

ORIGINAL ARTICLE

# Premature greying of hair among the population of King Faisal University in Al-Ahasa, Saudi Arabia: an epidemiological study

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## ABSTRACT

**Background:** Hair and skin play an important role in the physical appearance. Canities is a scientific term used to describe hair greying. It is considered as a physiological phenomenon with getting older, despite any factors like gender and race. In case where it appears at a young age, the term used is premature canities or premature greying of hair. This study aimed to assess the epidemiology of premature greying of hair.

**Methodology:** This study analyzed an observational descriptive cross-sectional data collected in September 2018. Our sample included males and females from 18 to 30 years of age from King Faisal University, Saudi Arabia. The sample size was 447 with a confidence level of 95% and a margin of error of 5%.

**Results:** The study sample consisted of 346 (77.4%) females and 101 (22.6%) males. Regarding premature greying of hair (PMGH), 257 (57.5%) people did not complain of PMGH and 190 (42.5%) people suffered from PMGH. Regarding gender, 160 (84.2%) females and 30 (15.8%) males had PMGH. The prevalence of PMGH in the present study was 42.5%.

**Conclusion:** This study revealed that PMGH is a common trichological disorder. Most frequent associations to PMGH included thyroid, deficiency of vitamins, alopecia areata, vitiligo, smoking, sun exposure, and personal habits like using hair straightener and application of hair gel. Family history of PMGH appears to play an important role in the predisposition of this disorder.

**Keywords:** Premature greying of hair, King Faisal-University, epidemiological study.

## Introduction

Hair and skin play an important role in peoples' physical appearance. Hair length, color, and style all have contribution in the physical appearance [1]. Canities is a scientific term that is used to describe hair greying. It is considered as a physiological phenomenon with getting older, despite any factors like gender and race. In case it appears in young people, the term use is as premature greying of hair (PMGH) or premature canities. As hair play an important role in self-acceptance, PMGH has some adverse effects on peoples [2]. The scientist defines the canities as it is a part of the process of chronological aging and it occurs with time regardless of gender or race. PMGH appears around 30–34 years in Japanese men and between 35 and 39 years in Japanese women. In Caucasians, it starts in their mid-30s, while in Asians it starts in their late 30s. On the other hand, in Africans, it is later and it commences in their mid-40s, while Bantus,

greying of hair is said to be uncommon before 40–50 years of age [3–5]. Both sexes are equally affected [6].

PMGH has a poorly understood etiology. Additionally, it is a common cause for referral to the Dermatology Department [7,8]. Hair color or melanogenesis depends on a genetically-regulated process of melanin distribution from follicular melanocytes to keratinocytes of hair bulb where the pigment is transferred to the hair cortex and outer root sheet. Hair bulb melanocytes have high

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synthetic activity during young age, and it is believed that the senile canities occurs due to exhaustion of regenerative ability of hair pigmentation. Premature canities may reflect an early degenerative changes of melanocytes due to genetically regulated process, as well as exogenous or/and endogenous factors and illnesses [9]. Reversible hypopigmentation of hair is possible and it has been observed in combination with nutritional insufficiencies, for example, kwashiorkor, nephrosis, celiac disease, and other causes of malabsorption. Severe iron deficiency and copper deficiency have been also associated [3]. Additional causes include stress and administration of certain medications. Some of the reported medications are chloroquine, dixyrazine, mephenesin, phenylthiourea, triparanol, fluoro butyrophene, the epidermal growth factor receptor inhibitor imatinib and interferon-alpha, as well as the use of certain chemicals (medicated oils) and topically applied agents like dithranol, prostaglandin F2 alpha [10,11]. PMGH is also caused by the oxidative stress produced outside hair follicle's melanocytes, for example, by pollution, ultraviolet (UV) light, psycho-emotional, or inflammatory stress [12]. Studies reported that the smoking was significantly associated with hair greying, and destroying of stem cell regenerative ability. Moreover, drug abuse was postulated to lead to greying, in a case report [13,14]. Premature greying has been shown associated with several autoimmune diseases such as vitiligo, pernicious anemia, autoimmune thyroid disorders, and premature aging syndromes like Werner's syndrome [15]. Furthermore, iron and vitamin B12 have been shown to affect hair growth and pigmentation [16]. This study aims to assess the epidemiology of premature greying of hair in King Faisal University among the population of Al Ahssa in the eastern province of Saudi Arabia.

## Subjects and Methods

This study analyzed an observational descriptive cross-sectional data. The sample included people from the

age range of 18–30 years, grouped from the population of King Faisal University in Al-Ahasa, Saudi Arabia in September 2018. The sample size was 477 with a confidence level of 95% and a margin of error of 5%. The data were collected via an electronic questionnaire, which was distributed randomly among the population.

The possible association/causes of PMGH that were taken into consideration included gender, profession, life style, and hair-styling habits, including smoking, use of hair dryer, hair straightener, hair conditioner, types of applied creams, and hair oils. The possible association of other factors to PMGH was also discussed that included personal and familial medical history, therapeutic, and vitamin supplementation consumption.

The data were analyzed using the IBM statistics statistical package for the social sciences version 22. The crosstabs analysis was carried out based on the data collected that demonstrated the relationship of prematurely greying of hair and other factors. Additionally, other data like age, gender, and residence were analyzed using frequency tables.

## Results

The study sample consisted of 346 (77.4%) females and 101 (22.6%) males from King Faisal University. All individuals (447 people) included in this study were from the age group 18–30 years. Regarding PMGH 257 (57.5%) people did not complain of PMGH and 190 (42.5%) people suffered from PMGH. Regarding gender, 71 (27.6%) males and 186 (72.4%) females did not suffer from PMGH. On the other hand, 160 (84.2%) females and 30 (15.8%) males had PMGH.

According to factors that had been asked for, in order to find the influencing causes participating in the appearance of premature grey hair; regarding chronic disease, 211 (47.203 %) people had no chronic disease and no PMGH, while 46 (10.29%) had a chronic disease but no PMGH.

**Table 1.** The association between PMGH and chronic disease.

Chronic disease		Premature grey hair			
		No		Yes	
		Count	Column N %	Count	Column N %
Thyroid	No	252	56.38	188	42.06
	Yes	5	1.12	2	0.45
Diabetes	No	255	57.05	189	42.28
	Yes	2	0.45	1	0.22
Asthma	No	255	57.05	190	42.51
	Yes	2	0.45	0	0.00
G6PD	No	227	50.78	175	39.15
	Yes	30	6.71	15	3.36
Others	No	250	55.93	188	42.06
	Yes	7	1.57	2	0.45

However, 169 (37.08%) had no chronic disease but had PMGH, while 21 (4.70%) had a chronic disease and also had PMGH (Table 1).

Moreover, 166 (37.14%) people did not suffer from both PMGH and skin disorder, while 91 (20.36%) had no PMGH but had a skin disorder. However, 132 (29.53%) people did not suffer from a skin disorder but had PMGH, and 58 (12.8%) had both PMGH and other skin disorder (Table 2).

In association with other hair diseases such as alopecia areata, 10 (2.24%) people who had suffered from alopecia areata, did not have PMGH, while 12 (2.68%) persons had PMGH. Nearly 43 (9.62%) had androgenetic alopecia but did not have PMGH, while 21 (4.70%) had androgenetic alopecia associated with PMGH. Regarding personal habits, 188 (42.06%) people who had PMGH were not smokers, two (0.45%) people were smokers, and two (0.45%) people were ex-smokers. Nearly 14 (3.13%) people who did not have PMGH had a history of smoking and 243 (54.36%) who were not smokers. (see Table 3).

Around 99 people (22.15%) with PMGH used hair oils, and 91 (20.36%) with PMGH did not use hair oils.

Nevertheless, 119 (26.62%) used hair oils but did not have PMGH and 138 (30.87%) did not use hair oils and did not have PMGH (Table 4). Regarding plant-based preparation, 163 (36.47%) persons did not use hair plants and did not suffer from PMGH, while 94 (21.03%) persons used hair plants without PMGH. However, 103 (23.04%) persons did not use hair plants but had PMGH, but 87 (19.46%) persons with PMGH used hair plant as 60 people (13.42%) used Henna plant and 21 people (4.70%) used Sidra plant. According to hair styling habit, 128 (28.64%) people who suffered from PMGH used hair straightener. Around 92 (20.58%) of people without PMGH did not use hair dryer and 165 (36.91%) used it. For hair gel, 9 (2.01%) people who suffered from PMGH used it, and 181 (40.49%) individuals with PMGH did not use it. Around 242 (54.14%) of people without PMGH did not use hair gels, 134 (29.98%) of people without PMGH did not use hair conditioner, and 123 (27.52%) used it (see Table 5).

## Discussion

Melanogenesis is the process that the hair goes through to synthesize the melanin. Studies show that the hair color

**Table 2.** The association between PMGH and skin disease.

	Skin disease	Premature grey hair			
		No		Yes	
		Count	Column N %	Count	Column N %
Vitiligo	No	254	56.82	185	41.39
	Yes	3	0.67	5	1.12
Dermatitis	No	208	46.53	156	34.90
	Yes	49	10.96	34	7.61
Acne	No	239	53.47	183	40.94
	Yes	18	4.03	7	1.57
Alopecia areata	No	247	55.26	178	39.82
	Yes	10	2.24	12	2.68
Psoriasis	No	251	56.15	189	42.28
	Yes	6	1.34	1	0.22
Others	No	248	55.48	189	42.28
	Yes	9	2.01	1	0.22

**Table 3.** Duration of sun exposure (hour/day).

	Have you had premature grey hair			
	No		Yes	
	Count	Percentage	Count	Percentage
Skipped	167	37.36	131	29.31
Less than 1 hour	44	9.84	19	4.25
1–3 hours	31	6.94	33	7.38
4–6 hours	14	3.13	6	1.34
More than 6 hours	1	0.22	1	0.22

**Table 4.** Use of hair oil and PMGH.

Do you use hair oil		Have you had premature grey hair			
		No		Yes	
		Count	Percentage	Count	Percentage
Coconut oil	No	214	47.87	158	35.35
	Yes	43	9.62	32	7.16
Argan oil	No	242	54.14	184	41.16
	Yes	15	3.36	6	1.34
Olive oil	No	243	54.36	177	39.60
	Yes	14	3.13	13	2.91
Castor oil	No	244	54.59	186	41.61
	Yes	13	2.91	4	0.89
Cactus oil	No	254	56.82	190	42.51
	Yes	3	0.67	0	0.00
Sesame oil	No	250	55.93	187	41.83
	Yes	7	1.57	3	0.67
Multi-oils and others	No	221	49.44	162	36.24
	Yes	36	8.05	28	6.26

**Table 5.** The relationship between family history and PMGH.

History of family member		Have you had a premature grey hair			
		No		Yes	
		Count	Percentage	Count	Percentage
Grandparents	No	248	55.48	158	35.35
	Yes	9	2.01	32	7.16
Parents	No	248	55.48	158	35.35
	Yes	9	2.01	32	7.16
Siblings	No	216	48.32	113	25.28
	Yes	41	9.17	77	17.23

depends upon the melanogenesis process and its following distribution from the melanocyte to keratinocyte. The hair follicles contain two types of melanin: the black-brown pigment eumelanin present in black and brown hair, and the yellow or red pheomelanin in reddish-brown and light-colored hair [4]. The causes of greying are inadequately understood. Currently, it is mostly considered to be genetic with the interaction of various environmental agents. Premature canities might be seen alone without any underlying pathology as an autosomal dominant disease [17]. It may also happen in connection with specific diseases such as autoimmune disorders like pernicious anemia, hyper, or hypothyroidism, and as part of various premature aging, syndromes, and atopic diathesis [17].

In the present study, the age group was between 18 and 30 years, 346 (77.4%) females and 101 (22.6%) males. This age group is very concerned to their self-image and greying can lead to a great psychosocial impact. The premature canities onset cannot be compared with any other study done in Kingdom of Saudi Arabia, as this parameter has not been evaluated previously.

Furthermore, there are no studies published so far that discussed premature greying of hair in the Middle East population. This study focused on the prevalence of premature grey hair. The sex distribution of the questionnaire was not comparable. The canities is thought to have a multifactorial etiology including a genetic part, environmental agents, endocrine abnormalities, and nutritional state, and others. In Sidharth Sonthalia D study, they found that the influence of psychosocial stress stemming from PMGH at the young age may display daunting event for them, while it found no gender preference for PMGH. Thus, insufficiency of iron and vitamin B12 may have a role to play in the pathogenesis of PMGH [18]. Regarding vitamin B12 deficiency, studies show statistically significant relationship that established in nine cases, which reported IgG antibodies to anti-parietal cells that are responsible for absorption of vitamin B12, which suggestive of pernicious anemia disease [18]. In same studies, they showed that hypovitaminosis B12 and hypothyroidism presented the connection with the premature canities disorder, on another side, anemia, serum ferritin, and fasting blood glucose did

**Table 6.** The association between family history and chronic disease, skin disorder, and hair disorder.

	Have a family history of PMGH	Have a PMGH			
		No		Yes	
		Count	Percentage	Count	Percentage
History of chronic disease	No	45	10.07	46	10.29
	Yes	0	0.00	0	0.00
	I don't know	212	47.43	144	32.21
Anemia	No	253	56.60	184	41.16
	Yes	4	0.89	6	1.34
Thyroid	No	257	57.49	186	41.61
	Yes	0	0.00	4	0.89
Diabetes	No	240	53.69	167	37.36
	Yes	17	3.80	23	5.15
Asthma	No	0	0.00	0	0.00
	Yes	0	0.00	0	0.00
	I don't know	257	57.49	190	42.51
Blood Pressure	No	253	56.60	184	41.16
	Yes	4	0.89	6	1.34
Others	No	2	0.45	2	0.45
	Yes	0	0.00	0	0.00
	I don't know	255	57.05	188	42.06
Any skin disorder they suffered form	No	83	18.57	83	18.57
	Yes	19	4.25	10	2.24
	I don't know	47	10.51	49	10.96
Skin disorder	Skipped	240	53.69	177	39.60
	Dermatitis	12	2.68	6	1.34
	Alopecia areata	2	0.45	4	0.89
	Vitiligo	1	0.22	2	0.45
	Acne	1	0.22	1	0.22
	Psoriasis	1	0.22	0	0.00
Hair disorder	No	78	17.45	80	17.90
	Yes	14	3.13	13	2.91
	I don't know	59	13.20	45	10.07
	Skipped	248	55.48	182	40.72
	Hair falling	9	2.01	8	1.79

not. Thyroid disorders including thyroiditis, hypo, and hyperthyroidism have conventionally been suggested to be associated with PMGH [18]. Concerning screening for the thyroid function, there is a lack of robust data to support this recommendation. Daulatabad et al. [19] study noticed no association of any thyroid abnormality in their 52 self-reporting patients with premature canities. There were some studies that suggested that sudden canities may be caused by acute and diffuse alopecia areata. Many studies show that this form of alopecia relates to the failure of the hair follicle melanin system due to its penchant for pigmented hair [20]. In the present study, 188 (98.9%) people had PMGH but without a history of thyroid disease, while two persons (1.1%) had

PMGH and reported to have thyroid disease. Regarding vitamin supplementation, the present study showed a higher percentage of vitamins supplementation use with an association of PMGH. Vitiligo considered being an autoimmune disease identified by the destruction of melanocytes. Vitiligo has been connected with the development of canities in up to 37% of cases [21,22]. They showed a significant correlation between grey hair and tobacco for all the age groups in both genders with an overall odds ratio of 4.40 (3.24–5.96). The smoking mechanism that leads to hair greying is inadequately explained. The color of hair essentially relies on the presence or the absence of melanin pigment produced by the melanocytes [23]. On the other hand, the smoking



can be associated with making vast amounts of reactive oxygen species leading to increased oxidative stress [24]. With aging gradual thinning of a hair-scalp results in a gradual decrease in natural protection of the scalp from UV radiation, while it has been known that at least 50% of UV radiation-induced harm to the skin is attributable to the UV radiation-induced production of free radicals. The UV radiation effects on the hair have received less attention. Photochemical impairment of the hair includes degradation and loss of hair proteins as well as degradation of hair pigment. The responsibility of UVB radiation is hair protein loss, and UVA radiation is hair color change [25].

Regarding oil use, the present study showed that 91 (47.9%) with PMGH did not use hair oil and 138 (53.7%) did not use hair oil and did not have PMGH. Coconut oil and multi-oils are considered having a high percentage of use. Moreover, no research has been done regarding oil use and PMGH. In case of Henna use, Sidharth Sonthalia D study reported that the duration of people who seek medical help for premature grey hair take a long time which range from 3 months to 14 years. A majority of the patients started using henna to cover the gray hair [18].

## Conclusion

The hair color plays a significant role in people appearance and self-perception. In this study, PMGH represented in 190 (42.5%) individuals. The present study reveals that PMHG is a common trichological issue. Most frequent associations that were observed in the study included thyroid, deficiency of vitamins, alopecia areata, vitiligo, smoking, UV radiation, and personal habits like using of a hair dryer, hair straightener, hair gel, and hair conditioner. It was also found that family history has a relation with premature gray hair.

## List of Abbreviations

PMGH	Premature greying of hair
UV radiation	Ultraviolet radiation

## Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

## Funding

None.

## Consent for publication

Informed consent was obtained from all participants.

## Ethical approval

Ethical clearance was taken from the ethical committee of the College of Medicine, King Faisal University.

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