

## RESEARCH ARTICLE

# Changing Trends of Types of Skin Cancer in Iran

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### Abstract

**Background:** Skin cancer is the most common type of cancer worldwide. It has an increasing trend. This study investigated the epidemiological trend and morphological changes in skin cancer in Iran. **Materials and Methods:** This study was done using existing data, extracted from the National Cancer Registry System and the Disease Management Center of Iranian Ministry of Health between 2003 and 2008. Data on epidemiologic trend was analyzed using Joinpoint software package. **Results:** The incidence of skin cancer is increasing in Iran, and more in men than women. There was a declining trend for basal cell carcinoma. Basal squamous cell carcinoma and melanoma had an increasing trend. The increase of skin cancer was related to squamous cell carcinoma. **Conclusions:** Our findings indicated that the increase of skin cancer was attributed to squamous cell carcinoma. It is necessary to be planning for the control and prevention of this disease as a priority for health policy makers.

**Keywords:** Skin cancer - trend - morphology - incidence - Iran

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### Introduction

Skin cancer is one of the most common cancers worldwide (Cihan et al., 2013). It is observed as melanoma and non-melanoma (Baldwin and Dunn, 2013). The two most common types of non-melanoma cancer are basal cell carcinoma and squamous cell carcinoma (Cihan et al., 2013). The annual incidence of non-melanoma is 2 to 3 million cases, while At least 132,000 melanoma cases occur in the world (WHO, 2015). More than half of incidence cases of the cancer and two thirds of death occur in low- and middle-income countries (Rohani-Rasaf et al., 2013). It is estimated that cancer incidence will increase to 45% in developing countries by 2025 (Amoori et al., 2014; Keyghobadi et al., 2015).

The cancer incidence pattern is different in various geographical regions, mainly because of the differences in risk factor (Rohani-Rasaf et al., 2013; Almasi et al., 2015). These risk factors include physical factors (ionizing and non-ionizing radiation), chemical factors (smoking, alcohol, environmental pollution, occupational exposure), biological factors (cancer-causing infectious agents), and genetic factor (Jemal et al., 2010). Ultraviolet radiation is the most important risk factor. In addition to the beneficial effects of this radiation, without the use of protective equipment, it may cause serious injuries, including

malignant melanoma which is the most invasive form of skin cancer associated with a high mortality (Saridi et al., 2014).

The increase in population, life expectancy, and the proportion of the elderly population, and socio-economic status and lifestyle changes causes to become Iran as the country at high risk of skin cancer (Parkin et al., 2005; Colditz et al., 2006; Keyghobadi et al., 2015). Although skin cancer is one of the most common cancers, it is one of the most preventable types of cancer. If the primary prevention begins at an earlier age, the effect will be greater (Reynolds et al., 2006). There is the high incidence of skin cancer in Iran. The lack of a comprehensive and systematic study on the morphology and clinical aspects of the disease in the country can be effective in planning and preventative measures for the cancer. This study investigated the epidemiological trend and morphological changes in skin cancer in Iran.

### Materials and Methods

This is cross-sectional study in Iran. The data were collected from Cancer Registry Center report of health deputy which is based on Iran ministry of health guideline (Goya, 2007). Data were collected retrospectively reviewing all new skin cancer patients in cancer registry

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**Table 1. Joinpoint analysis in Standardized Incidence Rate (per thousand) in Male and Female in 2003 and 2008**

	Full Range			Trend 1			Trend 2		
	years	AAPC	95% CI	years	APC	95% CI	Years	APC	95% CI
Male	2003- 2008	9.3 <sup>^</sup>	5.0 to 13.7	2003- 2005	16.9	-16.5 to 63.7	2005- 2008	5.0	-11.3 to 24.3
Female	2003- 2008	8.5 <sup>^</sup>	5.4 to 11.8						

<sup>^</sup> =APC or AAPC is significantly different from zero at alpha = 0.05

**Table 2. Frequency and Percent Change in the Percentage Allocated to the Morphology Data for Skin Cancer (2008-2003)**

	2003		2004		2005		2006		2007		2008	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Female</b>												
Basal Cell Carcinoma, Nos	1743	75.91	2108	75.85	2232	70.59	2274	69.12	2266	66.59	2439	65.99
Squamous Cell Carcinoma , Nos	282	12.28	351	12.63	450	14.23	440	13.37	477	14.02	469	12.69
Malignant Melanoma, Nos	56	2.44	80	2.88	85	2.69	91	2.77	105	3.09	123	3.33
Basosquamous Carcinoma	33	1.44	37	1.33	62	1.96	59	1.79	54	1.59	68	1.84
<b>Male</b>												
Basal Cell Carcinoma, Nos	2590	69.07	3084	67.91	3380	63.53	3349	60.73	3362	58.79	3701	59.05
Squamous Cell Carcinoma , Nos	766	20.43	941	20.72	1194	22.44	1232	22.34	1337	23.38	1319	21.04
Malignant Melanoma, Nos	71	1.89	122	2.69	134	2.52	112	2.03	145	2.54	154	2.46
Basosquamous Carcinoma	75	2.00	73	1.61	88	1.65	111	2.01	118	2.06	102	1.63

center report of health deputy for Iran during a 6-year period (2003 - 2008). skin cancer was defined as icd-o c16 (Fritz, 2000). This study survey basal cell carcinoma nos, squamous cell carcinoma nos, malignant melanoma nos & basosquamous carcinoma morphology.

*Statistical analysis*

Age-standardized rates of cancer incidence were calculated by the direct standardization method, using the world standard population as a reference. To describe incidence time trends, we carried out joinpoint regression analysis using the software Joinpoint Regression Program, Version 4.1.1.1 October 2014. As well to evaluate the morphological changes, were obtained the percentage allocated for kind of morphological types. So to analysis morphology change percentage trends for six year, we carried out joinpoint regression analysis using the software Joinpoint Regression Program. The analysis included logarithmic transformation of the rates, standard error, maximum number of one joinpoints, and minimum of six years between zero joinpoints. All other program parameters were set to default values. The aim of the approach is to identify possible joinpoints where a significant change in the trend occurs. In this study 0 joinpoint (Full model) was a significant model. The final model selected was the most parsimonious of these, with the estimated annual percent change (APC) based on the trend within each segment. In describing trends, the terms “significant increase” or “significant decrease” signify that the slope of the trend was statistically significant (P <0.05). All statistical tests were two sided.

**Results**

In this study, there were 49,740 registered skin cancer cases. Of them, 18,647 cases (37.45%) were women, and 31, 113 cases (62.55%) men. The sex ratio (male to female) was 1.67 for the total number of cases. The most common

**Table 3. Joinpoint Analyses of Cancers Percentage Allocated to the Morphology Data for Skin Cancer (2008-2003)**

	Female		Male	
	APC	95% CI	APC	95% CI
Basal Cell Carcinoma, Nos	-3.1 <sup>^</sup>	-4.2 – -2.0	-3.5 <sup>^</sup>	-4.9 – -2.2
Squamous Cell Carcinoma , Nos	1.2	-2.9 – 5.5	1.5	-2.0 – 5.0
Malignant Melanoma, Nos	5.3 <sup>^</sup>	1.3 – 9.3	2.7	-6.9 – 13.3
Basosquamous Carcinoma	4.9	-4.2 – 14.8	-0.2	-8.7 – 9.0

histological type was related to the Basal cell carcinoma, NOS and Squamous cell carcinoma NOS, 32,528 cases (65.40%) and 9,258 cases (18.61%) respectively. Of all histological types of skin cancer, BCC and SCC included in women 70.12% and 13.25%, respectively. BCC and SCC included in men 62.56% and 21.82% of all histological types, respectively. The number of cases and histology studied was more in men than women over the years. The chi-square test showed statistically significant differences between men and women according to the histology (p=0.001).

*Epidemiological Trend*

Standardized Incidence Rate (ASR) (per 100,000) increased from 10.05 in 2003 to 15.57 in 2008 in women. ASR (per 100,000) also increased from 13.89 in 2003 to 22.62 in 2008 in men. Results of Joinpoint analysis revealed that there was a significant increasing trend of ASIR in both sexes (Table 1).

*The morphological trend*

Over the years studied, the percentage allocated to each of histology (MALIGNANT MELANOMA NOS & BASAL CELL, SQUAMOUS CELL CARCINOMA NOS, and MALIGNANT MELANOMA NOS & BASOSQUAMOUS CARCINOMA) was different. The percentage assigned to histology of BCC reduced from 71.66% in 2003 to 61.62% in 2008 (Table2).

Results of Joinpoint analysis for the percentage allocated to histology showed a significant decline in both sexes for BASAL CELL CARCINOMA NOS. The percentage allocated to other histological studied was rising, except BASOSQUAMOUS CARCINOMA with the almost constant trend (Table3).

## Discussion

Our findings indicated that the trend of skin cancer incidence is increasing. According to morphology, the incidence of BCC had a declining trend, while MELANOMA NOS & BASAL CELL were increasing. BASOSQUAMOUS CARCINOMA in women was increasing, but in men was decreasing. Another study conducted in Italy also showed an increasing trend of skin cancer incidence (Group, 2009). Other studies also confirmed our results (Stang et al., 2006; Hussain et al., 2010). Increasing global incidence of skin cancer may be due to several factors, including climate change, environmental factors, an increase of public awareness, and diagnostic advances that have occurred in the years (Abarca and Casiccia, 2002; McCarthy, 2004; Bulliard et al., 2006; Ibiebele et al., 2007).

From epidemiologic aspect, the most important etiologic factor for all types of skin cancer is ultraviolet radiation (Wakeford, 2004). The incidence remarkably increases in regions near the equator

where there is the direct sunlight. The incidence of skin cancer is different in various races (Wakeford, 2004). Alexandria et al. investigated the relationship between sunlight exposure and skin cancer, and found that skin cancer incidence was 4.8 times more in people with high exposure to sunlight than others (28). Given to severe sun radiation in most seasons, and the lack of use of proper protection in outdoor in Iran, it should expect a high incidence of the disease.

Results of Joinpoint analysis for the percentage allocated to histology showed a significant decline in both sexes for BASAL CELL CARCINOMA NOS. The percentage allocated to other histological studied was rising, except BASOSQUAMOUS CARCINOMA with the almost constant trend.

Our study showed that there was a decreasing trend of BCC morphology. Martino et al. stated opposite findings. They found that the incidence in the Netherlands increased in both sexes from 1973 to 2008 (Flohil et al., 2011). Adam I also showed such an increasing trend (Adam I. Rubin et al., 2005). A study on cancer registry data in Jordan indicated that trend of BCC was increasing in men, but decreasing in women (Omari et al., 2006). These differences may be due to various geographic locations and individual genetic susceptibility.

Abdel K. Omari also declared that there was an increasing trend for SCC in Jordan from 1997 to 2001. Our study showed such similar findings (Omari et al., 2006). Leiter U et al. determined such an increasing trend (Leiter et al., 2014). An increase in non-melanoma skin cancer incidence may be due to ultraviolet sunlight, an increase in outdoor activities, covering, an increase of longevity, the destruction of the ozone layer, genetics, and in

some cases reducing the power of immune system Leiter et al. (2014) also showed an increase of incidence of melanoma skin cancer, similar to our study.

In summary, the incidence of skin cancer is rising in the country, especially basosquamous carcinoma and melanoma. Our finding revealed that epidemiology of skin cancer is changing in Iran. It is necessary to be planning for the control and prevention of this disease as a priority for health policy makers.

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