ORIGINAL ARTICLE

Prevalence of Cutaneous Malignancies in Johor Bahru: A 6-Year Retrospective Study at a Single Centre

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Abstract: Cutaneous malignancies, including basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and malignant melanoma (MM), are among the most common forms of skin cancer, particularly in regions with high ultraviolet (UV) exposure. Despite their prevalence, these malignancies are relatively underreported in Malaysia, where public awareness remains limited. This study aimed to analyse the epidemiology, demographic distribution, and associated risk factors of cutaneous malignancies among patients at Hospital Sultanah Aminah, Johor Bahru (HSAJB), between 2015 and 2020 to fill gaps in local data and inform public health strategies. A retrospective, cross-sectional study was conducted, encompassing all patients diagnosed with and histopathologically confirmed to have cutaneous malignancies at the Department of Plastic and Reconstructive Surgery, HSAJB, from January 2015 to December 2020. Descriptive statistics summarized socio-demographic variables, while logistic regression was employed to assess the association between lifestyle factors, comorbidities, and the risk of developing specific types of cutaneous malignancies. Out of 262 confirmed cases, 219 were included in the analysis. The majority of patients were male (59.8%) and of Chinese ethnicity (60.7%), with most cases occurring in the elderly population (mean age 68.60 ± 13 years). Basal cell carcinoma was the most common malignancy, followed by SCC and MM. Lesions predominantly occurred in sun-exposed areas, particularly the head and neck. A significant association was found between smoking and the risk of developing SCC ($P < 0.05$), but not with BCC and MM. Co-morbidities such as hypertension and diabetes mellitus did not significantly influence the risk of cutaneous malignancies. The prevalence of cutaneous malignancies was 15 per 1,000 people in Johor Bahru during the study period. The study highlights a higher prevalence of cutaneous malignancies among the Chinese population and males in Johor Bahru. Public health initiatives focusing on increasing awareness, early detection, and preventive measures such as sun protection and smoking cessation are essential to reduce the incidence and improve outcomes for cutaneous malignancies in Malaysia. Further research is needed to explore the impact of comorbidities and other risk factors on these malignancies.

Keywords: Cutaneous malignancies, Johor Bahru, Malaysia, Skin cancer

Introduction

Malaysia, encompassing a total area of approximately 330,534 square kilometres, is divided into Peninsular Malaysia and East Malaysia. As of 2020, Malaysia's diverse population, including non-citizens, stood at 32.4 million. Malaysian citizens comprised 52.3% males and 47.7% females, with Bumiputra forming the majority at 69.4%, followed by Chinese (23.2%), Indian (6.7%), and others (0.7%). Johor, located in the southern part of Peninsular Malaysia, had a total population of 4 million in 2020, with Johor Bahru having approximately 1.71 million residents [1].

According to the Malaysia National Cancer Registry Report 2012-2016 [2], skin cancer or cutaneous malignancies rank among the top ten most prevalent cancers in Malaysia, accounting for 2.6% of all cancer cases. Notably, the incidence of cutaneous malignancies is higher within the Chinese community compared to the overall Malaysian population [3]. Despite its prevalence, cutaneous malignancies remain relatively underreported and receive limited public attention in Malaysia. The World Health Organisation (WHO) has highlighted an increase in both melanoma and non-melanoma cutaneous malignancies in recent years [4].

Globally, cutaneous malignancies remain among the most common forms of cancer, particularly in regions with high UV exposure. The depletion of the ozone layer has resulted in reduced atmospheric protection, allowing more solar ultraviolet (UV) radiation to reach the Earth's surface, thereby increasing the risk of developing cutaneous malignancies [5]. Incidence rates of cutaneous malignancies are highest in Australia and New Zealand, reflecting high UV radiation levels and prevalent outdoor lifestyles. In contrast, regions with lower UV exposure, such as Northern Europe, have significantly lower incidence rates [6,7].

Since the 1960s, the incidence of basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) among Caucasians has increased by 3 to 8% annually. Individuals with darker skin benefit from greater epidermal melanin, enhanced melanocyte activity, and more scattered melanosomes, which can filter twice as much ultraviolet B (UVB) radiation compared to lighter-skinned individuals, such as Caucasians [3,8,9]. The incidence of malignant melanoma (MM), a potentially lethal tumour due to its high mortality rate, has increased over the years. Although less common than other cutaneous malignancies, MM accounts for the majority of skin cancer-related deaths, as reported by the WHO [6]. In addition to the three most prevalent cutaneous malignancies—SCC, BCC, and MM—other types can also occur, though they are relatively rare. These include Merkel cell carcinoma, sarcoma-like tumours, trichilemmal carcinoma, and metastatic skin cancer [8–10].

While Asians generally have lower incidence rates of cutaneous malignancies compared to Caucasians, the prevalence of these malignancies is on the rise in Asian countries. The Asian population is not homogeneous, with significant regional variations in skin types influenced by geographical conditions [11–13]. Early recognition of suspicious skin lesions and prompt referral to tertiary hospitals are crucial for effective management [14].

Several risk factors contribute to the development of cutaneous malignancies, including genetic predisposition, smoking, UV exposure, skin type, age, and immuno-suppression. A family history of cutaneous malignancies increases individual risk, and prolonged exposure to UV radiation from the sun or artificial sources, such as tanning beds, is a significant risk factor. Lighter skin types (Fitzpatrick I-III) are more susceptible to UV damage, and the risk of cutaneous malignancies increases with age due to cumulative UV exposure. Conditions that weaken the immune system, such as HIV/AIDS or the use of immunosuppressive medications, also increase the risk of cutaneous malignancies [15].

Understanding the relationship between lifestyle and the risk of developing cutaneous malignancies is crucial for improving patient outcomes and developing targeted prevention

strategies. Some studies suggest that medical conditions such as diabetes mellitus and smoking may be associated with an increased risk of certain cutaneous malignancies. It has been found that smoking, in particular, may increase the risk of SCC. However, the relationship between cardiovascular disease and cutaneous malignancies may not directly increase the risk [16,17]. Effective prevention strategies include public education on the risks of UV exposure, the importance of regular skin checks, and the use of sun protection measures such as sunscreen and protective clothing. These strategies have been shown to reduce the incidence of cutaneous malignancies by promoting protective behaviours [16,18].

However, data and literature on cutaneous malignancies at the local and national levels in Malaysia are limited. Therefore, this study aims to analyse retrospective data on the epidemiology of cutaneous malignancies at Hospital Sultanah Aminah, Johor Bahru (HSAJB). By examining data over a six-year period, this research seeks to fill gaps in local and national information, providing insights that can inform public health strategies for addressing trends in cutaneous malignancies. Enhanced public awareness and early detection are crucial for reducing the burden of cutaneous malignancies and improving outcomes in Malaysia.

Methodology

Study Design

This retrospective, cross-sectional study included all patients referred to, diagnosed with, and histopathologically confirmed to have cutaneous malignancies who received treatment at the Department of Plastic and Reconstructive Surgery, HSAJB, between January 2015 and December 2020. Data were extracted from patient's case notes spanning this period and were subsequently entered into the Skin Cancer Proforma. Ethical approval for this study was obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia. The study was also registered with the National Medical Research Registry under protocol number NMRR-21-1883-61570.

Statistical Analysis

All data were entered and analysed using IBM's Statistical Package for Social Sciences (SPSS) version 24. Socio-demographic variables of the patients were summarized using descriptive analysis and logistic regression. Numerical data were displayed as mean (SD) or median (IQR), depending on the normality of the distribution, while categorical data were presented as frequency and percentage (%). Cases with missing or incomplete data, or those for which case notes could not be identified, were excluded from the study.

Results

Demographic Data

From 2015 to 2020, 262 patients were histopathologically confirmed to have cutaneous malignancies. Due to missing and insufficient data, this study comprised only 219 participants, and the demographic data are summarized in **Table 1**. The majority of these 219 patients (81 patients, 37.0%) were between the ages of 71 and 80, with an average age of 68.60 ± 13 years. Most patients were male (131 patients; 59.8%), resulting in a male-to-female ratio of 1.5:1. Additionally, the majority were from the Chinese community (133 patients, 60.7%).

Point Prevalence

Between 2015 and 2020, the prevalence of cutaneous malignancies in Johor Bahru, Johor, Malaysia, was 15 per 1,000 people.

Cutaneous Lesions Size

The size of cutaneous lesions varied widely among the patients **(Table 2)**. The mean lesion size was 725.76 mm² with a standard deviation of 2555.24 mm², indicating a broad range of lesion sizes from as small as 4.00 mm² to as large as 34,500.00 mm². This wide range reflects variability in the stage at which the malignancies were diagnosed, as well as differences in lesion growth rates and tumour types.

Table 1 Demographic data of cutaneous malignancies patients.

Demographic Variables	Frequency, n (%)
Age (years old)	
0 - 10	0 (0)
11-20	0 (0)
21 - 30	4 (1.8)
31 - 40	7 (3.2)
41 - 50	9 (4.1)
51 - 60	36 (16.4)
61 -70	48 (21.9)
71 - 80	81 (37.0)
81 - 90	29 (13.2)
91 - 100	5 (2.3)
Gender	
Male	131 (59.8)
Female	88 (40.2)
Ethnicity	
Malay	77 (35.2)
Chinese	133 (60.7)
Indian	2 (0.9)
Others	7 (3.2)

Table 2 Cutaneous lesions size of patients.

	Cutaneous lesion size, mm²
Mean ± SD	725.76 ± 2555.24
Range	4.00 - 34500.00

Distribution of Cutaneous Malignancies by Demographics and Anatomical Location

Table 3 provides a comprehensive overview of the distribution of cutaneous malignancies among patients (n=219) treated at HSAJB. The analysis focuses on gender, ethnicity, and anatomical location, providing valuable insights into the demographics and characteristics of these patients. When examining specific types of cutaneous malignancies, BCC was fairly evenly distributed between males (52.5%) and females (47.5%). In contrast, SCC was predominantly found in males, accounting for 81.8% of the cases, compared to only 18.2% in females. Similarly, MM was more common in males (71.4%) than in

females (28.6%). The ethnic breakdown of patients revealed that the Chinese population had the highest incidence of cutaneous malignancies, representing 133 cases (60.7%). This was followed by the Malay population, which accounted for 77 cases (35.2%). Incidences among Indians and other ethnicities were much lower, with 2 cases (0.9%) and 7 cases (3.2%), respectively. Within specific malignancy types, BCC was most prevalent among the Chinese population (66.3%), followed by Malays (30.6%), with no cases reported among Indians. For SCC, the distribution was slightly more balanced but still showed a higher incidence in the Chinese (50%) compared to Malays (43.2%) and Indians (4.5%). Malignant melanoma was equally distributed among the Chinese and Malays (42.9% each), with no cases among Indians. The anatomical distribution of cutaneous malignancies highlighted that the vast majority of lesions were located in the head and neck region, accounting for 195 cases (89%). This trend was particularly pronounced in BCC, where 96.3% of cases were on the head and neck. SCC also showed a high concentration in this area (68.2%), followed by the upper limbs (15.9%) and anterior trunk (11.4%). Malignant melanoma had a more varied distribution, though the head and neck remained the most common site (57.1%), with significant cases also found on the lower limbs (28.6%) and posterior trunk (14.3%).

Lifestyle and Co-Morbidity

Table 4 reveals that a significant majority of patients (86.8%) were non-smokers, with only 13.2% reporting a history of smoking. Approximately 22.4% of patients had no recorded medical illnesses, indicating that a significant portion of patients with cutaneous malignancies may not have other underlying health conditions. About 23.7% of patients had one type of medical illness, while the highest proportion of patients had two types of medical illnesses (27.4%). Additionally, 22.4% of patients had three types of medical illnesses, and a small fraction (4.1%) had four or more medical illnesses. The co-morbidities or medical illnesses included hypertension, diabetes mellitus, and cardiovascular disease. Further analysis using logistic regression **(Table 5)** revealed that smoking was significantly associated with an increased risk of developing squamous cell carcinoma (SCC), with a p-value < 0.05. However, no significant association was found between smoking and the development of BCC or MM. Additionally, the analysis indicated that the number of medical illnesses did not significantly affect the likelihood of developing any type of cutaneous malignancy.

Table 3 Distribution of cutaneous malignancies according to gender, ethnicity and anatomical location.

	Frequency, n (%)				
	BCC	**SCC**	**MM**	**Others**	**Total**
Gender					
Male	84 (52.5)	36 (81.8)	5 (71.4)	6 (75.0)	131 (59.8)
Female	76 (47.5)	8 (18.2)	2 (28.6)	2 (25.0)	88 (40.2)
Total	160(100)	44 (100)	7 (100)	8 (100)	219 (100)
Ethnicity					
Malay	49 (30.6)	19 (43.2)	3 (42.9)	6 (75.0)	77 (35.2)
Chinese	106 (66.3)	22 (50.0)	3 (42.9)	2 (25.0)	133 (60.7)
Indian	0 (0.0)	2 (4.5)	0 (0.0)	0 (0.0)	2 (0.9)
Others	5 (3.1)	1 (2.3)	1 (14.2)	0 (0.0)	7 (3.2)
Total	160 (100)	44 (100)	7 (100)	8 (100)	219 (100)
Anatomical location					
UL	2 (1.3)	7 (15.9)	0 (0.0)	0 (0.0)	9 (4.2)

LL	0 (0.0)	0 (0.0)	2 (28.6)	0 (0.0)	2 (0.9)
Ant trunk	0 (0.0)	5 (11.4)	0 (0.0)	1 (12.5)	6 (2.7)
Post trunk	4 (2.4)	2 (4.5)	1 (14.3)	0 (0.0)	7 (3.2)
Head & neck	154 (96.3)	30 (68.2)	4 (57.1)	7 (87.5)	195 (89.0)
Total	160 (100)	44 (100)	7 (100)	8 (100)	219 (100)

*BCC= basal cell carcinoma; SCC= squamous cell carcinoma; MM= malignant melanoma; UL = upper limb; LL = lower limb; Ant = anterior; Post = posterior

Table 4 Lifestyle and co-morbidity of patients with cutaneous malignancies.

Variables	Frequency, n (%)
Smoking Behaviour	
Yes	29 (13.2)
No	190 (86.8)
Co-morbidity	
No medical illness	49 (22.4)
One co-morbid disease	52 (23.7)
Two co-morbid diseases	60 (27.4)
Three co-morbid diseases	49 (22.4)
More than three co-morbid diseases	9 (4.1)

Table 5 Binary logistic regression analysis of cutaneous malignancies with lifestyle factors and co-morbidities.

Variables	*B*	*S.E.*	Exp B	Wald X^2	*df*	*p*
Squamous Cell Carcinoma (SCC)						
Smoking	-1.100	0.432	0.333	6.478	1	0.011
One co-morbid disease	-0.186	0.483	0.830	0.149	1	0.700
Two co-morbid diseases	-0.284	0.471	0.753	0.363	1	0.547
Three co-morbid diseases	-0.581	0.520	0.559	1.250	1	0.264
More than three co-morbid diseases	-0.964	1.124	0.381	0.736	1	0.391
Basal Cell Carcinoma (BCC)						
Smoking	0.808	0.419	2.243	3.714	1	0.054
One co-morbid disease	-0.008	0.428	0.992	0.000	1	0.985
Two co-morbid diseases	0.484	0.435	1.623	1.236	1	0.266
Three co-morbid diseases	0.563	0.464	1.756	1.473	1	0.225
More than three co-morbid diseases	1.364	1.110	3.914	1.512	1	0.219
Malignant Melanoma (MM)						
Smoking	17.915	7310.895	60321780.4	0.000	1	0.998
One co-morbid disease	1.075	1.175	2.930	0.837	1	0.360
Two co-morbid diseases	-0.194	1.429	0.824	0.018	1	0.892
Three co-morbid diseases	0.767	1.245	2.154	0.380	1	0.538
More than three co-morbid diseases	-17.310	13148.712	0.000	0.000	1	0.999

Discussion

The aim of this study was to gain a comprehensive understanding of the distribution of cutaneous malignancies in Johor, Malaysia. Cutaneous malignancies rank as the 17th most common malignancies worldwide, with the highest incidence rates in Australia, New Zealand, and Northern European countries, and the lowest in certain African regions. This variation is likely due to differences in Fitzpatrick skin types, which affect lighter skin more than darker skin, as well as geographical location, UV exposure, and cultural habits [4,6,7]. Between 2015 and 2020, the prevalence of cutaneous malignancies in HSAJB was found to be 15 per 1000 people. As the study was confined to Johor Bahru only, comparisons with recent studies from neighbouring countries such as Singapore and Indonesia were not possible. These countries, along with Malaysia, have ethnically diverse populations with skin complexions ranging from Fitzpatrick III to VI [3,9,12].

The study found that cutaneous malignancies were most prevalent among the fair-skinned Chinese community in Johor, followed by the Malay population, and were least common among the Indian population. Furthermore, the Chinese population shows a higher incidence of cutaneous malignancies, particularly BCC, compared to other ethnic groups. The Chinese ethnic group's lower Fitzpatrick skin type compared to Malays and Indians contributes to their higher risk of cutaneous malignancies [3,19].

The most common types of cutaneous malignancies identified were BCC, followed by SCC and MM. This finding aligns with research conducted in various nations worldwide [4]. Furthermore, the majority of cutaneous malignancies, whether BCC, SCC, or MM, were significantly more prevalent in the elderly population. Generally, males exhibited a higher incidence of all cutaneous malignancies, with a male-to-female ratio of 1.5:1. This is consistent with global research, which indicates that men are more likely than women to develop cutaneous malignancies [8,9,12]. The increased risk in men may be attributed to a lower awareness of sun protection measures, such as the use of sunscreen. Further study is needed to understand the reasons behind this finding [15].

Regarding the anatomical location of cutaneous malignancies, the majority of lesions were found in sun-exposed areas, primarily the head and neck. This contrasts with the Caucasian population, where BCC distribution is more homogeneous across the body [8,12,20,21]. Cultural factors may influence this difference. In Malaysia, people commonly wear modest clothing that covers most of their bodies, which may reduce sun exposure. Additionally, the lack of sun protection measures, such as sunscreen, hats, and umbrellas, increases the risk of developing cutaneous malignancies, especially in the head and neck region. This pattern underscores the critical role of UV exposure in the development of cutaneous malignancies [18].

The relatively low percentage of smokers among the patients might reflect general population trends; however, the significant association between smoking and certain cutaneous malignancies, such as SCC, should not be overlooked. The significant association between smoking and SCC observed in this study aligns with existing literature [17]. Smoking is a well-established risk factor for SCC. Carcinogens present in tobacco smoke, such as polycyclic aromatic hydrocarbons and nitrosamines, contribute to DNA damage and mutations in skin cells, leading to the development of SCC. Furthermore, the association of smoking with BCC and MM is less pronounced in this study. Several studies have found no significant association between smoking and BCC, suggesting that other factors may contribute to the development of BCC. Similarly, the relationship between smoking and MM is complex, and other factors may need to be considered in the development of MM [16,17].

The finding that the number of medical illnesses did not significantly influence the risk of developing cutaneous malignancies is intriguing and warrants further investigation. In this study, medical illnesses such as hypertension, diabetes mellitus, and ischemic heart disease did not show a significant association with cutaneous malignancies. This could be due to the specific population studied or the relatively small sample size, highlighting the need for larger, multi-centre studies to clarify these relationships. Some research suggests that chronic medical conditions, particularly those that impair the immune system, could potentially increase the risk of cutaneous malignancies, such as immunosuppressive conditions. However, previous studies have also shown mixed results regarding the impact of co-morbidities on cutaneous malignancies [15,16].

Conclusion

This study provides a detailed assessment of cutaneous malignancies, including their prevalence and characteristics in Johor Bahru, Johor, Malaysia. It underscores the need for increased public awareness of cutaneous malignancies, irrespective of gender, skin colour, ethnic group, or age. Early detection of new and suspected skin lesions is crucial. Preventive measures to reduce the risk of cutaneous malignancies are essential, including education and awareness among healthcare providers and communities to improve early detection and diagnosis. For instance, studies indicate that emphasizing the effectiveness of educational campaigns in increasing the use of sunscreen and protective clothing, highlighting the dangers of smoking, and encouraging regular skin checks can significantly reduce the incidence of malignancies. Currently, cutaneous malignancy initiatives at both the hospital and community levels in Malaysia are insufficient and need improvement. One limitation of this study is the potential underreporting of cases. Therefore, there is a need for standardized national data collection procedures for similar research investigations, particularly for cutaneous malignancies.

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Conflict of Interest

The authors declare no potential conflicts of interest.

References

1. Department of Statistics Malaysia. Current Population Estimates, Malaysia; 2024.
2. Azizah AM, Hashimah B, Nirmal K, Siti Zubaidah AR, Puteri NA, Nabihah A. Malaysia National Cancer Registry Report (MNCR) 2012-2016 National Cancer Institute Ministry of Health Putrajaya Malaysia. Malaysia National Cancer Registry Report. 2019:1–116.
3. Chng CC, Wong SM, Lee YY, Rokiah I, Jayalaskmi P. A 7-year retrospective review of skin cancer at University Malaya medical centre: a tertiary centre experience. Malaysian Journal of Dermatology. 2012;29:16–22.
4. Harish KH, Rakesh SR, Sunder RE, Pradeep HP, Diviya KK, Raxit S, et al. Cutaneous malignancy: our observations and review of literature. International Journal of Current Research. 2018;10(12):76613-76618.
5. Gupta AK, Bharadwaj M, Mehrotra R. Skin cancer concerns in people of color: risk factors and prevention. Asian Pacific Journal of Cancer Prevention. 2016;17(12):5257–5264.
6. De Pinto G, Mignozzi S, La Vecchia C, Levi F, Negri E, Santucci C. Global trends in cutaneous malignant melanoma incidence and mortality. Melanoma Research. 2024;34(3):265–275.

7. McNoe BM, Gage R, Signal L. What can Aotearoa New Zealand learn from the Australian Sunsmart Story? A qualitative study. Australian and New Zealand Journal of Public Health. 2022;46(3):387–393.
8. Apalla Z, Lallas A, Sotiriou E, Lazaridou E, Ioannides D. Epidemiological trends in skin cancer. Dermatology Practical & Conceptual. 2017;7(2):1–6.
9. Oh CC, Jin A, Koh WP. Trends of cutaneous basal cell carcinoma, squamous cell carcinoma, and melanoma among the Chinese, Malays, and Indians in Singapore from 1968-2016. JAAD International. 2021;4:39–45.
10. Erkul E, Patel KG, Day T. Surgical planning for resection and reconstruction of facial cutaneous malignancies. International Journal of Head and Neck Surgery. 2016;7(3):149–164.
11. Abishegam SD, Yasir AM, Hussin I, Noran IS. Pilot epidemiological study of basal cell carcinoma in Melaka. Asian Journal of Medical Sciences. 2019;10(6):18–21.
12. Wibawa LP, Andardewi MF, Kristanti IA, Arisanty R. The epidemiology of skin cancer at Dr. Cipto Mangunkusumo National Central General Hospital from 2014 to 2017. Journal of General-Procedural Dermatology & Venereology Indonesia. 2019;4(1):11–16.
13. Ciążyńska M, Kamińska-Winciorek G, Lange D, Lewandowski B, Reich A, Sławińska M, et al. The incidence and clinical analysis of non-melanoma skin cancer. Scientific reports. 2021;11(1):1–10.
14. Shariff Z, Roshan A, Williams AM, Platt AJ. 2-Week wait referrals in suspected skin cancer: does an instructional module for general practitioners improve diagnostic accuracy? Surgeon. 2010;8(5):247–251.
15. Wunderlich K, Suppa M, Gandini S, Lipski J, White JM, Del Marmol V. Risk Factors and Innovations in Risk Assessment for Melanoma, Basal Cell Carcinoma, and Squamous Cell Carcinoma. Cancers (Basel). 2024;16(5):1–24.
16. Sawada Y, Nakamura M. Daily lifestyle and cutaneous malignancies. International Journal of Molecular Sciences. 2021;22(10): 5227.
17. Uotila I, Siiskonen H, Haimakainen S, Harvima I. Tobacco smoking is associated with cutaneous squamous cell carcinoma but not with basal cell carcinoma or melanoma in adult subjects at risk of skin cancer: A cross-sectional study. Tobacco Induced Diseases. 2024;22:1–13.
18. Baig IT, Petronzio A, Maphet B, Chon S. A review of the impact of sun safety interventions in children. Dermatology Practical & Conceptual. 2023;13(1):1–9.
19. Oh CC, Jin A, Koh W-P. Trends of cutaneous basal cell carcinoma, squamous cell carcinoma, and melanoma among the Chinese, Malays, and Indians in Singapore from 1968-2016. JAAD International. 2021;4:39–45.
20. Netscher DT, Leong M, Orengo I, Yang D, Berg C, Krishnan B. Cutaneous malignancies: Melanoma and nonmelanoma types. Plastic and Reconstructive Surgery. 2011;127(3):37–56.
21. Johnson-Obaseki SE, Labajian V, Corsten MJ, McDonald JT. Incidence of cutaneous malignant melanoma by socioeconomic status in Canada: 1992-2006. Journal of Otolaryngology- Head & Neck Surgery. 2015;44(1):1–7.