# Frequency of Malignant Skin Tumors in Relation to Facial Wrinkle Score and Sunlight Exposure

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## Abstract

Background: There are many risk factors that accentuate wrinkling like age, sex, occupation and smoking. Clinically, there is some sort of relationship between facial wrinkling and skin malignancy in association with sun exposure. Objective: To test the assumption whether skin cancer has relation with skin wrinkling frequency and sunlight exposure or not?

Patients & Methods: A case-control study was conducted in Department of Dermatology and Venereology in Baghdad Teaching Hospital in the period from April 2011 through March 2012 on ( 57)  patients with various skin tumors, and (79) respondents as a control group. Socio-demographic information, sunlight exposure duration measurement and full dermatological examination were done. Facial wrinkles were examined and measured according to wrinkle score in the group. Scores were simplified into: shallow (I, II), medium (III, IV) and deep wrinkles (V, VI). Results: The frequency of skin tumors were as follow; basal cell carcinoma (45.6%), squamous cell carcinoma (42.1%), and others (12.3%). Outdoor activity was more in patients with tumor, while about one third of control group only had outdoor activity (P<0.01). Shallow wrinkles are more frequent among indoor workers while there is no difference in frequency of medium and deep wrinkles among indoor and outdoor workers. Patients with superficial wrinkles more commonly affected with skin tumors than those with deep wrinkles. Conclusion: The present work had confirmed a negative association between the frequency of wrinkling score and skin tumors. Sunlight exposure had positive association with skin tumors, while outdoor activity may increase frequency of deeper skin wrinkling.

## Introduction

Skin ageing can be divided into intrinsic and extrinsic ageing, which is caused mainly by ultraviolet (UV) radiation.(1) Reactive oxygen species activated by UV radiation play an important role in UVinduced DNA damage, cellular senescence and ageing.(1)

Upon ageing, the capacity to repair DNA decreases. Both intrinsic and extrinsic ageing occur on sun-exposed sites. (2)

Photo-aging is degenerative changes caused by prolonged exposure to electro-magnetic (usually solar) radiation. Two types are found acute and chronic photo damage.(3,4,5) Risk factors for extrinsic aging include; cigarette smoking, continuous heat exposure, chemical exposure, skin photo-types and UV irradiation.(3)

Photoaged skin has coarse and fine wrinkles and is rough with irregular pigmentation, teleangiectasiae, and various benign and malignant tumors. (6, 7, 8, 9)

Skin wrinkling becomes evident gradually over age, especially in the sun-exposed areas, such as the face. Actual wrinkle formation is thought to be due to the combined effects of structural changes in ageing skin, gravitational forces and the effects of facial muscle contractions, which enable facial expressions. (10)

Skin atrophy is common in the sun-protected skin of the elderly and in grossly sundamaged skin regions, whereas mildly or moderately photoaged skin is thickened. (11, 12)

In ageing skin, collagen fibres become thicker and less soluble. (13) The degree of reduction in collagen production correlates with the amount of photodamage. (14)

In ageing skin, epidermal thickness declines in sun-protected areas, whereas sun-exposed regions develop an irregular epidermis with both thickened and atrophic regions. (15)

Skin tumor is a range of benign and malignant proliferation of skin layer cells. (5) Etiologies of skin tumors are; genetic factors, biological factors like oncogenic viruses and environmental factors like Ionizing radiation. (16)

The **aim** of the study was to assess the relation between skin cancer frequency and skin wrinkles and sunlight exposure.

## Patients and Methods

This is a case control study design that had been carried out in Department of Dermatology and Venereology Baghdad Teaching Hospital from April 2011 through March 2012. It included (57) patients with skin tumors their ages ranged between (40-99) years with a mean ± SD of (65.09 ± 14.132), they were (41) males and (16) females. The control group included (79) respondents attending the department for mild dermatological problems, their ages ranged from (40-75) years with mean ± SD (54.99±10.828), they were composed of (47) males & (32) females.

The patients or case group included all cases with skin tumor attending the department at that period. Socio-demographic information was taken from each patient and control group which included:

1- Age, sex and residency.

2- Occupation (current and past) and classified as: less than 4hrs, as indoor occupation and equal or more than 4hrs as outdoor occupation.(17)

3- Types of the lesions, site, size, duration, previous consultations, family history and any treatment used.

In this study the most common skin tumors related to sun exposure seen were: basal cell carcinoma (BCC) (26), squamous cell carcinoma (SCC) (24), and others (7) [which include: baso-squamous (3), Kaposi sarcoma (2), and malignant melanoma (2)].

Biopsy was done to all patients to establish final diagnosis of the tumor type.

Facial wrinkling was classified and measured according to wrinkle score table (1). (4)

This grading was simplified by gathering (Grade I-II) as shallow, (Grade

III- IV); medium, and grade (V-VI) as deep wrinkles.

Each subject's face wrinkles were examined closely while the subject was sitting with facial muscles relaxed in a well-illuminated room. The crow's foot area lateral to the outer canthus of each eye was examined closely on both sides. Adjacent areas, including the forehead and cheeks were inspected.

Wrinkles were examined for depth, length, and numbers by using specific materials called "Alginate impression". Other skin characteristics such as color, keratosis, atrophy, and pigmentation were ignored in this classification. Although the perioral and posterior nuchal areas were also inspected, changes observed here were not used in assigning a wrinkle score. (4)

## Results

The present work showed the age group seen                         between 40-99 years in cases and 40-79 in comparison group. The frequency of skin tumors were BCC 26 (45.6%), SCC 24 (42.1%), and others 7 (12.3%).

Basal cell carcinoma was more frequent in outdoor activity while there is no difference in frequency of SCC in relation with indoor- outdoor occupation activity. The skin tumors were more frequent in outdoor than indoor occupation patients but it was not statistically significant (P>0.05).table (2).

Shallow wrinkling was common in the indoor although it was not statistically significant (P>0.05), while medium and deep wrinkling were nearby the same in frequency in indoor and outdoor activity, Table (3).

Shallow wrinkling in BCC cases was more frequent than medium and deep wrinkles while less frequent in SCC and other skin tumors which statistically reaches significant level (P>0.05).table (4).

Shallow wrinkles were more seen in healthy respondents but the difference in wrinkle score became much less in diseased respondents although it did not reach statistically significant level (P>0.05).table (5).

The frequency of skin tumor disease is more in outdoor activity while the frequency of healthy respondents is much more in indoor activity that is statistically significant, Table (6).

## Discussion:

Skin cancer is a major health problem all over the world, but fortunately, it is less frequent in dark-skinned people like in Iraq. Still the commonest tumor was similar to what has been published like BCC, SCC, BS, and others. (16, 17, 18)

There are many risk factors associated with skin cancer, but the commonest are; skin color, followed by aging, sunlight exposure and smoking. (19)

The most common skin tumor is BCC followed by SCC, and less common BS, melanoma and Kaposi sarcoma, the result were similar to what has been published before. (18)

Solar radiation increases the incidence of all types of skin tumors. In the present study, outdoor workers had more frequency of skin tumors compared with indoor workers; healthy respondents had more frequent indoor activity. The results again were similar to what had been published before (19, 20).

As majority of healthy group had indoor activity, shallow wrinkle scoring increased among them. Therefore, sun exposure increase medium and deep facial skin wrinkles.

The present study showed that people with outdoor activity had deep wrinkling more frequent than indoor and shallow wrinkles were more common in indoor activity. Therefore, sun exposure was responsible for increase frequency of skin tumor as well as deeper facial wrinkling.

Superficial wrinkles were more frequent in BCC patients that mean deep wrinkles are protective from that disease, so in spite of deep wrinkles were not cosmetically acceptable feature still very useful to

humans being especially people engaged with outdoor activity.

We can conclude that sun exposure had important role in both skin cancer and facial wrinkling formation, and deep wrinkles were protective from skin cancer especially basal cell carcinoma, so there was a negative association between wrinkle score and skin cancer.

In conclusion, facial wrinkling was caused by sun exposure and proved protective agent from skin tumor.

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## Table (1) :Wrinkle score.

| Grade | Skin appearance |
|---|---|
| I | Essentially unwrinkled. Two or three shallow wrinkles usually less than 1 1/2 cm in length may be present in each crow's foot area. |
| II | Several wrinkles, each of which may be 3 cm long. The number of significant wrinkles on each side may be between two and six. |
| III | Several prominent wrinkles on each side, 3 to 4 cm long many smaller wrinkles may be present as well. Increased wrinkling may be present in the forehead skin, but little wrinkling in the cheek areas. |
| IV | Wrinkles extend from the crow's foot area superiorly and inferiorly, usually 5 cm or more if wrinkles are of unusual depth, they may be 4 cm long. Wrinkles extend over the cheek areas (zygomatic ridge). Men in this grade frequently exhibit prominent wrinkling of forehead and posterior nuchal region. |
| V | Wrinkles extend from crow's foot area and are prominent over the cheeks and forehead. |
| VI | Profound wrinkling extending over most of the face. |

**Table (2): Frequency of Tumor Type According to Occupation Type (Indoor & Outdoor).**

| | | | Occupation Type | | Total |
|---|---|---|---|---|---|
| | | | Outdoor | Indoor | |
| Tumor Type | BCC | Count<br>% within tumor type<br>% within occupation type<br>% of Total | 16<br>61.5%<br>51.6%<br>28.1% | 10<br>38.5%<br>38.5%<br>17.5% | 26<br>100.0%<br>45.6%<br>45.6% |
| | SCC | Count<br>% within tumor type<br>% within occupation type<br>% of Total | 12<br>50.0%<br>38.7%<br>21.1% | 12<br>50.0%<br>46.2%<br>21.1% | 24<br>100.0%<br>42.1%<br>42.1% |
| | Others | Count<br>% within type<br>% within occupation type<br>% of Total | 3<br>42.9%<br>9.7%<br>5.3% | 4<br>57.1%<br>15.4%<br>7.0% | 7<br>100.0%<br>12.3%<br>12.3% |
| Total | | Count<br>% within tumor type<br>% within occupation type<br>% of Total | 31<br>54.4%<br>100.0%<br>54.4% | 26<br>45.6%<br>100.0%<br>45.6% | 57<br>100.0%<br>100.0%<br>100.0% |

$\chi^2 = 1.097$, **df = 2, P value =0.578(NS).**

**Table (3): Frequency of Facial Wrinkles in Relation with Occupation Type (Outdoor, Indoor).**

| | | | Occupation Type | | Total |
|---|---|---|---|---|---|
| | | | Outdoor | Indoor | |
| Wrinkling Score | Shallow | Count<br>% within wrinkling score<br>% within occupation type<br>% of Total | 22<br>33.8%<br>37.9%<br>16.2% | 43<br>66.2%<br>55.1%<br>31.6% | 65<br>100.0%<br>47.8%<br>47.8% |
| | Medium | Count<br>% within wrinkling score<br>% within occupation type<br>% of Total | 17<br>53.1%<br>29.3%<br>12.5% | 15<br>46.9%<br>19.2%<br>11.0% | 32<br>100.0%<br>23.5%<br>23.5% |
| | Deep | Count<br>% within wrinkling score<br>% within occupation type<br>% of Total | 19<br>48.7%<br>32.8%<br>14.0% | 20<br>51.3%<br>25.6%<br>14.7% | 39<br>100.0%<br>28.7%<br>28.7% |
| Total | | Count<br>% within wrinkling score<br>% within occupation type<br>% of Total | 58<br>42.6%<br>100.0%<br>42.6% | 78<br>57.4%<br>100.0%<br>57.4% | 136<br>100.0%<br>100.0%<br>100.0% |

$\chi^2 = 4.082$, df =2, P value =0.130

**Table (4): Frequency of Wrinkle Scores According to Tumor Type of Patients.**

| | | | Wrinkling Score | | | Total |
|---|---|---|---|---|---|---|
| | | | Shallow | Medium | Deep | |
| Tumor Type | BCC | Count<br>% within tumor type<br>% within wrinkling score<br>% of Total | 15<br>57.7%<br>60.0%<br>26.3% | 4<br>15.4%<br>26.7%<br>7.0% | 7<br>26.9%<br>41.2%<br>12.3% | 26<br>100.0%<br>45.6%<br>45.6% |
| | SCC | Count<br>% within tumor type<br>% within wrinkling score<br>% of Total | 7<br>29.2%<br>28.0%<br>12.3% | 11<br>45.8%<br>73.3%<br>19.3% | 6<br>25.0%<br>35.3%<br>10.5% | 24<br>100.0%<br>42.1%<br>42.1% |
| | Others | Count<br>% within tumor type<br>% within wrinkling score<br>% of Total | 3<br>42.9%<br>12.0%<br>5.3% | 0<br>.0%<br>.0%<br>.0% | 4<br>57.1%<br>23.5%<br>7.0% | 7<br>100.0%<br>12.3%<br>12.3% |
| Total | | Count<br>% within tumor type<br>% within wrinkling score<br>% of Total | 25<br>43.9%<br>100.0%<br>43.9% | 15<br>26.3%<br>100.0%<br>26.3% | 17<br>29.8%<br>100.0%<br>29.8% | 57<br>100.0%<br>100.0%<br>100.0% |

$\chi^2 = 10.826$, df = 4, P value =0.029(S).

**Table (5): Frequency of Facial Wrinkling According to Type of Sample (Diseased, Healthy).**

| | | | | Type of Sample | | Total |
| --- | --- | --- | --- | --- | --- | --- |
| | | | | Diseased | Healthy | |
| 65 | 40 | 25 | Count | Shallow | | Wrinkling Score |
| 100.0% | 61.5% | 38.5% | % within wrinkling score | | | |
| 47.8% | 50.6% | 43.9% | % within type of sample | | | |
| 47.8% | 29.4% | 18.4% | % of Total | | | |
| 32 | 17 | 15 | Count | Medium | | |
| 100.0% | 53.1% | 46.9% | % within wrinkling score | | | |
| 23.5% | 21.5% | 26.3% | % within type of sample | | | |
| 23.5% | 12.5% | 11.0% | % of Total | | | |
| 39 | 22 | 17 | Count | Deep | | |
| 100.0% | 56.4% | 43.6% | % within wrinkling score | | | |
| 28.7% | 27.8% | 29.8% | % within type of sample | | | |
| 28.7% | 16.2% | 12.5% | % of Total | | | |
| 136 | 79 | 57 | Count | Total | | |
| 100.0% | 58.1% | 41.9% | % within wrinkling score | | | |
| 100.0% | 100.0% | 100.0% | % within type of sample | | | |
| 100.0% | 58.1% | 41.9% | % of Total | | | |

$\chi^2 = 0.687$, df =2, P value =0.709

**Table (6): Frequency of Sample Type (Disease, Healthy) in Relation with Occupation Type (Outdoor, Indoor).**

| Total | Occupation Type | | | | |
| --- | --- | --- | --- | --- | --- |
| | Indoor | Outdoor | | | |
| 57 | 26 | 31 | Count | Diseased | Subjects |
| 100.0% | 45.6% | 54.4% | % within Subjects | | |
| 41.9% | 33.3% | 53.4% | % within occupation type | | |
| 41.9% | 19.1% | 22.8% | % of Total | | |
| 79 | 52 | 27 | Count | Healthy | |
| 100.0% | 65.8% | 34.2% | % within Subjects | | |
| 58.1% | 66.7% | 46.6% | % within occupation type | | |
| 58.1% | 38.2% | 19.9% | % of Total | | |
| 136 | 78 | 58 | Count | Total | |
| 100.0% | 57.4% | 42.6% | % within Subjects | | |
| 100.0% | 100.0% | 100.0% | % within occupation type | | |
| 100.0% | 57.4% | 42.6% | % of Total | | |

$\chi^2 = 5.528$, df =1, P value =0.019