضية في جلد مرضى سرطان الخلايا القاعدية

حلا ياسين كاظم^١, ذكرى عطا إبراهيم^٢, علي حافظ عباس^٣

الملخص

الخلفية الدراسية: سرطان الخلايا القاعدية (BCC) هو النوع الأكثر شيوعاً من بين انواع سرطانات الجلد، ويعتبر مرضاً وبائياً نظراً لتزايد انتشاره في العديد من البلدان. المشكلة الأكثر أهمية في سرطان الخلايا القاعدية هي الغزو الموضعي. فهو ينمو بطريقة "صامتة" في الأنسجة ونادراً ما ينتشر لباقي الانسجة. عادة ما تكون الأورام المبكرة صغيرة وشفافة أو لؤلؤية ومرتفعة ومستديرة. وهناك ستة أنواع فرعية من سرطان الخلايا القاعدية (BCC) تشمل العقدية، والمصبغة، والسطحية، والمتشكلة، والكيسية المسبب الرئيسي لسرطان الخلايا القاعدية هو التعرض للأشعة فوق البنفسجية. العاملون لساعات طويلة في الهواء الطلق هم الأكثر عرضة للإصابة بسرطان الخلايا القاعدية. وهناك عوامل أخرى منها التاريخ العائلي لسرطان الجلد، وكذلك لون البشرة، والتقدم بالعمر.

الهدف من الدراسة: أجريت الدراسة الحالية لدراسة التغيرات المرضية والانسجية في مختلف الأنسجة الجلد للتعرف على العوامل المساهمة في تكرار الإصابة.

المرضى وطرق العمل: تم جمع ثلاثة وثلاثين عينة من مرضى سرطان الخلايا القاعدية من المركز الاستشاري لمستشفى بعقوبة التعليمي في محافظة ديالى، العراق. تم تشخيص جميع المرضى سريرياً على أنهم مصابين بسرطان الخلايا القاعدية من قبل أطباء الأمراض الجلدية.

النتائج: أظهرت الدراسة التغيرات النسجية والعيانية والمجهريّة في انسجة المرضى. وقد ظهر مظهر مجهري متقّرح لآفة. أوضحت الدراسة أماكن الإصابة حيث تمركزت آفات الورم على الوجه. ولوحظ أن نسبة المرضى من الرجال كانت أعلى من النساء، وارتفاع نسبة الإصابة في البشرة الفاتحة مقارنة بالبشرة الداكنة. كما أظهرت الدراسة أن الفئة العمرية ٦٦-٧٤ سنة كانت أعلى نسبة إصابة بينما النسبة الأقل كانت للفئة العمرية > ٨٣ سنة.

الاستنتاجات: ساهمت هذه النتائج في فهم أفضل التغيرات المرضية والانسجية لـ BCC وسلطت الضوء على الخصائص الديموغرافية والمظهرية المرتبطة بهذا المرض الوبائي. لذلك يجب ان تكون هناك المزيد من البحوث لاستكشاف التدابير الوقائية، واستراتيجيات الكشف المبكر، والعلاجات المستهدفة لسرطان الخلايا القاعدية.

الكلمات المفتاحية: سرطان الخلايا القاعدية, سرطان الجلد, سرطان الجلد غير الميلانيني

البريد الإلكتروني: hala@uodiyala.edu.iq

تاريخ استلام البحث: ٨ كانون الأول ٢٠٢٤

تاريخ قبول البحث: ١٥ آذار ٢٠٢٤

^١ فرع الامراض والطب العدلي، كلية الطب، جامعة ديالى

^٢ قسم علوم الحياة، كلية التربية للعلوم الصرفة، جامعة ديالى

^٣ وحدة الأبحاث البايولوجية للمناطق الحارة، كلية العلوم، جامعة بغداد