

## Premature Hair Greying: A Preliminary Study of Influencing Factors

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### ABSTRACT

**Background:** People with premature hair graying try to hide it because it makes them look older than their age. Hair graying is an esthetic problem that affects social life. This preliminary study aimed to investigate the influencing factors in premature hair graying.

**Methods:** One hundred twenty participants who were referred to a dermatology clinic were randomly selected and filled up an interview questionnaire. The questionnaire included demographic information such as age, sex, marital status, BMI, education level, and income. Also, queries on family history, cigarette smoking, and alcohol consumption were asked. The main question was the age of graying hair initiation which divided the participants into two groups; individuals with premature hair graying (PHG) under 30 and non-PHG individuals above 30 years old. Factors were compared and a logistic regression was used to identify the association.

**Results:** The mean age of participants was 42.2±1.2 and 49% of them were female. Cigarette smoking, alcohol consumption, educational level, marital status, and family history were significantly different between the two subgroups. But the marital status, family history, and alcohol consumption were significantly associated with premature hair graying.

**Conclusion:** Premature hair graying depends on family history and non-married people and alcohol users are more prone to it. More investigations are needed to identify the indicators.

**Keywords:** Premature Hair Graying, Influencing Factors, Smoking, Marital status, Alcohol, Iran

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## Introduction

**H**air has a significant effect on personal appearance. When hair becomes gray at an early age, it may affect self-esteem and result in difficulty in the socio-cultural acceptance of the youth (1). Hair graying (canities) known as the gradual loss of hair pigmentation, is correlated to the natural process of aging and often occurs in the fourth decade of life (2, 3).

Although several medical conditions contribute to PHG (4, 5), it often occurs in people without any severe disease. Premature hair graying is very common nowadays. Many factors may contribute to this event, such as race; for example, in Africans, hair graying starts at age of 40 while in Asians it starts at age of 30 (6). As like other parts of the skin, the scalp and hair go through the aging process. The mechanism of hair graying is not well understood. The main proposed mechanism is the decrease of 10 to 20 percent of melanocytes and melanin pigment production which occurs after the age of 30 (7). Hair graying is subject to individual intrinsic and extrinsic factors such as gender, familial history, radiation exposure, nutrition, smoking, etc. (8, 9). It may also depend on the scalp region (3).

Since there are limited reports on PHG in Iran, this study aimed to investigate the factors influencing PHG in this preliminary study.

## Materials and Methods

This cross-sectional study was performed on 120 patients referred to the dermatology clinic of Afzalipour hospital in 2019. The contributors who willingly participated in the study represented a random sample. However, one of them refused to complete the questionnaire during the interview so the number was decreased to 119.

First, the aim of the study was explained to participants, and confidentiality of information was assured. Then, after obtaining oral consent the questionnaire was filled up by a medical student as the researcher. The interview questionnaire included demographic characteristics such as age, sex, marriage status, education, income, weight, and height. Body mass index (BMI) was calculated as body weight (kg) divided by the square of measured height (m). The main question was "The age of hair graying initiation". Based on the literature, if hair graying appears before 30 years old it was classified in the PHG group, otherwise in non-PHG (10, 11).

This research project (no 96000466) was approved by the ethical committee of Kerman University of Medical Sciences (code: IR.KMU.AH.REC.1398.055).

## Statistics

Data were expressed as mean  $\pm$  SE. The student t-test was used for comparison of numerical variables between two groups of PHG and non-PHG. The distributions of categorical variables were compared using chi-square or Fisher's exact test. An ordinal logistic regression analysis was performed to identify factors associated with PHG and was described using the odds ratio (ORS). A p-value less than 0.05 was considered significant. The IBM SPSS version 21 was used to perform statistical analysis.

## Results

Data are shown in table 1. Out of 119 participants, 59 (49%) were female and 86 (28%) were married. The distribution of education was as follows; 15% Ph.D. or MD, 10% MSc, 35% BA, and the remaining 40% high school diploma. The monthly income of 32% of the participants was less than 10 million Rials, while that of 20% was over 30 million Rials.

**Table 1.** Characteristics of PHG and non-PHG participants

Characteristics		Total	PHG	Non-PHG	P-value
Age (Mean±SE) year		42.2±1.2	49.7±1.4	36.1±1.5	0.000
BMI (Mean±SE)		24.9±0.7	25.0±0.5	24.8±0.5	.....
Education	Diploma% (no)	40.3 (48)	30.4 (20)	52.8 (28)	
	Bachelor% (no)	34.5 (41)	33.3 (22)	35.8 (19)	
	MSc% (no)	10.1 (12)	12.1 (8)	7.6 (4)	0.003
	PhD & MD% (no)	15.1 (18)	24.2 (16)	3.8 (2)	
Sex	Male % (no)	50.4 (60)	45.3 (24)	53.0 (35)	.....
	Female% (no)	49.6 (59)	54.7 (29)	47.0 (31)	
Marital status	Married% (no)	27.7 (33)	57.6 (38)	90.6 (48)	0.000
	Non-married% (no)	72.3 (86)	42.4 (28)	9.4 (5)	
Heritage	With family history% (no)	95.5 (42)	77.8 (42)	36.9 (24)	
	No family history% (no)	4.5 (2)	22.2 (12)	63.1 (41)	0.000
Income	<10 million-R/month (no)	31.9 (38)	30.3 (20)	34.0 (18)	
	10-20 million-R/month (no)	22.7 (27)	28.8 (19)	15.0 (8)	
	20-30 million-R/month (no)	25.2 (30)	18.2 (12)	34.0 (18)	.....
	>30 million-R/month (no)	20.2 (30)	21.7 (15)	17 (9)	
Cigarette smokers % (no)		30 (36)	72 (26)	23 (12)	0.045
Age of smoking (Mean ± SE) year		21.7±0.9	24.0±2.0	20.5±0.6	0.042
Alcohol consumers% (no)		15 (18)	83 (15)	17 (3)	0.008
Age of Alc. consuming (Mean ± SE) year		20.0±0.7	23.3±1.7	19.3±0.7	0.028

The mean age of 119 participants was 42.2±1.2 years and the average BMI was 24.9±0.4 kg/m<sup>2</sup>. Thirty-six individuals (30%) were cigarette smokers who had started smoking at the mean age of 21.7±0.9 years and smoked 28.5±3.2 cigarettes a day. Eighteen participants (15%) were alcohol consumers who had started drinking alcohol at the age of 20±0.7 years. Men and women were equally represented in whole and two subgroups. No statistical difference in BMI and income was observed between the two subgroups.

Mean age of cigarette smoking initiation ( $P<0.05$ ), number of cigarettes smoked in a day ( $P<0.05$ ), and age of first alcohol drinking ( $P<0.05$ ) in the PHG group were significantly increased compared to non-PHG.

The Fisher exact test showed that the abundances of cigarette smokers and alcohol consumers were significantly different between the PHG and non-PHG groups ( $P=0.045$  and  $P=0.008$ , respectively). Also, a significant difference in marital status and family history ( $P=0.000$ ) has been observed between the two groups. There was a significant difference between the distribution of participants in PHG

and non-PHG groups regarding the level of education ( $X_2=12.5$ ,  $df=3$ ,  $P=0.003$ ).

In a binary logistic regression analysis, marital status ( $OR=6.6$ ) was significantly associated with PHG ( $P=0.002$ ). Further, less association was found for family history ( $OR=0.2$  and  $P=0.000$ ) and alcohol consumption ( $OR=0.2$  and  $P=0.000$ ). There was no significant risk ratio detected for other factors.

## Discussion

Hair graying can be a sign of aging, however, the definition was described differently. In Caucasians, the mean age of hair graying was 34±9 years while in Africans it was 43.9±10 (12). In a worldwide survey conducted in 2013, it was observed that in six to twenty-three percent of the population, half of the hair became gray before the age of 50 years (13). Likewise, there is no well-defined onset age of PHG. Some authors defined PHG occurring at the age of 20 years as the first appearance of gray hair, while others defined it as occurring at the age of 30 years (2, 14). Glasser and Gray for the first time defined PHG as the presence of more than 50% of gray hair before the 50<sup>th</sup> year of life (15).

Later, Rosen *et al.* defined PHG as a condition in which most of the hair becomes gray before the age of 40 years (16). In this study we considered the onset of PHG at the age of 30 years based on Trueb's studies (2,6) because observation of white hair through an electronic microscope showed the absence or decrease of melanocytes at this age (17) and it is known that epidermal melanocytes decrease 10% to 20% around the age of 30 years (7).

In our study, PHG was strongly affected by cigarette smoking and a significant association was found between the age of cigarette smoking initiation and the number of cigarettes smoked per day. Other authors reported a decrease in the mean age of PHG occurrence in cigarette smokers (10, 18) and a strong correlation with the number of smoked cigarettes (19). The same result was found in a study by Jo *et al.* that reported the risk of PHG 1.99 times more in smokers (3). It is known that cigarette smoking increases oxidative stress (6), so the production of reactive oxygen decreases melanin production (10) which leads to loss of hair color (17). Like smoking, drinking alcohol is the other lifestyle behavior associated with PHG. In our study, alcohol consumption, especially at young ages, showed a positive impact on PHG. The same result was found in a cross-sectional study conducted on Turkish people in which the authors stated that oxidative stress was the main consequence of both smoking and alcohol consumption (20, 21).

Genes play an important role in the premature graying of hair. Family history as an epigenetic factor is considered a predictor of PHG (9). In agreement with our study results, a strong association with the parents' PHG was also found in other populations such as Turkish, Korean, and Indian people (8,11). When parents had gray hair before age of 30 years, their children were three to five times more prone to PHG (22). Hereditary genes and autosomal dominant traits determine premature aging syndromes and PHG (23).

According to our study, most non-PHG participants were married and non-graduated. Akin Belli *et al.* reported that PHG depended on educational status, but no association was found with marital status (20). On the contrary, we found that PHG is more frequent in married people. In other words, non-married people were six times less prone to PHG. This discrepancy

might be explained by age since normally married people are older than non-married (24). Higher education achievement includes emotional stress, anxiety, and a more demanding lifestyle which may be a source of oxidative stress (25) that contributes to a premature graying of hair. Anxiety plays an important role in prooxidant-antioxidant balance (26). Nonetheless, quality of life and PHG are interdependent (1).

In our study, the mean BMI did not differ between PHG and non-PHG individuals. In contrast, Sharma and Dogra sustained that the odds of having PHG were significantly higher in obese people (25) and correlated with the severity of it (11). However, a study by Zayed *et al.* agrees with our results (10).

In accordance with our study, in a survey conducted on more than a thousand patients referred to two dermatologic clinics, no gender difference was found between PHG and non-PHG groups (3). While in Turkish people PHG was more frequent in males (21) and its rate depended on the paternal history of PHG (20), in medical students of Pakistan, the prevalence of PHG was higher in females (1).

The main limitation of this study was the small number of participants with no relationship between causes and effects. Samples should be selected from the whole population. The other limitation was the self-censorship of participants and the subjectivity of their answers; some participants may feel embarrassed or afraid of legal consequences in answering.

In conclusion, among investigated factors, family history, alcohol consumption, and marital status were more effective; while cigarette smoking and education showed less impact on the occurrence of premature hair graying. Considering the limitations of this study, a wide survey with a large number of participants is needed to propose suggestions to policymakers.

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#### **Conflict of interest**

The authors declare no conflict of interest.

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