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## Case report on premature hair graying treated with Melitane 5% and oral hair supplements

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### Abstract

With chronological aging, hair turns gray. Untimely premature hair graying (PHG) may tremendously influence on cosmesis, self-credibility, and social life of the affected individuals. Consequently, early treatment is required to improve cosmetic appearance. To the best of our knowledge, until today, only one case of PHG is reported in the literature, and it occurred due to iron deficiency and successfully treated with ferrous sulfate. Herein, we delineate a case of PHG in a 14-year-old female treated with the topical formulation of Melitane 5% and oral hair supplements which resulted in boosting improvement in hair color.

**Keywords:** Melitane, oral hair supplements, premature hair graying

### Introduction

Graying of hair is defined as a physiological process of chronological aging without any gender or race bias. Biologically, the gradual destruction of melanin pigment-generating cells called “melanocytes” seems to be correlated with gray hair processing. Premature hair graying (PHG) also called premature canities or achromotrichia described by the onset of the hair graying before the age of 20 in Whites, 25 in Asians and 30 in Africans. However, till today, the exact etiology of PHG is still unclear and much speculative; therefore, it is a usual cause of referral to dermatologists. PHG perhaps appears alone as an autosomal prevailing characteristic or once in a while connected with different autoimmune disorders involving hypothyroidism, pernicious anemia, and premature aging syndromes such as Werner's syndrome. Furthermore, in the pathogenesis of PHG, the role of environmental determinants such as climate, ultraviolet radiation, smoking habit, some medications, trace elements, and nutritional scarcities have been postulated, too. It has also been hypothesized that trace element insufficiencies involving iron, copper, Vitamin B12, Vitamin D3, and calcium have been proved to influence hair growth and pigmentation and therefore may be also associated with PHG. PHG is frequently seen as an indication of old age and loss of

health and vigor. As a result, affected individuals are often subjected to social stigma, discrimination, and difficulties in marriage; hence, its early treatment is crucial from a cosmetic point of view. In spite of the advance molecular exploration being done to comprehend the pathogenesis of graying, treatment alternative still stays away from satisfactory and the efficient remedy is not procurable.[1] To the best of our knowledge, until today, only one case of PHG is reported in the literature, and it occurred due to iron deficiency and successfully treated with ferrous sulfate.[2] Herein, we report a case of PHG treated with topical formulation of Melitane 5% and oral hair supplements which resulted in promising improvement in hair color.

## Case Report

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A 14-year-old female presented with a history of graying of hair on her scalp since childhood. On physical examination, a higher portion of gray hair mingle with natural black-coloured hair was found on the scalp. Graying of hair started at the frontal and parietal region, and gradually, it extended to the temporal and occipital region of the scalp [Figure 1]. Her family history of PHG was noncontributory. Besides, a history of autoimmune diseases such as alopecia areata, vitiligo, autoimmune thyroid disorder, pernicious anemia, and any associated rare premature syndrome demonstrating PHG was absent. Routine laboratory parameters were within standard limits, and notably, serum calcium, serum iron, serum ferritin, serum zinc, serum copper, Vitamin C, Vitamin D3, Vitamin B12, and other thyroid function tests were within the normal range. On the basis of all laboratory findings, the exact etiology of PHG could not be found; the author's thought to be genetic etiology was the mainstay for the occurrence of PHG in our case. The topical formulation of 5% Melitane aqua gel was prescribed for once daily on the scalp. The patient was instructed to use it. Firstly, wash the scalp with a mild shampoo and then pour the gel directly onto the affected part of the scalp with two fingers, around 2 g daily, and massage the scalp to ensure that the gel is evenly spread. Then allowed the gel to absorb within 30 min, finally no rinsing was required. Then, allowed the gel to absorb within 30 min, finally, no rinsing was required. Tablets of oral hair supplements containing a combination of biotin, calcium pantothenate, element copper, element manganese, element selenium, element zinc, folic acid, and N-acetyl cysteine was also prescribed for 24 months. After 6 months, the patient was showing the improvement. At about 24-month duration, treatment was stopped at that time the patient achieved >95% conversion of gray hair to black hair [Figure 2]. The patient did not develop any reoccurrence after 6 months of stopping treatment.

## Discussion

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Fatemi Naieni *et al.*[1] researched the association between iron, zinc, copper serum concentrations, and premature canities, and the findings revealed that a low serum copper concentration might play a prominent role in PHG in our community. Apart from these, low iron concentration is further a crucial factor for PHG, and zinc level did not seem to be an effect on PHG. Bhat *et al.*[3] stated that the level of serum calcium, serum ferritin, and Vitamin D3 was decreased in PHG patients and might be playing a role in PHG in our society. As per the published report by Sonthalia *et al.*,[4] heredity, Vitamin B12 insufficiency, and hypothyroidism are a crucial factor associated with PHG. In the present case, we have taken into account all these parameters to recognize the exact pathogenesis for PHG, significant results argued the role of these parameters in this case, and the author believed that genetic etiology might be a crucial factor in the presented case.

Goodier and Hordinsky[5] hypothesized that genetic elements have a major effect on the hair follicle stem cells and melanocytes. Telomere shortening, reduction in cell counts, and sparse transcription factors have all been involved in the aging process. In turn, these molecular remodelings result in structural alterations of the hair fiber, reduced melanin generation, and expanding of the telogen phase of the hair cycle. At the molecular level, various genes and signaling pathways that influence hair pigmentation are being studied. Han *et al.*[6] postulated receptors for bone morphogenetic protein and activins that are Bmpr2 and Acvr2a are known to influence hair pigmentation and their reduced activity can cause early graying in preclinical

studies. Schouwey *et al.*[7] deliberated that Notch 1 and Notch 2 signaling pathways play a predominant role in the upkeep of hair pigmentation. Hachiya *et al.*[8] contemplated that stem cell factor (SCF) is a cytokine involved in many physiological processes such as hematopoiesis. Recently, SCF and its receptor (kit) are determined to have a role in melanogenesis during anagen phase.

However, various treatment strategies are available, and only a few treatment options are satisfactory; hence, the treatment of PHG is still challenging. The treatment for PHG should be directed to address the cause. Vitamin B12 deficiency and hypothyroidism are reversed with vitamin and hormone replacement, respectively. Iron deficiency is reversed by ferrous sulfate which was reported in a case report by Choi *et al.* Although various vitamins and minerals such as biotin, calcium pantothenate, zinc, copper, and selenium are being prescribed, the results have not been promising. Green tea extract, selenium, copper, phytoestrogens, and melatonin are being studied as attractive topical antiaging compounds. Various topical preparations containing phytic acid, amino acids, peptides, acetyl hexapeptide-1, Melitane, Capixyl, pea proteins, etc., are already available in the market. Currently, for therapeutic and cosmetic alteration of hair, topical liposome-targeting melanins, genes, and proteins selective to hair follicles are the modern era of research.[1] Recently, the research is still going on to find ideal treatment, yet no definite treatment option is concluded. Here, in our case, we treat the patient with a topical formulation of Melitane 5% and oral hair supplements, and the patient felt a satisfactory improvement in hair color. Further research should be done with more number of patients to conclude more beneficial justification. Melitane™ is a newer molecule for PHG and originally agonist of  $\alpha$ -melanocyte-stimulating hormone ( $\alpha$ -MSH) biomimetic peptide. It acts through melanocortin 1 receptor; the process of melanogenesis (the production and release of melanin by melanocytes in skin and hair) is stimulated by  $\alpha$ -MSH.[9] Besides, it has a defensive action on DNA damage provoked by ultraviolet A or B radiations and lessens the number of sunburn cells attesting a DNA repair action, for maximal antiaging benefits. Melitane™ also restricts the expression of biochemical inflammation mediators and contributes a significant protection against UV-induced erythema, reducing skin redness as utilized for a healthy glow and skin protection. The use of 0.5%–5% topical Melitane™ for 4–6 months is being promoted to stimulate hair pigmentation and reverse hair graying and mainly recommended for premature canities between 8 and 25 years of age only.[10] However, published evidence is lacking and needs to be generated in randomized placebo-controlled trials. Nowadays, there are a few industries which are used Melitane™ as an active ingredient including Lucas Meyer Cosmetics,[10] Alembic Pharmaceuticals,[11] and Redenhair.[12] Altris 5 solutions and Altris gel are two main Melitane™-containing products manufactured by Alembic Pharmaceuticals, India.[11] Anti-gray lotion, manufactured by Redenhair, the worldwide specialist in hair health, used Melitane™ as one of the active ingredients in the lotion, and they carried out three studies to evaluate the clinical effectiveness of Melitane™. The findings suggested that it decreases the number of poorly pigmented and nonpigmented cells and raises the amount of moderate and profoundly pigmented cells in the hair bulb, reversing the process of gray hair formation. Another study demonstrates the transfer properties of Melitane™, and the results revealed that it induces the formation of dendrites facilitating the transfer of melanosomes (melanin) in the skin. At the last study, it could be verified that Melitane™ stimulates pigmentation and melanin pigment, a natural protection factor under UV radiation.[12] Irritation and itching of the scalp are main side effects associated with it and contraindicated in case of hypersensitivity toward the drug Melitane™ or any other allergies.[10] It is not a Food and Drug Administration-approved drug. However, the treatment of Melitane and oral hair supplements is very costly; expecting nearly 2000 rupees/month, no other therapy is as effective. Due to its effectiveness in PHG and simple to utilize, it will become the favored alternative for the physician, for the patient who can afford its cost.

Our concern was to guide the clinician to deal with PHG, and patients get early treatment without compromising social life. As per our suggestion, certain investigations such as serum iron, copper, Vitamin B12, Vitamin D3, calcium, and thyroid profile may be conducted in individuals, with very early onset in the absence of any family history, and these findings will guide clinicians to choose an effective treatment option for PHG as it is associated with cause.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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## Figures and Tables

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**Figure 1**



A lot of gray hairs admixed with normal colored hairs on the scalp

**Figure 2**

After 24 months of Melitane and oral hair supplement treatment, hair color recovered perfectly normal black color without graying hairs

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