ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 08 | August - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

UNDERSTANDING PREMATURE HAIR GRAYING: AN INVESTIGATIVE APPROACH

Dermatology

Dr. Prabhat Kumar MBBS, MD (DVL), Head of Department, Department of Dermatology, Venereology and Leprosy, Rajendra Institute of Medical Sciences Ranchi Jharkhand India 834009

Dr. Raksha Rani* MBBS, Junior Resident, Department of Dermatology, Venereology and Leprosy, Rajendra Institute of Medical Sciences Ranchi Jharkhand India 834009 *Corresponding Author

Dr. Vejeta Rani MBBS, MD (DVL), Senior Resident, Deaprtment of Dermatology, Venereology and Leprosy,Rajendra Institute of Medical Sciences Ranchi Jharkhand India 834009

ABSTRACT

Background: Premature canities, or early-onset hair graying, is often viewed as cosmetic, but emerging evidence links it to systemic, nutritional, and endocrine factors. Limited data exist from Asian populations. **Objectives:** To assess the role of nutritional deficiencies and thyroid dysfunction in premature canities and identify associated demographic and lifestyle factors. **Methods:** This cross-sectional study included 45 individuals under 30 years with premature graying. Clinical histories and investigations—CBC, serum ferritin, thyroid profile, vitamin D3, and B12 levels—were performed. **Results:** Among participants, 62.2% had low vitamin D3, 48.9% had low B12, and 44.4% had both deficiencies. Anemia was seen in 17.8%, low ferritin in 15.6%, and thyroid dysfunction in 11.1%. Females and vegetarians were more commonly affected, particularly in the 20–25 age group. **Conclusion:** Nutritional deficiencies, especially in vitamin D3 and B12, are strongly associated with premature canities. Early identification and correction may offer therapeutic value. Broader studies are needed to validate these findings.

KEYWORDS

INTRODUCTION

Premature graying is a gradually progressive loss of hair pigment that takes place at an abnormally early age, significantly earlier than the typical age-related graying process. Premature graying of hair is defined as occurring before the age of 20 in Caucasians, before 25 in Asians, and before 30 in individuals of African descent [1]. A large population-based study found that between 6% and 23% of individuals have 50% gray hair by the age of 50.No specific cutoff range has been recommended for the Indian population [2].

Although often regarded as a cosmetic concern, premature canities (early-onset graying of hair) may reflect underlying systemic, nutritional, genetic, or lifestyle-related factors. The increasing incidence of premature graying, especially among younger individuals in urban environments, highlights the urgent need to explore its prevalence, clinical patterns, and potential etiological associations.

Vitamin B12 plays a role in stabilizing the early anagen phase of the hair follicle, promoting pigmentation[3]. Low levels of vitamin D3 impair calcium-dependent processes involved in melanogenesis. Iron is utilized by metalloenzymes that play a role in the process of melanin synthesis[4]. Premature canities has traditionally been associated with thyroid disorders, including hypothyroidism, hyperthyroidism, and thyroiditis[5].

While premature canities is primarily diagnosed clinically, investigations such as complete hemogram, serum ferritin, thyroid profile, and vitamin D3 and B12 levels are essential for identifying underlying causes and nutritional deficiencies, particularly in younger patients or cases with rapid progression. Understanding these factors is vital for establishing early diagnostic markers and preventive strategies, ultimately improving quality of life and guiding personalized healthcare interventions.

MATERIALS AND METHODS

This observational cross-sectional study was conducted over a period of three months in the Dermatology outpatient department at RIMS to investigate the role of nutritional deficiencies, thyroid dysfunction, and other systemic factors in the onset of premature canities. The study included individuals under 30 years of age presenting with early graying of hair, who provided informed consent. Patients with known genetic disorders causing early graying (e.g., Vitiligo), chronic dermatological conditions such as Eczema, Psoriasis, or Acne, significant psychological disorders, or those with recent use (within 3 months) of vitamin B12 or mineral supplements were excluded. Additionally, individuals who declined to participate were not included. Demographic, genetic, and lifestyle factors associated with premature graying were also evaluated as secondary objectives.

Study Procedure

Individuals presenting with premature canities were enrolled for this observational study. A detailed history was obtained for each participant, including information on medication taken within the past three months, associated comorbidities, addiction history, dietary habits, lifestyle factors, family history of premature graying, as well as the duration and onset of hair graying. Each participant underwent a comprehensive laboratory evaluation, which included complete blood count (CBC), serum ferritin, thyroid function tests, serum vitamin D3, and serum vitamin B12 levels. All clinical history and investigation findings were systematically documented using a pre-structured proforma.

The collected data were compiled and analyzed to identify trends and determine the prevalence of nutritional deficiencies or systemic abnormalities within the study group, which comprised 45 patients with premature canities (aged below 30 years). In this study, vitamin D status was categorized as sufficient (>30 ng/mL), insufficient (12–30 ng/mL), or deficient (<12 ng/mL)[6]. Vitamin B12 levels were considered deficient if <200 pg/mL, and borderline if between 200–300 pg/mL[7]. Normal serum ferritin levels were defined as 12–300 ng/mL for males and 12–150 ng/mL for females[8]. Thyroid function was considered normal with T4 levels between 77–155 nmol/L, T3 levels between 1.2–2.8 nmol/L, and TSH values ranging from 0.3–4 mU/L[9]. Hemoglobin levels were regarded as normal at 13.5–17.5 g/dL for males and 12.0–16.0 g/dL for females. Additionally, WBC counts within 4,500–11,000/mm³ and platelet counts between 150,000–400,000/mm³ were considered within normal limits[10].

RESULT

Out of the 45 participants included in the study, 28 individuals (62.2%) were found to have deficient serum vitamin D3 levels, while 22 participants (48.9%) demonstrated vitamin B12 deficiency. Notably, 20 individuals (44.4%) exhibited concurrent deficiencies of both vitamin D3 and B12. Hemoglobin levels were below the normal range in 8 participants (17.8%), and low serum ferritin was observed in 7 participants (15.6%). Additionally, thyroid function abnormalities were detected in 5 participants (11.1%) (Table 1, Figure 1). These results indicate a high prevalence of nutritional deficiencies in individuals with premature canities, with vitamin D3 and B12 being the most frequently affected parameters. The presence of thyroid dysfunction in a subset of cases underscores the importance of comprehensive systemic evaluation.

Table- 1 Deficient Parameters Observed in Individuals with Premature Canities

Condition	Number of individuals	Percentage(%)

low vitamin D3	28	62.22
low vitamin B12	22	48.89
low vitamin D3 & B12 (both)	20	44.44
low hemoglobin	8	17.78
low serum ferritin	7	15.56
deranged thyroid profile	5	11.11

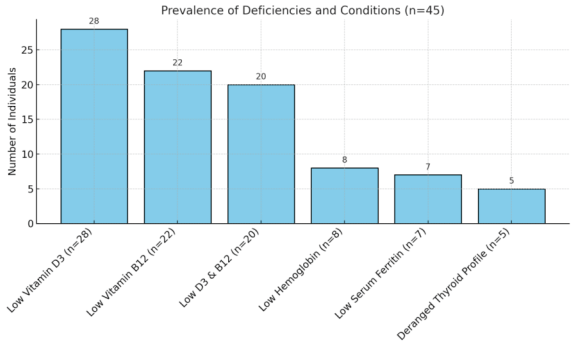

Figure-1. Distribution of Deficient Laboratory Parameters in Premature Canities Cases

The most affected age group was 20–25 years (Table 2). A higher prevalence of premature canities was observed among females (60%) compared to males (40%) (Table 3). Furthermore, a greater proportion of affected individuals followed a vegetarian diet (66.7%) compared to those with a non-vegetarian diet (33.3%) (Table 4).

Table- 2. Distribution of Individuals Affected Across Different Groups, with the 20-25 Years Age Group Being the Most Commonly Affected.

Age group	Total individuals	Male	Female
<20	14	6	8
20-25	16	6	10
26-30	15	6	9
Total	45	18	27

Table- 3. Gender Differences in the Occurrence of Premature Canities.

Gender	Number of individuals	Percentage(%)
Male	18	40
Female	27	60
Total	45	100

Table- 4. Dietary Preference Among Individuals with Premature Canities.

Dietary preference (DP)	DP in Number	DP in Percentage(%)
Vegetarian	30	66.7
Non- vegetarian	15	33.3
Total	45	100

DISCUSSION

Premature canities, or early-onset graying of hair, is increasingly seen in individuals under 30 and may signal more than a cosmetic issue. This cross-sectional study of 45 participants highlights possible underlying metabolic or systemic factors contributing to early graying. The most affected age group was 20–25 years, suggesting this period may be particularly susceptible to environmental, nutritional, and physiological stressors impacting melanogenesis.

A higher prevalence among females was noted, potentially linked to hormonal influences, menstrual iron loss, or lifestyle factors such as diet. Most affected individuals followed a vegetarian diet, which may contribute to vitamin B12 deficiency due to limited animal-source intake. In our study, 48.89% had low B12 levels, and 62.22% had low vitamin D3, with 44.44% showing deficiencies in both. These nutrients are crucial for hair follicle function and melanin production, influencing follicular growth and melanocyte activity.

Other findings included low hemoglobin (17.78%), low ferritin (15.56%), and abnormal thyroid function (11.11%). As iron and thyroid hormones play roles in melanin synthesis and melanocyte regulation, their deficiencies may also contribute to graying.

These results support the importance of screening for nutritional and endocrine imbalances—particularly vitamin B12, D3, iron stores, and thyroid profile—in young individuals with premature graying. While reversal of canities is uncertain, early intervention through targeted supplementation may slow progression and improve overall health.

CONCLUSIONS

This three-month observational cross-sectional study of 45 individuals under 30 highlights that premature canities may signal underlying nutritional or endocrine imbalances, rather than being purely cosmetic. Most affected were females aged 20–25 years, often with vegetarian diets.

Common abnormalities included low vitamin D3 (62.22%), vitamin B12 deficiency (48.89%), iron deficiency, and thyroid dysfunction. These findings underscore the need for early clinical evaluation and biochemical screening. Recognizing premature graying as a potential early marker of systemic issues may guide timely interventions and improve overall health outcomes.

LIMITATION

This study is limited by its small sample size (n=45) and short duration (3 months), which may affect the generalizability and prevent assessment of long-term outcomes. The cross-sectional design restricts causal inference between premature graying and biochemical abnormalities. Dietary data were self-reported, introducing potential bias, and key factors such as genetics and psychological stress were not evaluated. Future longitudinal, multicentric studies are needed to establish causality and assess the impact of corrective interventions.

REFERENCES

1. Majid I, Mubashir S. Canities and pigment anomalies of hair. In: Chandrashekhar BS, editor-in-chief; Madura C, associate editor. *IADVL Textbook of Trichology*. 1st ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2018. p. 350.
2. Pandhi D, Daulatabad D. Premature greying. In: Sacchidanand S, editor-in-chief. IADVL Textbook of Dermatology. 5th ed. Mumbai: Bhalani Publishing House; 2022. p. 1804.
3. Bhat RM, Sharma R, Pinto AC, Dandekeri S, Martis J. Epidemiological and investigative study of premature graying of hair in higher secondary and pre-university school children. Int J Trichology. 2013;5(1):17–21.
4. © 2024 The Author(s). International Journal of Dermatology published by Wiley Periodicals LLC on behalf of the International Society of Dermatology. Int J Dermatol. 2025;64:819–829.
5. Almutairi RT, Dhafiri MA. Premature greying of hair among the population of King Faisal University in Al-Ahasa, Saudi Arabia: an epidemiological study. Int J Med Dev Ctries. 2019;3(6):542–548. doi:10.24911/IJMDC.51-1549226311
6. Kaur J, Khare S, Sizar O, Munakomi S. Vitamin D Deficiency [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan– [updated 2025 Feb 15; cited 2025 Jun 23]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK532266/
7. Ankar A, Kumar A. Vitamin B12 Deficiency [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan– [updated 2024 Sep 10; cited 2025 Jun 23]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441923/
8. Al-Jafar HA. Treatment of serum ferritin deficiency regardless of haemoglobin level. Blood. 2012 Nov 16;120(21):5166. Available from: http://doi.org/10.1182/blood.V120.21.5166.5166
9. Kinjo Y, Takasu N, Komiya I, Tomoyose T, Takara M, Kouki T, Shimajiri Y, Yabiku K, Yoshimura H. Remission of Graves' hyperthyroidism and A/G polymorphism at position 49 in exon 1 of cytotoxic T lymphocyte-associated molecule-4 gene. J Clin Endocrinol Metab. 2002 Jun;87(6):2593-6. doi: 10.1210/jcem.87.6.8612. PMID: 12050220
10. Dean L. Blood Groups and Red Cell Antigens [Internet]. Bethesda (MD): National Center for Biotechnology Information (US); 2005. Table 1, Complete blood count [cited 2025 Jun 23]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK2263/table/ch1.T1/