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To Demonstrate the Role of Iron, Vitamin B12, and Vitamin D in Young Females with Chronic Telogen Effluvium Attending the Tertiary Care Centre of Jharkhand

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Abstract: ***Introduction**: Many females nowadays present with complaints of diffuse hair loss (DHL) at a relatively younger age. The causes of acquired diffuse non - cicatricial hair loss are diverse, including telogen effluvium (TE), diffuse female pattern hair loss, anagen effluvium, diffuse alopecia areata, etc. The actual prevalence rate of Telogen Effluvium is not reported since most of the cases are subclinical in nature. Deficiency of vitamins and minerals is considered to be associated with telogen effluvium. Therefore, this study was conducted to determine if an inadequate level of ferritin, vitamin D, or vitamin B12 is significantly related to chronic telogen effluvium. **Aims and Objectives**: Evaluation of serum ferritin, vitamin D, and vitamin B12 levels in females with chronic telogen effluvium (TE) to establish their role. **Materials and Methods**: This was a cross - sectional study conducted on 100 females who met the inclusion and exclusion criteria and presented with chronic telogen effluvium (CTE). The diagnosis of CTE was made clinically. Investigations done: Blood samples were sent for estimation of serum ferritin, vitamin D, and vitamin B12 levels. RESULT: My study included 100 females with chronic telogen effluvium. The mean ferritin level was 13.59 ng/dL.65% of patients had serum ferritin levels lower than the normal range (14 - 150 ng/dL). Vitamin D levels (deficiency <20 ng /ml) were low in 98% of the patients. Vitamin B12 levels (normal range 191 - 663 pg/ml, mean 239.79 pg/ml) were low in 36% of patients (p value 0.802). **Conclusion**: The study found low levels of serum ferritin and vitamin D in approximately two - thirds of the females with chronic telogen effluvium, and vitamin B12 deficiency was found in only one - third of patients.*

Keywords: Chronic Telogen Effluvium, Alopecia, Vitamin B12, Vitamin D, and Serum Iron

1. Introduction

Many females nowadays present with complaints of diffuse hair loss (DHL) at a relatively younger age. The causes of acquired diffuse non - cicatricial hair loss are diverse, including telogen effluvium (TE), diffuse female pattern hair loss, anagen effluvium, diffuse alopecia areata, etc. The actual prevalence rate of Telogen Effluvium is not reported since most of the cases are subclinical in nature. [1] Hair loss or alopecia of the scalp is not a serious, life - threatening disorder, but it can cause tremendous psychological distress and adversely affect quality of life. In telogen effluvium, there is an increase in the shedding of telogen club hairs due to premature termination of the anagen phase of the hair cycle. Chronic telogen effluvium is diagnosed by excluding other causes of chronic telogen hair loss. Although deficiency of vitamins and minerals is considered to be associated with telogen effluvium. There is a paucity of studies analyzing these parameters in order to establish a definite correlation. [2] Therefore, I conducted this study to determine if an inadequate level of ferritin, vitamin D, or vitamin B12 is significantly related to chronic telogen effluvium.

Aims and Objectives

Evaluation of serum ferritin, vitamin D, and vitamin B12 levels in females with chronic telogen effluvium (TE) in order to establish their role.

2. Materials and Methods

This was a cross - sectional study conducted on 100 females presenting with chronic telogen effluvium (CTE) to the Outpatient Department of Skin and Venereal Diseases at a tertiary care hospital during May 2023 to October 2023. Participants were enrolled after Institutional Ethics Committee approval and written informed consent.

Inclusion Criteria

1) Women in the age group 15 to 35 years
2) Patients who are willing to give consent.

Exclusion Criteria

1) Patients having any medical and autoimmune disorders.
2) Pregnant, lactating, and menopausal females
3) Any obvious exacerbating events (physical /psychological stress, febrile illness, chemical applications, and cosmetic hair procedures), if present, were excluded.

The diagnosis of CTE was made clinically. Investigations done: Blood samples were sent for estimation of serum ferritin, vitamin D, and vitamin B12 levels

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) version 25: 0. Qualitative data variables were expressed as frequency and percentage. Fisher's exact test was used to find the association of serum ferritin, vitamin D, and vitamin B12 levels with chronic telogen effluvium and correlate it with parameters such as age, family history, and history of previous treatment. p - value <0.05 was considered significant.

3. Result

My study included 100 females with chronic telogen effluvium aged between 15 - 35 yrs (mean age 26.41 years). Of these, 78% of patients were below 30 years, with the majority between 25 to 30 years.45% of the total participants had taken some oral or topical treatment within last 6 months.

Table 1: Frequency of subjects in different small age groups

Age (years)	Number of subjects (%)
15 - 19	11
20 - 24	29
25 - 29	38
30 - 35	22

Mean ferritin level was 13.59 ng/dL.65% patients had serum ferritin levels lower than the normal range (14 - 150 ng/dL).67% in age group below 30 years and 54% in age group above 30 years had low serum ferritin with p value of 0.037.

Table 2: Broader age group with frequency according to normal and low value of S. ferritin

Serum Ferritin levels	Age Group		Total	P value
	<30yrs	>30yrs		
Normal	25	10	35	0.037
Low	53	12	65	
	78	22	100	

Table 3: Broader age group with frequency according to normal and low value of S. Vitamin D

Serum Vitamin D12 levels	Age Group		Total	P value
	<30yrs	>30yrs		
Normal	2	0	2	0.017
Low	76	22	98	
	78	22	100	

Vitamin D levels (deficiency <20 ng /ml) were low in 98% of the patients, 97% of females younger than 30 years were in the low range (p value 0.017).

Vitamin B12 levels (normal range 191 - 663 pg/ml, mean 239.79 pg/ml) were low in 36% of patients (p value 0.802). Other parameters like duration, family history, past history of treatment did not demonstrate any statistically significant correlation with serum ferritin, vitamin D and vitamin B12 level

Table 4: Broader age group with frequency according to normal and low value of S. Vitamin B12.

Serum Vitamin B12 levels	Age Group		Total	P value
	<30yrs	>30yrs		
Normal	50	14	64	0.802
Low	27	9	36	
	77	23	100	

(A) 23 years old girl with chronic telogen effluvium

(B) 19 years old girl with chronic telogen effluvium

4. Discussion

Hair is one of the characteristic features of mammals and plays a vital function, such as protection against external factors; produces sebum, thermoregulation, and has an impact on social interactions, also a source for stem cells. Hair follicles undergo a repetitive sequence of growth and rest known as the hair cycle. First described by Kligman, telogen effluvium (TE) is characterized by an abrupt onset, rapid, diffuse, excessive shedding of normal club hairs, usually seen 2 - 3 months after a triggering event. Triggering events, the most common ones are severe febrile illness (example: malaria), postpartum (telogen gravidarum), accidental trauma and major surgery, emotional stress, chronic systemic illness, and crash diet. [3]

In one - third of cases, no trigger can be identified. Acute or classical TE is a self - limiting condition lasting for about 3 - 6 months; however, if the stimulus/event persists beyond six months, the condition becomes chronic. Chronic TE is diffuse hair loss persisting beyond six months, may be primary/idiopathic, or secondary to some underlying disease.

Various causes of chronic diffuse TE, such as iron deficiency anemia, hypo/hyperthyroidism, malnutrition, acrodermatitis enteropathica, and acquired zinc deficiency, have been the most widely accepted. [4] There are several reasons to suspect a role for micronutrients in non - scarring alopecia which includes telogen effluvium. Micronutrients are major elements in the normal hair follicle cycle, playing a role in cellular turnover, a frequent occurrence in the rapidly dividing matrix cells in the follicle bulb.

The role of nutrition and diet in treating hair loss represents a dynamic and growing area of inquiry. Deficiency of such micronutrients may represent a modifiable risk factor associated with the development, prevention, and treatment of alopecia. The most common nutritional deficiency in the world is iron deficiency, which contributes to TE. The serum ferritin (iron - binding protein) level is considered to be a good indicator of total body iron stores and is relied upon as an indicator in hair loss studies. The association between iron deficiency and hair loss, the exact causative relation is unclear. Iron is a known cofactor in ribonucleotide reductase, a rate - limiting enzyme for DNA synthesis. Hair follicle matrix cells are among the most rapidly dividing cells in the body. [5]

In our study mean serum ferritin level was 13.59 ng/dL, which is an alarming condition. Menstrual blood loss and pregnancy are the biggest causes of iron deficiency in otherwise healthy premenopausal Indian women. Gowda et al indicated in a study that a relatively higher proportion of participants with TE had iron deficiency. [6] In contrast, another Indian study conducted by Deo et al. aimed to detect the association of the prevalence of hair loss with serum ferritin levels was found statistically insignificant. Vitamin B12 is necessary for DNA synthesis, neurological function, and red blood cell formation. Vitamin B12 is a cofactor for methionine synthase and thereby affects the synthesis of nearly 100 substrates, including DNA, RNA, and protein. Thus, theoretically, vitamin B 12 levels can be expected to correlate with telogen effluvium.

In my study, participants had values ranging between 25 - 767.3 pg/ml (mean of 239.79 pg/ml), with 36% having low levels. [7, 8] Similarly, Durosoy et al found no statistically significant difference in folate and B12 levels between patients of chronic telogen effluvium and controls. [9] Vitamin D is a hair follicle differentiation promoter without having much effect on its proliferation. Correlation of vitamin D levels has been seen among patients with hereditary vitamin D receptor (VDR) deficiency with alopecia [10]. In my study, the mean value of vitamin D was found to be 14.71 ng/ml, with low levels detected in 98% of females. There are contradictory data from previous studies evaluating vitamin D in CTE. While some studies have shown either no correlation or even the opposite result while others have demonstrated significant correlation. [11] The strength of my study was the sample size, which is at par with most of the previous studies. Moreover, we explored the correlation of serum ferritin, vitamin B12, and vitamin D with multiple parameters like age, duration, family history, and treatment history.

5. Conclusion

The present study detected low levels of serum ferritin and vitamin D in approximately two - thirds and a majority of females with chronic telogen effluvium, respectively, with vitamin B12 deficiency found in only one - third of patients. The majority of the women were younger than 30 years. Thus, a statistically significant correlation was established between serum ferritin and vitamin D level with chronic telogen effluvium. However, more robust evidence is required to validate their role as biochemical markers of this challenging disorder.

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Declaration of Interest
The authors report no conflicts of interest. The authors alone are responsible for the context and writing of this paper.

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