ISSN: 1343-4292
Volume 140, Issue 01, April, 2022

Trends in skin cancer Incidence in Iraq during the period 2000-2019

Muzahem M. AL-Hashimi[1]

Department of Statistics and Informatics, College of Computer science & Mathematics, University of Mosul, Iraq[1]

ABSTRACT— There is a lack of information on the prevalence of skin cancer in Iraq. This study aimed to explore the skin cancer trend in Iraq from 2000 to 2019. Based on data from the Iraq Cancer Registry (ICR) from 2000 to 2019, the age-standardized incidence rates (ASIRs) were calculated for skin cancer using the world standard population, in addition to the age-specific incidence rates. The Joinpoint regression analysis was used to calculate the average annual percentage changes (AAPCs) and annual percentage changes (APCs) in skin cancer incidence rates and their statistically significant differences for each linear segment for the whole study period (2000-2019), four 5-year periods (2000-2004, …, and 2015-2019), and by year for all ages combined (0-70+ years), for the age groups (0-19, 20-29, 30-39, 40-49, 50-59, 60-69, and 70+ years), and for males and females separately. In Iraq from 2000 to 2019, the ASIR of skin cancer in both sexes and all ages was 4.144/100,000 people during the study period. In males, the ASIRs increased significantly from 2000 to 2019 with an AAPC of +2.069%. While in females, the incidence increased significantly with an AAPC of +2.206%. The highest incidences of skin cancer cases were observed in elderly individuals (70+), with an AAPC of +2.481% for males and 3.863% for females. This study has shown an increasing incidence of skin cancer in Iraq. Our results may be beneficial in improving the planning for the control and prevention and early detection of skin cancer in Iraq.

KEYWORDS: skin cancer, Incidence, Poisson Regression, Time Trends.

1. INTRODUCTION

Cancer is currently one of the world's most serious health concerns [1]. Skin cancer is the most prevalent type of cancer in the world, accounting for 75% of all malignancies [2]. Skin cancer includes abnormal changes in the skin's outer layer. It is typically divided into two types: melanoma and non-melanoma, the latter encompassing Basal Cell Carcinoma (BCC) and Squamous Cell Carcinoma (SCC) as the predominant histologic subtypes [3]. Globally. Non-melanoma skin cancer (NMSC) is the most prevalent cancer among light-skinned people, with a rising global prevalence. NMSC is an increasing concern for healthcare systems globally, causing considerable morbidity [4], [5]. In 2020, it is estimated that 1.198 million were diagnosed with NMSC representing 6.2% of all cancer cases, and 63.731 deaths representing 0.6% of all cancer deaths, while 324,635 melanoma of skin cases occur in the world representing 1.7% of all cancer cases, and 57.043 deaths representing 0.6% of all cancer deaths [4]. NMSC is the most common cancer diagnosed in Australia/New Zealand, where rates are highest in both males and females. Melanoma was the fifth most frequent cancer in males and the seventh most common cancer in females in the United States in 2015. Melanoma is common in Asia, Africa, and Latin America [1].

Skin cancer has been on the rise in recent decades [1], and because the majority of these tumors are caused by solar radiation [6], global climate change and ozone, genetic as well as changes in individual and social behaviors, can justify this increase [1].

In Iraq, skin cancer is the commonest ten cancer in both sexes. Skin cancer was the ninth most prevalent skin cancer in 2019, with a male-to-female ratio of 1.13 and incidence rates of 4.57% and 2.96%, respectively [7].

Based on data from the Iraqi cancer registry, this study aimed to explore the temporal trend in skin cancer incidence in Iraq. The findings of this study can inform government healthcare officials in Iraq to plan health initiatives based on changes in the prevalence of skin cancer and populations at higher risk.

2. Materials and Methods

The Iraqi Cancer Registry (ICR) was started in 1975. It collects data from official and private health facilities throughout all Iraqi provinces. It issued an annual report outlining the prevalence of malignant growth in Iraq, by age, gender, topography, morphology, and regional distribution.

Based on data from the ICR from 2000 to 2019, the ASIRs (1/100,000) were calculated for skin cancer (melanoma and NMSC coded C43 and C44) using the world standard population, in addition to the age-specific incidence rates.

To quantify the changes attributable to skin cancer in the Iraqi population, the joinpoint regression model was used to calculate the change in skin cancer incidence rates from 2000 to 2019. The Joinpoint regression analysis software (version 4.9.0.0) was used to calculate the AAPCs and APCs in skin cancer incidence rates and their statistically significant differences for each linear segment for the whole study period (2000-2019), four 5-year periods (2000-2004, …, and 2015-2019), and by year for all ages combined (0-70+ years), and for the age groups (0-19, 20-29, 30-39, 40-49, 50-59, 60-69, and 70+ years), for males and females separately. The program requires a minimum (0) (Full model) and maximum (>0) number of joinpoints to be specified in advance. In our analyses, the minimum number of joinpoints is set to zero and the maximum number of joinpoints is set to four. The random errors were considered homoscedastic (constant variance). To find the location of the joinpoints, the grid search was selected. The model selection approach employed successive permutation tests to identify the best number of joinpoints. The permutation is calculated using Monte Carlo simulation with a number of permutations set to 4,499. The significance level was set at p-value ≤ 0.05 for all analyses.

3. Results

In Iraq from 2000 to 2019, over 2745 (53.12%) males and females 2423 (46.88%) were diagnosed with skin cancer. The male-to-female ratio was 1.13. BCC (36.827%) and SCC (34.449%) were the most prevalent histological types of skin cancer in Iraq (Table 1). The ASIR of skin cancer in both sexes and all ages was 4.144 per 100,000 people. The lowest ASIR (2.627/100,000) was observed in 2007, but the highest ASIR (5.995/100,000) was observed in 2019. Overall, the skin cancer incidence of ASIR increased from 2000 to 2019 by 58.514%.

Table 1. The percentage for most frequent histology of Skin Cancer in Iraq, both gender, (2000-2019)

Histology	%
Basal cell carcinoma, NOS	36.827
Squamous cell carcinoma, NOS	34.449
Melanoma	5.912
Kaposi's sarcoma	2.046
Dermatofibrosarcoma, NOS	1.955

ISSN: 1343-4292
Volume 140, Issue 01, April, 2022

Adenocarcinoma	1.861
Others	16.950

Among the 5-year periods, the ASIR for skin cancer incidence increased by 34.748% among Iraqi males, with the lowest ASIR (4.024/100,000) in the period 2005–2009 and the highest ASIR (5.754/100,000) in the most recent period 2015–2019. The ASIR for skin cancer incidence increased by 32.765% among Iraqi females, with the lowest ASIR (2.622/100,000) in the period 2005–2009 and the highest ASIR (4.354/100,000) in the most recent period 2015–2019 (Table 2).

Table 2. Age-specific and age-standardized incidence rates (1/100,000) of skin cancer among males and females in Iraq from 2000 to 2019, by period.

Gender	Age group	Period				Total	Overall changes (%)
		2000-2004	2005-2009	2010-2014	2015-2019		
		Age-specific rates					
Male	0-19	0.125	0.159	0.142	0.148	0.144	17.628
	20-29	0.508	0.426	0.487	0.521	0.488	2.678
	30-39	1.589	1.237	1.351	1.575	1.441	-0.905
	40-49	3.919	2.912	3.576	3.788	3.580	-3.353
	50-59	8.681	9.052	10.335	10.878	9.883	25.309
	60-69	18.284	20.063	22.861	25.825	22.199	41.248
	70+	35.363	29.249	41.367	53.677	40.864	51.789
Age-standardized incidence rate		4.270	4.024	4.926	5.754	4.835	34.748
Female	0-19	0.102	0.078	0.120	0.149	0.115	46.520
	20-29	0.308	0.472	0.489	0.484	0.445	57.131
	30-39	1.017	0.926	1.073	1.421	1.137	39.792
	40-49	2.883	2.313	3.153	3.015	2.886	4.578
	50-59	8.248	6.242	8.469	8.744	8.010	6.019
	60-69	15.948	12.798	16.238	19.002	16.351	19.150
	70+	21.255	16.199	27.311	38.853	26.800	82.789
Age-standardized incidence rate		3.280	2.622	3.635	4.354	3.551	32.765

For both sexes, the ASIR of skin cancer increased significantly from 2000 to 2019 with an AAPC of +1.610 % (95 % CI -0.716, +3.991 %). One joinpoint was found in 2007. During 2007–2019 the APC was +5.069 % (95 % CI +2.567, +7.632 %) (Table 3).

In males, the ASIRs increased significantly from 2000 to 2019 with an AAPC of +2.069 % (95 % CI +0.621, +3.538 %) (Figure 1-A). No joinpoint was detected during the study period. Table 3 shows the evolution of the yearly age-specific incidence rate, which increased throughout the whole study period in the age groups 0–19, 20–29, and 30–39 years, however, the AAPCs were not statistically significant. There were no joinpoints detected for these aged. In the age group 40–49 years, the number of joinpoints detected was one (2003) with a statistically significant increase in incidence during 2003–2019; APC +2.333 % (95 % CI +0.082, +4.634 %). In the age group 50–59 years, the age-specific incidence increased throughout the whole study period, however, the AAPCs were not statistically significant, and no joinpoint was found. In the age group 60–69 years, there was an annual increasing trend in the skin cancer incidence from 2000 to 2019 with a statistically significant AAPC +2.077 % (95 % CI +0.245, +3.943 %). During the study period, no joinpoints were detected. In the age group 70+ years, one joinpoint was found, 2006. During 2006–2019 the APC was +6.658 % (95 % CI +3.525, +9.886 %).

In females, the incidence increased significantly from 2000 to 2019; AAPC +2.206% (95% CI +0.451, +3.991%). There was one joinpoint regression occurs in 2007; 2007-2019 APC +6.100% (95% CI +3.574, 8.687%) (Figure 1-B). Table 3 shows the evolution of the yearly age-specific incidence rate. No significant change occurred in the age group 0–19 years during the period 2000-2019; AAPC of +2.416 % (95 % CI -0.811, +5.747 %). In the age group 20-29 years, there was no joinpoint regression observed, however, the incidence raised significantly over the study period with an AAPC of +2.540% (95% CI +0.201, +4.933%). The incidence increased significantly from 2000 to 2019 in the age group 30–39 years; AAPC +2.317% (95% CI +0.743, +3.916%), and no joinpoint regression was detected. Females aged 40-49 years showed not significant raised in incidence between 2000 and 2019; AAPC +0.870% (95% CI -1.063, +2.841%), and no change in the trend was observed. In the age group 50–59 years, two joinpoint regression was observed, 2007 and 2010; 2000-2007 APC -11.050 % (95 % CI -15.751, -6.087%); 2007-2010 APC +23.207 % (95 % CI -17.931, +84.965%); 2010-2019 APC -0.583 % (95 % CI -4.203, +3.174%). One joinpoint regression was detected in 2007 for 60-69 years, with a statistically significant increase from 2007 to 2019; APC +5.449% (95 % CI +2.084, +8. 924%). One joinpoint regression also was detected in 2007 for 70+ years, with a statistically significant increase from 2007 to 2019; APC +9.367% (95 % CI +5.700, +13.162%) (Table 3).

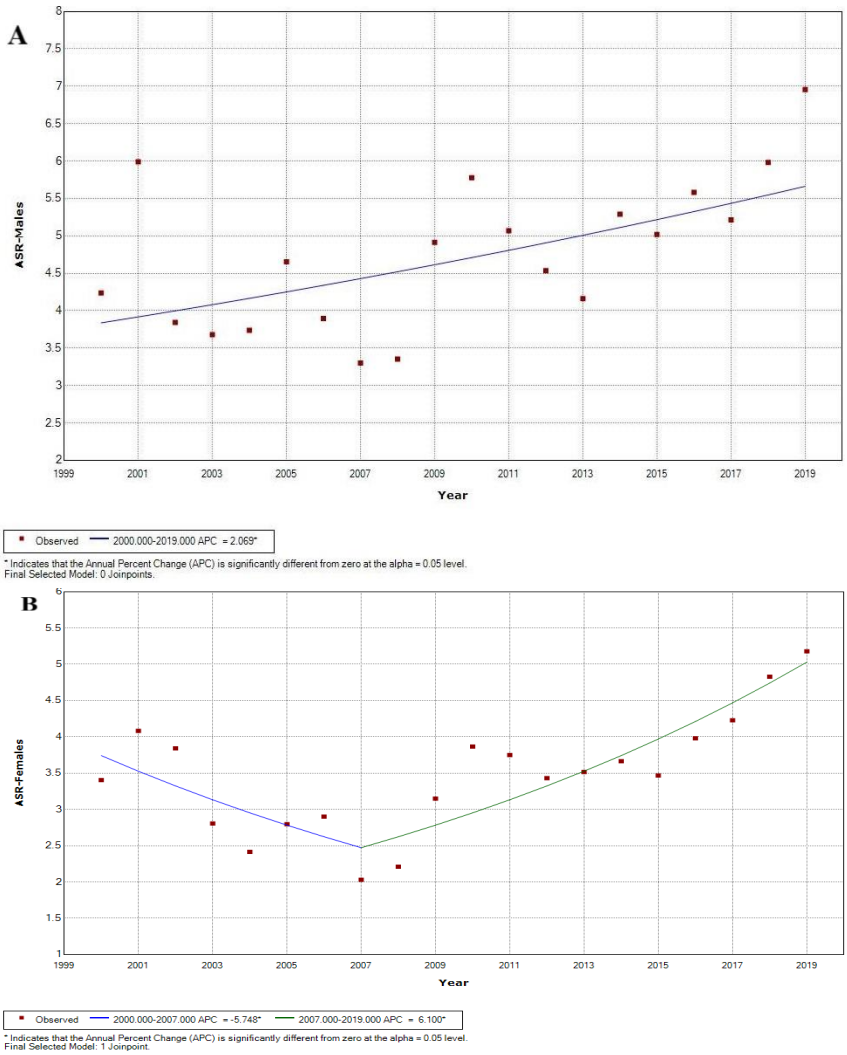

Figure 1. Joinpoint regression analysis of age-standardized incidence rates (1/100,000) of skin cancer, all ages, 2000–2019. Among males, A; among females, B.

ISSN: 1343-4292
Volume 140, Issue 01, April, 2022

Table 3. The evolution of the yearly ASIR of skin cancer in males and females in Iraq from 2000 to 2019.

Gender	Age group	Joinpoint	Trend APC (95 % CI)	Trend AAPC (95 % CI)
Both sexes		2007	2000-2007: -4.057 (-9.143; +1.314) 2007-2019: +5.069 (+2.567; +7.632)	+1.610 (-0.716, +3.991)
Male	0-19	Not significant; No joinpoint detected		+1.086 (-2.157, +4.437)
	20-29	Not significant; No joinpoint detected		+1.440 (-3.079, +6.169)
	30-39	Not significant; No joinpoint detected		+0.099 (-1.836, +2.072)
	40-49	2003	2000-2003: -23.273 (-42.587; +2.539) 2003-2019: +2.333 (+0.082; +4.634)	-2.216 (-6.565, +2.335)
	50-59	Not Significant; No joinpoint detected		+1.443 (-0.260, +3.175)
	60-69	Significant; No joinpoint detected		+2.077 (+0.245, +3.943)
	70+	2006	2000-2006: -6.016 (-14.631; +3.469) 2006-2019: +6.658 (+3.525; +9.886)	+2.481 (-0.908, +5.987)
Female	0-19	Not significant; No joinpoint detected		+2.416 (-0.811, +5.747)
	20-29	Significant; No joinpoint detected		+2.540 (+0.201, +4.933)
	30-39	Significant; No joinpoint detected		+2.317 (+0.743, +3.916)
	40-49	Not significant; No joinpoint detected		+0.870 (-1.063, +2.841)
	50-59	2007 2010	2000-2007: -11.050 (-15.751; -6.087) 2007-2010: +23.207 (-17.931; +84.965) 2010-2019: -0.583 (-4.203; +3.174)	-1.288 (-7.267, 5.077)
	60-69	2007	2000-2007: -6.775 (-13.363; +0.313) 2007-2019: +5.449 (+2.084; +8.924)	+0.769 (-2.323, +3.958)
	70+	2007	2000-2007: -4.936 (-11.989; +2.681) 2007-2019: +9.367 (+5.700; +13.162)	+3.863 (+0.514, +7.324)

4. Discussion

To our knowledge, this is the first study to explore the trend of skin cancer in Iraq. The most remarkable observation in skin cancer epidemiology in Iraq is the steadily increasing incidence rates of skin cancer. This is further demonstrated by data from the Iraqi Cancer Registry, which recorded the incidence of skin cancer over a three-decade period.

In Iraq, skin cancer is the most common cancer. As compared to Western societies (US whites and the populations of the United Kingdom, France (Gironde), Germany (Hamburg), Sweden, Norway, Australia, New Zealand) [4], [8], [9] malignant melanoma is far less prevalent than NMSC. Alternatively, the most common NMSC are BCC and SCC. Approximately 37.0% of non-melanoma are categorized as BCC and 34.5% as SCC, which is similar to the study conducted in Saudi Arabia (neighbors Iraq) between 1990 and 2003, reported that BCC accounting for 41% of cases, SCC accounting for 29%, and melanoma accounting for 4.1% [10]. Another study reported that the most frequent malignant neoplasms in Saudi Arabia were BCC and SCC (51.4% and 22.5% of the malignant neoplasm, respectively), while Malignant melanoma represents 3.8% of malignant skin cancers in Saudi Arabia [11].

We used the joinpoint regression to conduct a national-level study of changes in skin cancer incidence among the Iraqi population to assess the temporal trend. This study demonstrated that the trends of skin cancer incidence in Iraq have increased significantly over the study period in both genders and most of the age groups from 2000 to 2019. Skin cancer was more frequent among males than females, and their ASIR was higher.

Melanoma and other skin cancers have different proportions and incidence rates in both genders worldwide. Melanoma was the leading cause of skin cancer in the majority of Western countries. From 2008 to 2012, melanoma prevalence was 100% for both genders in Hamburg, Germany; it was more than 90% in

Australia and the United States (95.2% and 92.4% in men, 96.0% and 92.3% in females), and it was higher than 80% in Gironde, France (77.9% in males, 81.4% in females). Only the United Kingdom had a melanoma proportion that was greater than 50% of all skin malignancies among the mentioned Western countries (45.5% in males, 52.6% in females) [9]. In Beijing, China, Hiroshima and Osaka, Japan, the Republic of Korea, and Mumbai, India, the proportion of other skin cancer was substantially higher than that of melanoma (77.9 to 91.7% in males, 77.0 to 93.9% in females) [9]. Melanoma and other skin cancer incidence place Iraq among countries with the lowest proportion of melanoma and a high proportion of NMSC among selected countries, close to Hiroshima and Osaka, which the proportion of melanoma in all skin cancer was around 10% or less (8.3% and 9.3% in males, 6.1% and 10.8% in females) [9].

Globally, ASIRs of NMSC vary between regions and genders. The ASIR of NMSC in the high HDI region was 287.52/100,000 in 2017, which was far higher than that in other regions, while it was 34.25/100,000 in High middle SDI, 18.50 in Low- middle SDI, 32.04/100,000 in the Middle SDI region, and 10.4/100,000 in Low SDI [12]. The global ASIRs of the NMSC increased from 95.39/100,000 in 1990 to 97.11/100,000 in 2017 [12]. Between 1999 and 2012, the male population in Schleswig-Holstein federal state (Germany) had a high ASIR of NMSC, increasing from 125/100,000 to 170/100,00, while the female population's ASIR of NMSC increased from 92/100,000 to 134/100,000 per year [13]. The ASIRs of NMSC in Upper Silesia (Poland) during the period 1999-2007 were 14.96/100,000 in men and 10.94/100,000 in women [14].

In the USA, the adults and non-Hispanic whites had a very high ASIR of skin cancer from 1999-2016, it was 390.9/100,000 and 519/100,000, respectively [15]. Niino and Matsuda reported that the ASIRs for skin cancer between 2008 and 2012 in Australia were 42.1/100,000 in males and 29.5/100,000 in females, and in the United Kingdom, it was 24.4/100,000 in males and 21.5/100,000 in females [9]. In the Asian region, the ASIRs of skin cancer in Iran increased from 3.8/100,000 in 2000 to 13.0/100,000 in 2005. The ASIR for males was higher, rising from 4.5/100,000 in 2000 to 16.0/100,000 cases in 2005, while the rate for women increased from 3.0/100,000 in 2000 to 9.8/100,000 in 2005 [16]. The ASIRs of skin cancer in Mumbai, India were 1.4/100,000 for males, 1.8/100,000 for females, and the ASIR in the Republic of Korea, Hiroshima and Osaka, Japan, and Beijing, China was less than Western countries (1.4/100,000 to 5.5/100,000 for males, 1.2/100,000 to 4.9/100,000 for females) [9]. In Iraq, the ASIRs in males increased from 4.27/100,000 in 2000-2004 to 5.75/100,000 in 2015-2019, and from 3.28/100,000 to 4.35/100,000 in women. Iraq's incidence rates are lower than those in Western countries, similar to those in most of Asia's selected countries.

Worldwide, increasing incidencerates of NMSC in white populations have been reported [13]. [17] found that NMSC in Serbia increased with an APC of 8.6% between 1999 and 2011. In Saarland federal state (Germany), between 1970-1972 and 2010-2012, the NMSC ASIRs increased in males with AAPC +6.0% and females with AAPC+ 6.3% [13], while in Schleswig-Holstein (Germany), the ASIR of NMSC increased in males with APC=2.3% and 3.3% in females during 1999-2012 [13]. [18] report that the NMSC ASIR increased in Iran with an AAPC of 9.3% in males between 2003 and 2008, and with an AAPC of 8.5% in females. In contrast, the Incidence of NMSC in women in Alberta, Canada, has been stable from 2000 to 2007 with an APC of 0.08% and has declined in men from 2001 to 2007 with an APC of −1.28% [19], while in Qom province in Iran, there was a decreasing trend of skin cancer in women, according to the APC equal to -3.4% from 2004-2008, while the APC equal to -5.4% in males [20]. Iraq, like the majority of countries, has seen a rising trend of skin cancer. The ASIRs increased in males from 2000 to 2019 with an AAPC of +2.069 % and increased with an APC of +6.100% in females from 2007 to 2019.

International variations in skin cancer incidence trends show that numerous risk variables are distributed

differently by gender, age group, and time. In general, the incidence of skin cancer rises with age [3], [5], [13], [21], [22]. According to [3] the rates of global skin cancer burden were greater in older people, with rising trends identified in all subtypes of skin cancer beginning at the age of 55. Age effects have the most influence on skin cancer incidence in the United States [15]. Similar findings have been reported in Germany [13], Belgrade [17], and Serbia [23]. Similar to other countries, most of the incidence cases in Iraq occur in male persons aged from 50 to over 70 years, and female persons aged from 20 to 39 and from 60 to over 70 years with a slow decline in the incidence of the age of 50-59.

In Iraq, little is known about skin cancer. According to [24] BCC was the most frequent histologic subtype in Iraq, accounting for 37.3%, while SCC accounted for 16.2%. The prevalence of Mycosis fungoid was 15%, Kaposi sarcoma was 10%, and malignant melanoma was 4.3%.

However, it is beyond the aim of this study to examine why the incidence of skin cancer in Iraq is raised or lowered. The observed breakpoint in 2003 was caused, in part, by the 2003 Gulf War and widespread looting that occurred in the days following US forces' invasion of Iraq, resulting in the stoppage of activity in government offices and the destruction of official records.

Improved case reporting in recent years, UV sunlight, increase in outdoor activities, genetics, and older age may all have a role in the development of skin cancer in Iraq. Our results may be beneficial in improving the planning for the control and prevention and early detection of skin cancer in Iraq. The findings of this paper indicate that more research is needed.

5. Conclusion

Skin cancer incidence rates continue to rise in most age groups and both sexes across the world, including in Iraq. The observed trends are probably due to increased case reporting in recent years, UV radiation, an increase in outdoor activities, genetics, and older age, all of which may have a role in the development of skin cancer in Iraq. The findings of this paper demonstrate that more researches are required.

Acknowledgments

I would like to thank the Iraqi Cancer Board-Ministry of Health employees for their efforts in giving data access. I am grateful to the University of Mosul for their assistance with our efforts.

6. References

[1] Khazaei Z, Ghorat F, Jarrahi AM, et al (2019). Global incidence and mortality of skin cancer by histological subtype and its relationship with the human development index (HDI); an ecology study in 2018. World Cancer Res J, 6, e13.

[2] Razmjooy N, Ashourian M, Karimifard M, et al (2020). Computer-aided diagnosis of skin cancer: A review. Curr. Med Imaging, 16, 781-93.

[3] Zhang W, Zeng W, Jiang A, et al (2021). Global, regional and national incidence, mortality and disability-adjusted life-years of skin cancers and trend analysis from 1990 to 2019: An analysis of the Global Burden of Disease Study 2019. Cancer Med.

[4] Sung H, Ferlay J, Siegel RL, et al (2021). Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J, 71, 209-49.

[5] Leiter U, Eigentler T, Garbe C (2014). Epidemiology of skin cancer. Sunlight, vitamin D and skin cancer, 120-40.

[6] Armstrong BK (2004). How sun exposure causes skin cancer: an epidemiological perspective. In Prevention of skin cancer (pp. 89-116). Springer, Dordrecht.

[7] Iraqi Cancer Board (2019). Results of the Iraqi Cancer Registry 2019. Baghdad, Iraqi Cancer Registry Center, Ministry of Health.

[8] Whiteman DC, Green AC, Olsen CM (2016). The growing burden of invasive melanoma: projections of incidence rates and numbers of new cases in six susceptible populations through 2031. J. Invest. Dermatol., 136, 1161-1171.

[9] Niino M, Matsuda T (2019). International comparison of skin cancers incidence by detailed sites. Jpn. J. Clin. Oncol., 49, 1176-1177.

[10] Al-Maghrabi JA, Al-Ghamdi AS, Elhakeem HA (2004). Pattern of skin cancer in Southwestern Saudi Arabia. Saudi Med. J., 25, 776-779.

[11] Almohideb M (2020). Epidemiological Patterns of Skin Disease in Saudi Arabia: A Systematic Review and Meta-Analysis. Dermatol Res Pract, 2020.

[12] Lin L, Yan L, Liu Y, (2019). Incidence and death in 29 cancer groups in 2017 and trend analysis from 1990 to 2017 from the Global Burden of Disease Study. J. Hematol. Oncol., 12, 1-21.

[13] Leiter U, Keim U, Eigentler T, (2017). Incidence, mortality, and trends of nonmelanoma skin cancer in Germany. J. Invest. Dermatol., 137, 1860-1867.

[14] Juszko-Piekut M, Moździerz A, Kołosza Z, (2013). Incidence of melanoma and non-melanoma skin cancer in the inhabitants of the Upper Silesia, Poland. Highlights in Skin Cancer. Rijeka, HR; InTech, 1-25.

[15] Le HV, Le CH, Le PH, (2020). Incidence and trends of skin cancer in the United States, 1999-2016. J Clin Oncol, 38, 15.

[16] Heidari M, Najafi F (2013). Trends of skin cancer incidence in 6 geographical regions of the Islamic Republic of Iran, 2000-2005. East Mediterr Health J, 19, 59-65.

[17] Videnović G, Miljuš D, Ilić D (2015). Nonmelanoma Skin Cancer in the Population of the City of Belgrade in the Period 1999-2011. Srp Arh Celok Lek, 143(5-6):290-295.

[18] Razi S, Rafiemanesh H, Ghoncheh M (2015). Changing trends of types of skin cancer in Iran. Asian Pac J Cancer Prev., 16, 4955-4958.

[19] Jung GW, Metelitsa AI, Dover DC (2010). Trends in incidence of nonmelanoma skin cancers in Alberta, Canada, 1988–2007. Br J Dermatol, 163,146-154.

[20] Rafiemanesh H, Rajaei-Behbahani N, Khani Y (2016). Incidence trend and epidemiology of common

cancers in the center of Iran. Glob. J. Health Sci., 8, 146.

[21] Bath-Hextall FJ, Perkins W, Bong J (2007). Interventions for basal cell carcinoma of the skin. Cochrane Database Syst. Rev.

[22] Didona D, Paolino G, Bottoni U (2018). Non melanoma skin cancer pathogenesis overview. Biomedicines, 6, 6.

[23] Ilić D, Videnović G, Kozomara R (2020). Non-melanoma skin cancer in Serbia 1999-2015-the need for national prevention strategy and control. Vojnosanit Pregl., 201-201.

[24] Al-Turfy IA, Al-Mufarji HS, Alsaadawi AR (2019). Frequency of Skin Cancer among Iraqi Patients Attending Dermatology Center/Medical City in Baghdad between January 2013 and December 2018. Iraqi Postgraduate Medical Journal, 18.