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Full length research paper

A pilot study about photoprotection by the use of clothing

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Photoaging refers to the effects of long-term Ultraviolet (UV) exposure and sun damage which appears as pigmentation, laxity, wrinkles, telangiectasia, a leathery appearance, and cutaneous malignancies. Hair photodamage leads to loss of mechanical strength, luster and an increase in surface roughness. The aim of this study was to compare the effect of sun exposure on the skin and hair among females wearing scarves and those did not, we intend to have more clues to understand if scarves have a role as a photoprotectant. This study included 150 females who are frequently exposed to the sun (4 to 6 h/day). They are classified into 2 groups: First group included 50 females without scarves while the second group included 100 females with scarves which were subdivided into (70 females with ordinary scarves and 30 females with nekab. This study revealed a significant association between wearing scarves and traction alopecia, also protection of hair luster but there was no significant association with diffuse hair loss. There was a significant association between hair loss and scarves multilayer but no association with scarves fabrics. On the other hand, we found a significant association between nekab and photoprotection of both wrinkles and pigmentation. We concluded that scarves may play a role as photoprotectant. Continued studies to evaluate role of scarves as a photoprotectant is needed.

Key words: hyperpigmentation, sun, hair, Scarve

INTRODUCTION

The skin is the most exposed organ to Ultraviolet (UV) and to the associated sequel (Darrell, 2008). A major function of the skin is to protect the organism from physical and environmental assaults. These stressors come in many forms; solar radiation, infection, temperature extremes, dehydration and mechanical trauma. The skin also possesses and mediates immune, endocrine and neural functions. All of these functions can decline with age. Photoaging refers to the effects of long-term UV exposure and sun damage superimposed on intrinsically aged skin (Francis, 2004). UV radiation has numerous direct and indirect effects on the skin. It is estimated that approximately 50% of UV-induced damage is from the formation of free radicals, whereas direct cellular injury and other mechanisms account for the remainder of UV effects (Bernstein et al., 2004). Sun exposure contributes to pigmentary changes, vascular alteration, immunosuppressant and matrix metalloproteinases upregulation (Jessica et al., 2006).

Human hair is constantly subjected to repeated environmental assaults, commonly termed *weathering*, which is aggravated by various extrinsic damages. Extrinsic factors which cause weathering include sunlight, water, dust, friction, hair combing, cosmetic hair treatments such as hair dyeing or permanent waving. These factors cause extrinsic hair shaft aging in addition to natural intrinsic hair shaft aging (Lee et al., 2005). Among the natural aggressors, sunlight in particular, ultraviolet (UV) rays plays an important role in hair aging. In light-induced aging, the hair becomes paler in color, and changes that impair the softness and shine of hair occur in the surface condition. Hence light modifies the cosmetic properties of hair. Hair fibers therefore need to be protected from light (Lee, 2009). It is well known that

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Table 1. Comparion of hair changes between studied groups.

Scarve	No scarve		Scarve		Total		
Hair	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**	χ^2, *p*
Changes	50	(100%)	100	(100%)	150	(100%)	
Traction alopecia							
Yes	10	(16.7%)	50	(83.3%)	60	(100%)	χ^2 =12.5
No	40	(44.4%)	50	(55.6%)	90	(100)	*P* <0.001
Hair loss							
Yes	27	(34.6%)	51	(65.4%)	78	(100)	χ^2=0.12
No	23	(32%)	49	(68%)	72	(100)	*P* >0.05
Hair luster							
Normal	15	(20.3%)	59	(79.7%)	74	(100)	χ^2=11.2
Decrease	35	(46.1%)	41	(53.9%)	76	(100)	*P* <0.001

ultraviolet and visible radiations damage hair with unhealthy appearance of the hair (Nogueira et al., 2005).

Comparing the effect of sun exposure on the skin and hair among females wearing scarves and those did not, we intend to have more clues to understand if scarves have a role as a photoprotectant.

MATERIALS AND METHODS

This study included 150 females who are frequently exposed to the sun (4 to 6 h/day) especially between 10 am to 4 pm with they are classified into 2 groups: First group included 50 females without scarves while the second group included 100 females with scarves for at least 1 year which was subdivided into (70 females with ordinary scarves and 30 females with nekab)

A questionnaire was prepared that included personal history, medical history, hair details, scalp details, sun exposure details, and scarves details, skin photo aging details (pigmentation and wrinkles). General examination and local examination of the hair including hair pull test, scalp and sun exposed areas were conducted. Assessment was blinded as it was done by another researcher who did not know he was observing subjects who typically wore scarves or not.

Blood samples were taken for laboratory examinations that included: complete blood picture, Hormonal profile (T3, T4, TSH, Prolactin, and Free testosterone), Serum ferritin, Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT). All cases included in this study had normal laboratory analysis.

RESULTS

The age of the included women ranged between 20 to 45 years old with mean age 28.9 ± 5.7 years. They are classified into 2 groups: 33.3% of the sample was without scarves while 66.7% with scarves for at least 1 year (46.7% with ordinary scarves and 20% with nekab).

As shown in Table 1, this study revealed a significant association between wearing scarves and tractional alopecia; as 50 females with scarves (83.3%) had tractional alopecia in comparison to 10 females without scarves (16.7%)

Also, there was a statistically significant association between wearing scarves and protection from hair luster affection as only 41 females with scarves (53.9%) had decrease luster in comparison to 35 females without scarves (46.1%).

There was no association between scarves and diffuse hair loss in our study as there was no statistically significant difference in diffuse hair fall between females with scarves 51 (65.4%) and females without scarves 27 (34.6%).

From our study we observed no significant association between scarves fabric and loss of hair as nearly the same percentage (51%) of females wearing cotton scarves and synthetic scarves showed evidence of hair loss in the present study Table 2.

There was a significant association between layers of scarves and hair loss as hair loss increased with multilayer scarves (61.2%) in comparison to one layer scarves (30.3%) Table 3.

On the other hand; we studied the correlation between scarves and skin photoaging (wrinkles and pigmentation) Table 4. We found a significant association between wearing nekab and protection from wrinkles as only 10 females (12.5%) with nekab had wrinkles in comparison to 44 females (55%) with ordinary scarves and 26 females (32.5%) without scarves. Also, our results showed a significant association between wearing nekab and protection of skin from hyperpigmentation as only 3 females (0.04%) with nekab showed hyperpigmentation

Table 2. Association between scarve Fabric and hair loss.

Hair loss / Scarve fabric	No. hair loss	Hair loss	Total
	No. (%)	No. (%)	No. (%)
Cotton	21(48.8%)	22 (51.2%)	43 (100%)
Synthetic	28 (48.2%)	29 (51.8%)	57 (100%)
Total	49 (49%)	51(51%)	100 (100%)

χ^2= 1.06; p > 0.05.

Table 3. Association between scarves layers and hair loss.

Hair loss / Scarve layer	No Hair loss	Hair loss	Total
	No. (%)	No. (%)	No. (%)
One layer	23 (69.7%)	10 (30.3%)	33 (100%)
Multilayer	26 (38.8%)	41(61.2%)	67(100%)
Total	49 (49%)	51(51%)	100 (100%)

χ^2 = 8.4; p < 0.05.

Table 4. Comparison of Skin photoaging between studied groups.

Studied groups / Skin photoaging	No scarve		Scarve		Nekab		Total		χ^2, *p*
	No.	(%)	No.	(%)	No.	No.	No.	(%)	
	50	-100%	70	-100%	30	30	150	-100%	
Skin wrinkles									
Yes	26	-32.50%	44	-55%	10	10	80	-100%	χ^2=7.2
No	24	-34.30%	26	-37.10%	20	20	70	-100%	*P* <0.05
Skin hyperpigmentation									
Yes	23	-30.60%	49	-65.30%	3	3	75	-100%	χ^2=30.7
No	27	-36%	21	-28%	27	27	75	-100%	*P* <0.01

versus 49 females (65.3%) with ordinary scarves and 23 females (30.6%) with no scarves**.**

DISCUSSION

Ultraviolet (UV) has a hazardous effect on skin and hair. Our study detected a significant association between wearing scarves and tractional alopecia. The term traction alopecia (TA) refers to hair loss as a result of excessive pulling of the hair usually on the margins of the scalp from hairstyles. Hairstyle-related pulling forces are thought to cause mechanical damage to hair follicles. This results in inflammation often presenting as follicular papules and pustules in areas of traction but may be subclinical (Khumalo et al., 2008).

Also, there was a statistically significant association between wearing scarves and protection from hair luster affection. This result can be explained as clothing including scarve has an excellent photoprotectant. UVB is scattered more by a given fabric compared with UVA. UV protectiveness of fabrics is expressed as UV protection factor (UPF), which is analogous to sun protection factor (SPF) of sunscreens (Laperre et al. 2001).

There was no association between scarves and diffuse hair loss in our study. Kermode (2011) reported that

hejab is good for hair by protecting it from pollution and dirt, it can keep it in great condition. Many hejab women find that they can grow their hair longer than they could without. Now days, in addition to the effect of scarf in traction of hair stalk, it has been shown that the vitamin D3 deficiency secondary to the decreased exposure to sun is effective in inducing hair loss (Sadamoto et al., 1990).

From our study we observed no significant association between scarves fabric and loss of hair**.** In contrary to our study Moneib et al. (2011) reported a highly significant association between the fabric of hejab and hair loss where the cotton was the least fabric associated with hair loss while silk was the worst fabric associated with hair loss. This difference from our results can be explained as many of the females with synthetic scarves wear cotton under scarves which prevent hair contact with the synthetic fabrics.

There was a significant association between layers of scarves and hair loss**.** Similar to our findings, Goldberg (2009) reported a significant association between layers of scarve and presence of hair loss as hair loss increased with multilayer of scarves which may be due to traction by the weight of the different fabrics.

We found a significant association between wearing nekab and protection from wrinkles and pigmentation. Prisana and Henry (2005) showed that clothing is an excellent photoprotectant. Dark-color fabrics have greater UPF than light color ones.

CONCLUSION AND LIMITATION OF THE STUDY

Prolonged sun exposure has different hazards on the skin and hair. This study recommended photo protective measures include sun avoidance during the peak UVR (10 am to 4 pm), the use of photo protective clothing, wide-brimmed hat, sunglasses, and broad-spectrum sunscreens. Continued studies to evaluate role of scarves as a photoprotectant is needed.

No explanation of timing of wearing scarves and the counted hair loss. There are many more reasons for photo aging and hyperpigmentation disorders of skin, so it was not known if these disorders were affected by scarves wearing or not. Hair loss, hair luster, wrinkles and hyperpigmentation were all assessed using subjective questions, these subjective assessments could be better graded along a spectrum (scale of five; mild moderate, severe, etc).

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