International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

Serum Vitamin B12 Levels and Premature Hair Graying: A Hospital Based Study

Dr. Nidhi Sharma, Dr. Devraj Dogra, Dr. Mashkoor Ahmed Wani

Govt. SMGS Hospital, Jammu, India

Abstract: ***Background: Premature graying of hair can lead to immense psychological distress in young children and adolescents. Its exact etiology is not fully elucidated but genetic, environmental and nutritional factors have been implicated. Materials and Methods: This was a case control study conducted in a tertiary care hospital in North India in which 60 patients with premature hair graying and equal number of age and sex matched controls were included and serum Vitamin B12 levels were measured in both cases and controls. Results: Serum Vitamin B12 levels were significantly lower in patients of premature canities as compared to control population. However there was no statistically significant correlation between the levels of Vitamin B12 and grades of graying. Conclusion: The results of this study further strengthen the role of vitamin B12 in premature canities, however further studies with larger sample size are required to definitely delineate its role in premature hair graying.***

Keywords: Premature hair graying, premature canities, Vitamin B12

1. Introduction

Premature graying of hair (PHG) or premature canities ia a term used when graying occurs before the age of 20 in Whites, 25 in Asians & 30 in Africans **(Chakrabarty *et al,* 2016)**. Average age of onset in Caucasians is 34 ± 9.6 years, & in Negroes, it is 43.9 ± 10.3 years. Graying of hair appears between 30 and 34 years in Japnese men & between 35 and 39 years in Japnese women **(Dawber RP *et al,* 1997)**.

Premature graying of hair is considered analogous to aging and thought to reflect the aging process happening inside. Graying is more readily apparent and noticed earlier in those with dark hair, but fair haired individuals appear totally gray earlier **(Mosher DB *et al,* 1999)**. Both sexes are equally affected **(Westerhof W *et al,* 1998)**.% of the population have at least 50% gray hair known as the 50/50/50 rule of thumb **(Keogh EV *et al,* 1965)**.

Exact etiology of premature graying is not known but various genetic and acquired factors are implicated. Various nutritional deficiencies have been found to be associated with premature graying (**Dawber RP *et al,* 1997**). Reversible hair graying is documented in Vitamin B12 deficiency (**Noppakun N *et al,* 1986**). In this study we aimed to study vitamin B12 level in patients of premature graying and and to find any correlation between vitamin B12 levels and severity of graying.

2. Materials and Methods

The present study was conducted in the Post Graduate Department of Dermatology, Venereology & Leprology, Government Medical College, Jammu, in SMGS Hospital from November 2016 to October 2017 after obtaining approval from Institutional ethical committee.

This was a hospital based case control study in which patients reporting to the Department of Dermatology were evaluated for entry into the study. A written informed consent was taken from the patients and in case of minors, consent for undergoing investigations was obtained from first degree relative.

In this study, premature graying of hair was defined as more than 5 gray hair in the scalp in patients less than 25 years of age. Control group comprised of age and sex matched patients and attendants attending the Department for disease other than premature graying of hair.

Inclusion criteria:

1) Clinically diagnosed patients of premature graying of hair
2) Age less than 25 years

Exclusion criteria

1) Patients with graying of hair as a part of other conditions such as vitiligo, cutaneous disease involving scalp
2) Pregnant or lactating women

The diagnosis of premature graying of hair was made clinically and was graded into 4 groups as:

a) No gray hair
b) Mild: less than 10 gray hair
c) Moderate: 10-100 gray hair
d) Severe: more than 100 gray hair
(Shin *et al,* 2015)

After taking informed consent, Serum Vitamin B12 was measured in both cases & controls after 12 hours of overnight fasting

3. Statistical Analysis

Appropriate statistical techniques were applied to study Vitamin B12 levels in patients with premature graying of hair and to compare them with control population. The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and was analyzed using computer software Microsoft Excel and SPSS version 21.0 for Windows. Data reported as mean ± standard deviation and

proportions as deemed appropriate for quantitative and qualitative variables respectively. The statistical difference in mean value between two groups was tested using unpaired 't' test. The qualitative data was compared using Fisher's exact test. A p-value of less than 0.05 was considered as statistically significant. All p-values reported were two tailed.

4. Results

A total of 60 patients with premature graying and equal number of age and sex matched controls were enrolled in the study. In cases, more patients had low serum vitamin B12 (63.33%) as compared to those in controls (15%). The difference between the two groups was statistically highly significant (p<0.0001). Also the mean value of serum vitamin B12 in cases was less as compared to that of controls, the difference being statistically highly significant (p<0.0001).

Table 1: Distribution of patients according to serum vitamin B12 levels in cases and controls

Serum vitamin B12 (pg/mL)	Cases (n=60)		Controls (n=60)		Statistical inference (Fisher's exact test)
	No.	%	No.	%	
<200 (low)	38	63.33	9	15.0	p<0.0001; Highly significant
≥200 (normal)	22	36.66	51	85.00	
Total	60	100.00	60	100.00	
Mean serum vitamin B12 ± Standard deviation (pg/mL)	202.85 ± 112.46		258.88 ± 87.68		
Statistical inference (unpaired t test)	t=4.30; p<0.0001; Highly significant				

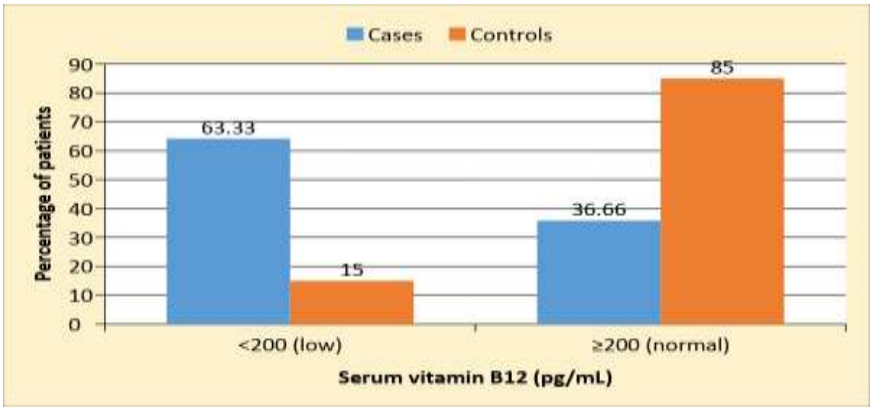

Figure: Bar chart showing distribution of patients according to serum vitamin B12 levels in cases and controls

Table 2: Distribution of patients according to grading of premature graying of hair

Grading	Cases (n=60)	
	No.	%
Mild	17	28.33
Moderate	20	33.33
Severe	23	38.34
Total	60	100.00

In cases, premature graying of hair was severe in 38.34% patients, moderate in 33.33% and mild in 28.33% patients. On comparing the Serum levels of Vitamin B12 with grade of graying, the patients with moderate and severe grade of graying had lower serum levels of Vitamin B12 as compared to patients with mild graying. However this difference was statistically not significant (p=0.31)

5. Discussion

The cells of hair follicles are considered to be rapidly dividing cells. Proliferation of these cells depends on synthesis of DNA, which is further dependent on sufficient supply of vitamin B12 **(Volkov I *et al*, 2006)**. Vitamin B12 also facilitates stabilization of the initial anagen phase of hair follicle **(Krugluger W *et al*, 2011)**. Thus, deficiency of iron and/or Vitamin B12 may have a role to play in the pathogenesis of premature hair graying. A case of reversible generalized hyperpigmentation of the skin and nails with reversible premature gray hair due to pernicious anemia-associated Vitamin B12 deficiency has also been reported **(Noppakun N *et al*, 1986)**.

In our study, more patients with premature graying had low serum vitamin B12 (63.37%) as compared to control population (15%). The difference between the two groups was statistically highly significant. These results are in accordance with study conducted by **Chakrabarty *et al* (2016)** in which serum vitamin B12 levels were significantly lower in patients of premature hair graying compared to controls (p<0.001). However, no correlation of was found between the levels of Vitamin B12 and grade of graying was foundin this study. Similar results were reported by **Bhat *et al* (2013)** who found no correlation with levels of Vitamin B12 and grade of graying. However contradictory results have been reported by **Sonthalia *et al* (2017)** , who found a correlation of PHG with low Vitamin B12 levels. However, there was no control group in their study.

6. Conclusion

The present study reveals that significantly lower serum Vitamin B12 levels are seen in patients with premature canities. This suggests that Vitamin B12 deficiency may be one of the acquired factors in etiopathogenesis or aggravation of premature graying of hair and may serve as future therapeutic target for treatment of premature canities. Further follow up studies to evaluate the effects of Vitamin B12 supplements in improving canities are required.

References

[1] 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;5:17–21. [PMCID: PMC3746220] [PubMed: 23960391]
[2] Chakrabarty S, Krishnappa PG, Gowda DG, Hiremath J. Factors associated with premature hair graying in a young Indian population. Int J Trichol 2016;8:11-4
[3] Dawber RP, Gummer CL. The colour of the hair. In: Dawber R editor. Diseases of the hair and scalp. 3rd ed. Oxford: Blackwell Science; 1997.p. 397-416.
[4] Keogh EV, Walsh RJ. Rate of greying of human hair. Nature 1965;207:877-8.
[5] Krugluger W, Stiefsohn K, Laciak K. Vit B12 activates wnt-pathway in human hair follicle by induction of beta catenin and inhibition of glycogen synthase kinase 3 transcription. J Cosmet Dermatol Sci Appl.2011;1:25-9.
[6] Mosher DB, Fitzpatrick TB, Ortonne JP, Hori Y. Hypomelanoses and hypermelanosis. Disorders of melanocytes. In: Freedmerg IM, Eisen AZ, Katz SI, Wolff K, Goldsmith LA, Austen KF, et al. editors. Fitzpatrick's Dermatology in General Medicine. 5th ed. New York: McGraw Hill; 1999.p. 945-1017.
[7] Noppakun N et al. Arch Dermatol. 1986 Aug;122(8):896-9.
[8] Shin H, Ryu HH, Yoon J, Jo S, Jang S, Choi M, *et al.* Association of premature hair graying with family history, smoking, and obesity: A cross-sectional study. J Am Acad Dermatol 2015;72:321-7.
[9] Sonthalia S, Priya A, Tobin DJ. Demographic characteristics and association of serum Vitamin B12, ferritin and thyroid function with premature canities in Indian patients from an urban skin clinic of North India: A retrospective analysis of 71 cases. Indian J Dermatol 2017;62:304-8
[10] Volkov I, Press Y, Rudoy I. Vitamin B12 could be a 'master key' in the regulation of multiple pathological processes. J Nippon Med Sch.2006;73:65-69.
[11] Westerhof W, Njoo D, Menke KE. Miscellaneous hypomelanoses: Disorders characterized by extracutaneous loss of pigmentation. In: Nordlund JJ, Biossy RE, Hearing VJ, King RA, Ortonne JP. editors. The Pigmentary System: Physiology and Pathophysiology. New York: Oxford University Press; 1998.p. 690-705.