Smokers' hair: Does smoking cause premature hair graying?

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ABSTRACT

Aims: To determine if there is a significant association between premature hair graying and cigarette smoking. **Materials and Methods:** A cross-sectional observational study was conducted in a nonclinical setting on 207 participants on August 24 until 25, 2010. Participants were classified into two groups [premature hair graying (PHG) and normal hair graying]. PHG was defined as the first appearance of gray hair before the age of 30. Data were collected using an interview questionnaire and measurements of body mass index, waist circumference, fasting blood glucose and blood pressure. Collected data were statistically analyzed using SPSS 16, Chicago, IL. **Results:** Of the 207 subjects, 104 (50.2%) had first appearance of gray hair before the age of 30 (PHG group) while the other 103 (49.8%) were considered normal hair graying group. The prevalence of smokers in the "PHG" group was higher (40.2% vs. 24.7%, $P = 0.031$). Smokers had earlier onset of hair graying (smokers: 31 (7.4) vs. nonsmokers: 34 (8.6), $P = 0.034$). Using multiple logistic regression with conditional likelihood, smokers were two and half times (95% CI: 1.5-4.6) more prone to develop PHG. **Conclusion:** This study suggests that there is a significant relation (with adjusted odds ratio of two and half) between onset of gray hair before the age of 30 and cigarette smoking.

Key words: Jordan, premature hair graying, smoking

INTRODUCTION

It is well accepted that gray hair is a natural phenomenon of age in humans.[1] There is also some evidence that age is associated with increased graying in mice as well.[2] Premature hair graying (PHG) has been linked to certain autoimmune disorders such as autoimmune thyroid disease and pernicious anaemia and to several rare premature aging syndromes (e.g., Werner's syndrome).[3] In addition, a link between smoking and gray hair in both men and women and between smoking and hair loss in men has been reported.[4–6] Because of this, PHG has attracted the attention of the medical community. Could PHG be a marker of early aging of organs and thus premature morbidity and mortality?

Research exploring the relationship of PHG to smoking has been very little worldwide and does not exist in the Middle East.

Because of this rarity of studies in this field, this particular study was undertaken to determine the association between PHG and cigarette smoking in the Jordanian population.

MATERIALS AND METHODS

A cross-sectional observational study that aimed at evaluating the association of smoking with PHG. It was conducted in a nonclinical setting involving 207 participants (94 men and 113 women) over a period of 2 days from August 24 until August 25, 2010. The participants represent a random sample of Jordanian people who participated willingly in this public health survey.

Statistical Methods

Collected data were entered into Statistical Package for Social Sciences (SPSS16, Chicago, IL). Data were expressed as mean (SD). Data were subdivided between two groups (PHG and normal hair graying). PHG was defined as the first appearance of gray hair before the age of 30. Whereas in the literature, other definitions were used. (See discussion section).

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Data of continuous nature [age of first appearance of gray hair, height, weight, body mass index (BMI), waist circumference, fasting blood glucose, systolic blood pressure and diastolic blood pressure] were compared between the two groups by independent Student *t*-test. Data of categorical nature (gender, smoking behavior and medical history of hypertension, diabetes, and dyslipidemia) were compared between the two groups by Chi square. Despite its importance, family history was not included in this survey, because it was subjected to recall bias since the onset of hair graying in the family members was not exceptionally remembered by the participants. Multiple logistic regression was utilized to discern the relationship between significant variables and the susceptibility to PHG.

A nonsmoker was defined as someone who never smoked. However, the range of smoking among the smokers in this study was between one to 70 cigarettes per year. Those who had smoked in the past were not included in the study.

BMI was calculated by dividing the body weight in kilograms by the height in square meters.

RESULTS

The total number of people who agreed to participate was 207 subjects, half of them had PHG (*n* = 104) [Table 1]. Men and women were equally represented in the whole sample (men: 94 (45.4%)) and in the two subgroups (men in PHG group: 51 (49%), *P* = 0.29). The participants covered a wide range of age categories with an average age of 44 (11.6) years (range: 18-65 years). One quarter of recruits was below the age of 35.3 years, one quarter above the age of 53.7 and with a median age of 44.5 years.

Table 1: Clinical characteristics of participants by the onset of first appearance of gray hair

Variable	Premature hair gray (*N*=104) mean±SD or *N* (%)	Normal hair gray (*N*=103) mean±SD or *N* (%)	*P* value
Age (years)	40.5±12.8	52.9±11.9	<0.000
Height (m)	1.67±0.09	1.65±0.09	0.11
Weight (kg)	78.8±15	78±15.3	0.73
BMI (kg/m²)	28.9±5.3	28.1±5.3	0.3
Waist circumference (cm)	95.6±14.4	96.5±12.6	0.67
Fasting blood glucose (mg/dl)	104.3±26.8	108.5±25.9	0.29
Diabetes	6 (5.8)	12 (11.7)	0.13
Systolic blood pressure (mmHg)	121.6±11.3	123.7±16.7	0.32
Diastolic blood pressure (mmHg)	80.1±7.5	82±8.2	0.11
Hypertension	8 (7.7)	29 (28.2)	<0.001

BMI: Body mass index

The average age for the first appearance of gray hair was 31.7 years with one quarter was below the age of 25, one quarter above the age of 40 and a median age of 30 years. There was 15 years difference in age at which hair graying was first noted between the two groups [25.0 (4.7) vs. 40 (5.3), *P* < 0.001].

There was no statistically significant difference in the demographics between the two groups. There were no differences in their body weight [78.8 (15) vs. 78.0 (15.3) kg, *P* = 0.73]; height [1.67 (0.09) vs. 1.65 (0.09) m, *P* = 0.11]; BMI [28.9 (5.3) vs. 28.1 (5.3) kg/m², *P* = 0.3]; waist circumference [95.6 (14.4) vs. 96.5 (12.6) cm, *P* = 0.67]; fasting blood glucose [104.3 (26.8) vs. 108.5 (25.9) g/dL, *P* = 0.29]; systolic blood pressure [121.6 (11.3) vs. 123.7 (16.7) mmHg, *P* = 0.32] and diastolic blood pressure [80.1 (7.5) vs. 82.0 (8.2) mmHg, *P* = 0.11] [Table 1].

The prevalence of physician-diagnosed diabetes was similar between the two groups (5.8% vs. 11.7%, *P* = 0.13). The prevalence of hypertension was lower in subjects with PHG (7.7% vs. 28.2%, *P* < 0.001). The prevalence of smokers in the "PHG" was higher (40.2% vs. 24.7%, *P* = 0.031). Smokers had earlier onset of hair graying [smokers: 31 (7.4) vs. nonsmokers: 34 (8.6), *P* = 0.034] in the whole sample.

Backward stepwise multiple logistic regression with conditional likelihood was used to find out the best subset of variables to predict PHG. The logistic regression was specified for significance level of 0.05 for entry and at level of 0.1 for removal. The different models were compared by conditional logistic regression, and minus two log likelihood ratio statistic was used in comparing the fitness of combined models. Two variables were evaluated for susceptibility; smoking behavior and medical history of hypertension. Smoking behavior remained statistically significant with adjusted odds ratio of 2.5 (95% CI: 1.5-4.6).

DISCUSSION

Besides being a well-known risk factor for cardiovascular disease, smoking was reported to be associated with an increase in apparent biological age over chronological age.[7] Model D. indicates that people who smoke have characteristic facial changes similar to those seen in premature aging.[8] Smoking was also linked to PHG. Mosley and Gibbs reported a significant relation between gray hair and smoking.[4] Of their 606 patients aged over 30 years, 152 of each sex, smoked. They indicated a significant association between gray hair and smoking for all age groups in both sexes with overall odds ratio of 4.40 (3.24-5.96). However, they did not mention their definition of gray hair. Our cross-sectional observational study showed similar results. Smokers had earlier onset of hair graying [smokers: 31 (7.4) vs. nonsmokers: 34 (8.6), *P* = 0.034] in the whole sample with adjusted odds ratio of 2.5

(95% CI: 1.5-4.6). On the other hand, there was no significant association between PHG and BMI, waist circumference, fasting blood glucose or blood pressure. It should be noted that the prevalence of hypertension was lower in subjects with PHG (7.7% vs. 28.2%, $P < 0.001$), despite being smokers. This could be related to the fact that PHG group was significantly younger than the normal hair graying group [40.5 (12.8) vs. 52.9 (11.9) years, $P < 0.000$].

To our knowledge, there is no universal definition of PHG. Gould, *et al*. and Glasser defined PHG if 50% of hair is gray before the age of 50.[9,10] On the other hand, others considered participants to have PHG if all or most of their hair is gray before the age of 40.[11,12] Whereas Trueb adopted the threshold of PHG to be at the age of 20 in Caucasian and at the age of 30 in Africans, but he did not specify the percentage of gray hair.[13] In our study, we considered participants to have PHG if the onset of visible gray hair is before the age of 30. The reason that this age was chosen because it has been proposed that for every decade after the age of 30, there is a decrease of 10-20% in pigment-producing epidermal melanocytes.[14,15] This melanocyte decrease is one of the proposed mechanisms of hair graying.

The mechanisms by which smoking causes hair graying are incompletely understood. The color of hair mainly relies on the presence or absence of melanin pigment produced by the melanocytes.[13] It has been indicated that smoking could be associated with generating huge amounts of reactive oxygen species leading to increased oxidative stress.[6] This pro-oxidant effect of smoking could lead to damage the melanin-producing cells, the melanocytes. This theory is supported by the observation that melanocytes in gray hair bulbs are frequently highly vacuolated, a common response to increased oxidative stress.[13]

A limiting factor throughout this study was that there is no temporal relationship and it is impossible to distinguish between cause and effect. For this reason surveys such as this can be regarded as hypothesis-generation and not hypothesis-testing. Other limitations include left censorship, and the potential that nonresponders are of different quality than the responders.

CONCLUSIONS

This hypothesis-generating study suggests that there is a significant relation (with adjusted odds ratio of two and half)

between onset of gray hair before the age of 30 years and cigarette smoking in a random sample of Jordanian people. We think that the results of this study are important for young smokers especially females and for policy makers in the fields of public health and preventive medicine in their continuous war against smoking.

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