

Smoking as a Cause of Skin Aging

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Abstract:

Background: Smoking has hazardous effect on many systems like pulmonary and cardiovascular systems. Mean ages of death among smoker 5 years younger than nonsmoker. Also cigarette smoke might affect the skin causing premature aging.

Objectives: The aim of present work is to study the aging changes among smokers and non smokers.

Patients & Methods: A case-control study was conducted in the outpatient clinic of Dermatology and Venereology, Baghdad Teaching Hospital in the period extending from April 2002 through October 2003. A total of 900 male patients age matched smokers and non-smokers with various skin problems were studied, (452 smokers, 448 non-smokers). Full dermatological examination was done to evaluate the severity of facial wrinkles (in the crow's-foot area lateral to outer canthus of each eye). It was measured according to wrinkle score, for both smokers and non- smokers indoor and outdoor subjects.

Results: The present work had shown that smokers were much more susceptible to prominent facial wrinkling than their age matched non-smokers. Outdoor smokers were more severely wrinkled than outdoor non-smokers.

Conclusion: Cigarette smoking is an important preventable and an associated factor causing premature facial wrinkling. It was prominently accentuated by smoking.

Keywords: Skin aging, Smokers, Non-Smokers, Wrinkling scor.

Introduction

It is well-known that smoking has hazardous effect on many systems like pulmonary and cardiovascular system^[1,2,3]. Also cigarette smoke might affect the pattern and frequency of skin disease and premature aging and facial wrinkles^[4-7].

The aim of present work is to study the aging changes among smokers and non smokers

Patients & Methods:

The study includes 900 patients with various skin disorders, taken from outpatient clinic of Dermatology and Venereology in Baghdad Teaching Hospital in the period from April 2002 through October 2003. All patients included in this study were aged 20 years and older. The design of study is a Case-control study including all attendants to the out-patient of Dermatology & Venereology during that period.

(Table -1)The distribution of smoker by their pack-year smoking

Cigarette smoking (pack-years)	Type	No.	%
(≤5) smoke 1 packet for ≤5 years	Mild	70	15.48
(6- 10) smoke 1 packet for 5-10 years	Moderate	137	30.32
(≥11) smoke 1 packet for more than 11 years	Heavy	245	54.20
Total	3 groups	452	100

Wrinkle score used for evaluation of skin wrinkling among the examined groups. (64)

I	Essentially unwrinkled. Two or three shallow wrinkles usually less than 1.5 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 may 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 the crow's-foot area and are prominent over the cheeks and forehead.
VI	Profound wrinkling extending over most of the face.

A full dermatological examination was done to estimate the facial wrinkling severity which was measured according to wrinkle score (Table 2-3) for both smokers and nonsmokers and divided into seven age groups starting from 20 to 80 years old⁽⁵⁾. Close dermatological examination of facial wrinkles, in the crow's-foot area lateral to the outer canthus of each eye, in sitting position and facial muscles completely relaxed in a well-illuminated room. Adjacent areas, including the forehead and cheeks, were also examined. The wrinkles examined for depth, length and numbers, but other skin characteristics like color, keratosis, atrophy and pigmentation were ignored.

Inclusion criteria were cigarette smoker only. Whereas exclusion criteria include; pipe, shisha smokers, ex-smokers, alcoholic and chronic drug user, patients with chronic medical, surgical and dermatological disorders like genodermatosis, metabolic abnormalities, abnormalities of dermal connective tissue and skin tumors.

The statistical analysis was performed by using chi square test (χ^2) and some tables needs corrected (χ^2) Yates test.

Results:

The study included 900 age-matched males with various skin problems, 452 smokers 20-80 mean $\pm$

SD (36.28 $\pm$ 12.56) years. While 448 non-smokers 20-70 mean $\pm$ SD (37.25 $\pm$ 12.21) years ($P > 0.05$)

The interaction between the effects of sun exposure and cigarette smoking on the degree of facial wrinkling is shown in (Table 3). In Figure 1, the correlation between age group & wrinkle score in smokers & non-smokers were much more likely to be prominently wrinkled in smokers leading to premature skin aging. The most heavily wrinkled class in each age group was composed of smokers, especially in grade 5 and 6 score. The percentage of all smokers in grade 3, 4, 5 and 6 were 76.28% while nonsmokers 23.71%. The role of sun exposure had (Table 3) additional synergistic effects to smoking on severity of facial wrinkling. The Chi-square χ^2 and P-value between indoor smokers and indoor nonsmokers were ($\chi^2 = 384.43$, $p = 0.0000001$) while between outdoor smokers and outdoor nonsmokers were ($\chi^2 = 152.06$, $p = 0.0000001$). The difference between indoor and outdoor non smokers was ($\chi^2 = 176.27$, $p = 0.0000001$) and between indoor and outdoor smoker was ($\chi^2 = 313.9$, $p = 0.0000001$) so table 3 clearly showed an association between severity of wrinkling and both age and outdoor exposure; it also demonstrated a strong relationship between smoking and severity of wrinkling.

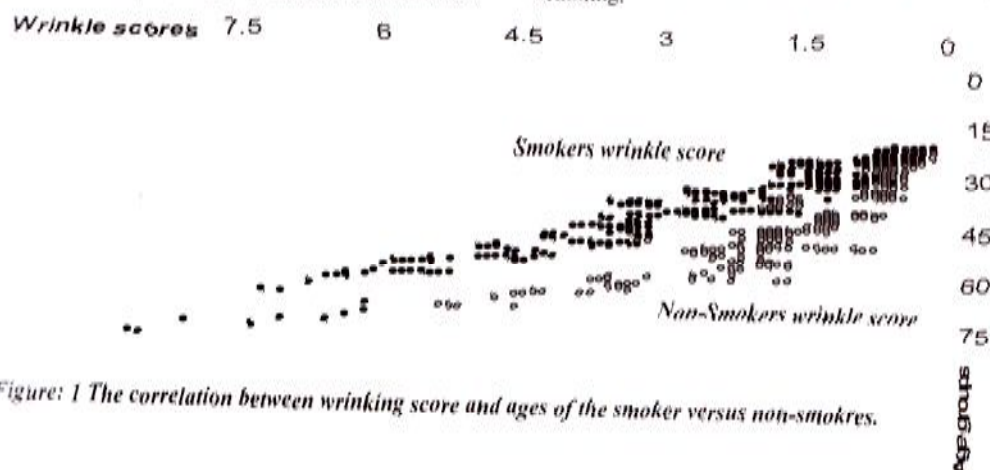


Figure: 1 The correlation between wrinkling score and ages of the smoker versus non-smokers.

Table 3: The degree of wrinkle score among indoor and outdoor workers smoker and non-smokers.

Wrinkle score		I		II		III		IV		V		VI		Total		χ^2 , P-value
Smoking		SM	NS	SM	NS	SM	NS	SM	NS	SM	NS	SM	NS	SM	NS	
Sun	Indoor	131	178	51	65	26	15	14	2	6	0	2	0	230	260	$\chi^2=384.4$ <0.0001
	Outdoor	54	110	68	49	50	22	26	7	15	0	9	0	222	188	
TOTAL		185	288	119	114	76	37	40	9	21	0	11	0	452	448	$\chi^2=152$ <0.0001
		473		233		113		49		21		11		900		

SM= Smoker, NS=Non smoker $\chi^2=176.33$, $P=0.0000001$

SM= Smoker, NS=Non smoker $\chi^2 = 176.27$, $P = 0.0000001$ bet. Indoor & outdoor nonsmokers

$\chi^2 = 313.9$, $P = 0.0000001$ bet. Indoor & outdoor smokers

Discussion:

The present study showed the effect of smoking on some skin aging. Furthermore, the acute & prolonged ischemic effects of smoking, that results in diminished nutritional supplementations. An additional factor like the anti-antioxidant effect of smoking and the decrease in the serum levels of vitamin A & C, α & β -carotene in smoker's serum.⁽¹⁰⁾, this indirectly leads to premature aging of the skin.

The possible cause is that smoking is associated with increase in abnormality, morphology & function of leukocytes in smokers blood which lead to liberation of proteolytic & proinflammatory mediators that result in initiation & increase in the severity of wrinkling & skin aging^(11,12)

In this study, we found a strong relationship between current smokers and facial wrinkles and this correlation was increased with increase in the severity of pack-year smoking especially when combined with excessive exposure to sunlight (as in outdoor occupation) $\chi^2=152.06$ $P = 0.0000001$. So smokers were much more likely to be prominently wrinkled than nonsmokers. Of a particular interest, the incidence of prominent wrinkling in current smokers occurred in younger age group more than in old age group when matched with nonsmokers. This explains the molecular basis and the biochemical mechanisms for premature skin aging in smokers, compared with nonsmokers, a possibility resulting from:

1. Smoking associated with increased in elastosis change in the skin^(13,14).
2. Decrease in collagen synthesis of dermis⁽⁶⁾.
3. Increase plasma neutrophil elastase activity⁽¹⁵⁾.
4. Chronic ischemia of the dermis⁽⁶⁾.
5. Decrease in Vit.A, Vit.C, α -& β -carotene and hence decrease protection against free radicals^(10,16).
6. Decrease skin stratum corneum moisture⁽⁶⁾.
7. Increase in the hydroxylation of estradiol which leads to relative hypoestrogenic state especially in women in postmenopausal period, that may cause atrophy, and dryness of skin^(16,17).
8. Smoking induces matrix metalloproteinase enzymes, which leads to degradation of collagen^(18,21).

We conclude that smokers facial skin age faster than that of the non-smokers counterpart.

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