

Melanoma and non-melanoma skin cancer among patients who attended at King Khalid University Hospital in Riyadh, Saudi Arabia from 2007 - 2018

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ABSTRACT

الأهداف: تقييم مدى انتشار سرطان الجلد وسرطان الجلد غير الميلانيني للمرضى الذين حضروا مستشفى الملك خالد الجامعي، الرياض، المملكة العربية السعودية. وقيمتنا أيضًا أكثر فئات سرطان الجلد شيوعًا التي يمكن مواجهتها بين هؤلاء المرضى.

المنهجية: أجرى الباحثون دراسة استيعابية شملت جميع المرضى (السعوديين وغير السعوديين) الذين حضروا مستشفى الملك خالد الجامعي (KKUH) خلال الفترة (2007م-2018م). تم جمع البيانات من محفوظات قسم علم الأمراض في KKUH وتم تصنيفها إلى: سرطان الجلد القمامي (MSC)، وسرطان الجلد غير الميلانومي (NMSC)، والذي تضمن: سرطان الخلايا القاعدية (BCC) وسرطان الخلايا الحرشفية الجلدي (SCC)، ما قبل الأورام الآفات، والآفات الجلدية غير الورمية.

النتائج: أصيب عدد 111 مريضًا بسرطان الجلد من أصل 9828 حالة، والتي كانت تعاني من أمراض جلدية أخرى. معظم الحالات كانت سرطان الخلايا القاعدية بإجمالي 76 (68.5%) من جميع الحالات. تم تشخيص 18 مريضًا (16.2%) مع MSC. تم تشخيص المرضى الـ 17 المتبقين (15.3%) بسرطان الخلايا الحرشفية.

الخلاصة: وقوع وانتشار سرطان الجلد يتزايد في جميع أنحاء العالم. في دراستنا، كان BCC أكثر أنواع سرطان الجلد شيوعًا لدى منشئتنا، وهو مشابه لغالبية الدراسات الدولية الأخرى.

Objectives: To assess the prevalence of melanoma and non-melanoma skin cancer for patients attended King Khalid University Hospital, Riyadh, Saudi Arabia. We are also assessing the most common category of skin cancer to be encountered among those patients.

Methods: The authors conducted a retrospective study including all patients (Saudi and non-Saudi) who attended King Khalid University Hospital (KKUH) at the period of (2007-2018). Data were collected from archives of Pathology Department at KKUH and categorized into: melanoma skin cancer (MSC), non-melanoma skin cancer (NMSC), which included: basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), pre-neoplastic lesions, and non-neoplastic skin lesions.

Results: A total of 111 patients were reported to have skin cancer out of 9828 cases, which had other skin pathology. Majority of cases were basal cell carcinoma with a total number of 76 (68.5%) of all cases. 18 patients (16.2%) were diagnosed with MSC. The remaining 17 patients (15.3%) were diagnosed with squamous cell carcinoma.

Conclusion: Skin cancer prevalence and incidence is increasing worldwide. In our study, BCC was the most common type of skin cancer to be reported in our institute, which is similar to the majority of other international studies.

Keywords: MSC, NMSC, BCC, SCC, KKUH

*Saudi Med J 2020; Vol. 41 (7): 709-714
doi: 10.15537/smj.2020.7.25138*

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Received 10th September 2019. Accepted 10th April 2020.

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An increase in the incidence of melanoma and non-melanoma skin cancer (NMSC) worldwide has been reported by different studies. Non-melanoma skin cancer is considered the most common type of cancer among Caucasians.¹ Nowadays, more than one million new cases of skin cancer are reported each year. Non-melanoma skin cancer category consists of 2 main types.² The most common is basal cell carcinoma (BCC), which represents the majority of cases of NMSC by 75%.^{3,4} The second main type is squamous

cell carcinoma (SCC), which represents the majority of the remainder of the cases of NMSC.⁵ There are many risk factors for developing skin cancer, and it is usually a combination of environmental, genetic and phenotypic features.⁶ The incidence rate of melanoma skin cancer (MSC) has been steadily increasing worldwide.⁷ Generally, the incidence of NMSC (BCC and SCC) is higher than the melanoma incidence by 18-20 times.⁸ Nowadays, malignant melanoma accounted for 232,000 new cases worldwide (1.6% of new cancers). Fair skin is considered a risk factor for developing skin cancer in Europe. The highest incidence of skin cancer is documented in both males (40.3 per 100,000) and females (30.5 per 100,000) in Australia/New Zealand with very low incidence rates (below 0.5 per 100,000 in both males and females) are estimated in South-Eastern Asia and South-Central Asia.⁹⁻¹¹ Screening for susceptible patients and identifying the risk factors associated with the development of these skin cancers will help in eliminating the disease and reducing its morbidity rates.¹² One of the most important risk factors for developing skin cancer is ultraviolet (UV) light exposure.¹³ An intensive UV exposure in childhood and adolescence was causative for the development of BCC. The development of melanoma appears to be related to intense, intermittent sun exposure as well.¹⁴ Other risk factor is precursor lesions, which are not appreciated in cases of BCC, but seen in cases of SCC. This includes actinic keratosis and SCC in situ. Melanoma may arise from dysplastic or atypical nevi and rarely from benign nevi.¹⁵ Skin cancer has a large financial burden on health care services, and primary prevention programs of this disease would take a long period to start showing results.¹⁶ Our study aim is to provide the estimated prevalence of all skin cancer patients, through the registered cases at King Khalid University Hospital, Riyadh, Saudi Arabia, from 2007 to 2018.

Methods. The Institutional Review Board at King Saud University Medical City approved the study. We have conducted a retrospective study. Patients included in this study were identified from King Khalid University hospital registry. Our data was collected from histopathological samples of all types of skin biopsy in the Pathology Department, King Khalid University Hospital for the past 11 years (2007 - 2018).

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

All patients with skin sample or biopsy as a diagnostic method were included. We excluded patients presented to the hospital for other medical condition, patients with any other cutaneous malignancies, and patients who underwent any medical treatment for skin abnormality without a pre-diagnostic test. All skin samples and biopsies reports were addressed, but only skin cancer reports were included for analysis. A new Excel sheet was established where data was entered and coded to ensure confidentiality. The data was plotted based on demographics, which included the file number, laboratory number of the biopsy or sample, age, gender, and nationality. Other parameters were measured as well; including information on the nature of lesion, its type, size, site, borders, depth, and lymphovascular invasion. Risk factors were identified in each case that includes history of previous skin cancer, exposure to radiation or long exposure to sunlight, use of immunosuppressant and metastasis. No follow-up was conducted from our team. Data were then analyzed using the Statistical Package for Social Sciences version 24.0 (IBM, armonk, NY, USA).

Results. A total of 9828 cases with skin abnormality on their histopathology reports were revised. Approximately 111 cases had documented skin cancer on their report and were included in our study. The incidence rate was steady throughout the years (**Table 1**). Majority of cases were BCC with a total number of 76 (68.5%) of all cases of skin cancer. The remainder was MSC with total number of 18 (16.2%) cases followed by 17 cases of SCC (15.3%). Basal cell carcinoma was among the age group of 63 ± 14 years. The remainder SCC and melanoma patients were among a younger age group (**Table 2**).

Basal cell carcinoma was more common in males (53.9%) compared to females (46.1%). Approximately 52.9% and 72.2% of the patients who had SCC and melanoma were females. Basal cell carcinoma and SCC showed a strong correlation between history of immunosuppressant use and development of skin cancer, with a $p < 0.0001$. Most cases of BCC presented as an ulcer (65.8%), with a $p < 0.0001$. Squamous cell carcinoma patients presented mostly as a non-ulcerated nodule (76.5%), with a $p < 0.0001$. The majority of the patients diagnosed with melanoma presented to the clinic with a pigmented lesion (77.8%) ($p < 0.0001$).

The nose was the most common anatomical location of the diagnosed BCC patients (26.3%) followed by the face (19.7%), scalp (14.5%), back (10.5%), and

Table 1 - Incident rate of 9828 cases with skin abnormality.

Years	Total number of samples	Number of cases with skin cancer n (%)
2007	788	5 (0.6)
2008	802	11 (1.4)
2009	755	6 (0.8)
2010	934	9 (1.0)
2011	832	11 (1.3)
2012	1070	8 (0.8)
2013	790	6 (0.8)
2014	837	11 (1.3)
2015	695	16 (2.3)
2016	764	9 (1.2)
2017	820	15 (1.8)
2018	741	4 (0.5)
Total	9828	111 (1.2)

lastly were the eyes (9.2%). 23.5% of the SCC cases were located in the face and scalp. Acral melanoma represents almost 56% of all melanoma located in the lower extremity followed by the upper extremity.

The majority of BCC skin cancer histopathology indicated well-defined margins. This resulted in less aggressive disease with less recurrence. Only 27% were recurrent BCC. Squamous cell carcinoma showed (52.9%) of ill-defined margins and (47.1%) of well-defined margins in the studied samples. Melanoma sample indicated more ill-defined margins (94.4%), with a *p* value of <0.0001, and only (5.6%) with a well-defined border. Lymph-vascular invasion was primarily found in melanoma, which has the highest rate of invasion by (61.1%)

Basal cell carcinoma presented with the smallest surface area on the skin with 1.328 cm ± 1.70 cm for lesion size. This correlates with the lower risk of recurrence. Squamous cell carcinoma surface area was 3.674 cm ± 6.61 cm, and the highest surface area was melanoma 6.989 cm ± 8.89 cm.

Table 2 - Patients demographics and analysis.

Variables	Groups			P-value
	Melanoma (n=18) 16.2%	Non-melanoma (BCC) (n=76) 68.5%	Non-Melanoma (SCC) (n=17) 15.3%	
Nationality				
Saudi	17 (94.4)	64 (84.2)	13 (76.5)	0.330
Non-Saudi	1 (5.6)	12 (15.8)	4 (23.5)	
Age (mean ± SD)	56.333 ± 15.54	63.118 ± 14.58	58.529 ± 18.097	0.176
Gender				0.135
Male	5 (27.8)	41 (53.9)	8 (47.1)	
Female	13 (72.2)	35 (46.1)	9 (52.9)	
Metastasis	11 (61.1)	1 (1.3)	3 (17.6)	<0.0001
Presented as nevus	14 (77.8)	0 (0)	1 (5.9)	<0.0001
Immune suppression Hx.	8 (44.4)	73 (96.1)	15 (88.2)	<0.0001
Lymphovascular invasion	11 (61.1)	4 (5.3)	2 (11.8)	<0.0001
Presented as lesion	1 (5.6)	25 (32.9)	13 (76.5)	<0.0001
Presented as ulcer	3 (16.7)	50 (65.8)	3 (17.6)	<0.0001
Borders				<0.0001
Ill defined	17 (94.4)	29 (38.2)	9 (52.9)	
Well defined	1 (5.6)	47 (61.8)	8 (47.1)	
Primary	12 (66.7)	55 (72.4)	13 (76.5)	0.807
Recurrent	6 (33.3)	21 (27.6)	4 (23.5)	

BCC - basal cell carcinoma, SCC - squamous cell carcinoma

In regard to the depth, SCC has a depth of 0.759 cm \pm 0.905 cm, while the depth of melanoma cases found to be 0.639 cm \pm 0.66 cm. Basal cell carcinoma presented with the lowest depth of 0.404 cm \pm 0.355 cm.

Metastasis of cancer were found to be statistically significant and highest among melanoma cases by 61.1% with $p < 0.0001$. Approximately 17.6% of SCC had metastasis. Lastly, with the lowest metastasis rate comes BCC by 1.3%, which is found to be significant with a $p < 0.0001$.

Discussion. This study was conducted to assess the epidemiology of skin cancer among patients who attended at King Khalid University Hospital, Riyadh, Saudi Arabia. Skin cancer prevalence rate is increasing worldwide.^{17,18} It was proven that skin cancer in general is more common among Caucasian population.^{12,19} In the United States, NMSC reported to be the most common type of skin cancer.¹⁷ Australia came first as highest incidence rate and prevalence of skin cancer worldwide.^{20,21} It was also found that BCC and SCC are the most diagnosed type of skin cancer in Australia.²¹ A study carried out in Italy reported that incidence rate of BCC is the highest.²² Another study conducted in Vaud, Switzerland, reported BCC to be the most common type reported among both males and females.²³ While in Germany, it was reported that 80% of skin cancer cases were found to be BCC.²³ A study conducted in Northern Ireland, reported BCC to be the most common type among the skin cancer cases. It was also found to be more common among males than females.²⁴

Asia is a big geographical area, which explains different numbers of incidence rate and prevalence. Unfortunately, there are no enough studies conducted among Asian population to assess incidence rate and prevalence of skin cancer.²⁵ The report of cases is less in developing countries due to limited financial resources. A study carried out in Singapore, reported BCC as the most common skin cancer, followed by SCC and melanoma.²⁶ A study conducted in Saudi Arabia from 1990 to 2003, reported 193 patients to have skin cancer based on the histopathological diagnosis, BCC represented 41% of cases, SCC 29%, and melanoma was 4.1%. Male gender was predominant in this study.²⁷ Our study came in concordance with other international and local studies and shows the higher incidence of BCC compared to other skin cancer types. It also shows male predominance. Our data shows higher number of cases of melanoma than

SCC. Ultraviolet light exposure for a long period of time reported to be the main contributing factor to develop BCC specifically, and skin cancer in general.²⁵ Ultraviolet light exposure and sunlight exposure could vary among people.²⁸ Unfortunately, UV light exposure is difficult to assess clinically.²⁹ In our study, we could not assess all patients for UV light exposure, since it was a retrospective study. Use of immunosuppressive treatment in general has a significant correlation in developing malignant neoplasm in general.³⁰ In our study, it was significant correlation between the use of immunosuppressive treatment and developing skin cancer. Approximately 96.1% of our patient with BCC had history of immunosuppressant use. Approximately 88.2% with SCC had positive history of immunosuppressive conditions.

Skin cancer is usually found on sun-exposed areas, such as head and neck. Multiple studies reported skin cancer to appear more in those areas of human body.^{15,25,26,31-44} In our study we had similar results, were NMSC reported to appear more frequently present in the head and neck. Melanoma was most commonly presented in the lower limb.

Studies reported that BCC has the least metastatic rate followed by SCC. Melanoma has the highest rate of metastasis.^{45,46} Our study shows similar results.

Study limitations. Study included low sample size because the scope of the study was limited to only patients attending King Khalid University Hospital in Riyadh, Saudi Arabia.

The study would benefit from expanding the sample size to include more hospitals in Riyadh and Saudi Arabia in general. In the future, the study can include more hospitals and higher sample size with focus on subtypes of each category of skin cancer. It can also be conducted prospectively to assess sunlight exposure, mortality, and morbidity rate.

In conclusion, skin cancer prevalence and incidence is increasing worldwide. In our study, we found similar results to international studies, were BCC was the most common type of skin cancer to be reported.

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