

Association of Ferritin and Vitamin-D (Calciferol) Deficiency with Female Pattern Hair Loss

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ABSTRACT

Background: In addition to individuals with elevated androgen levels, female pattern hair loss is also reported in women without elevated androgen levels. In recent years, vitamin D and ferritin levels have been taken into account while treating these individuals. Women who have female-pattern hair loss may also suffer from vitamin D and iron deficiencies. This research is to determine the roles that ferritin and vitamin D play in the etiopathogenesis of hair loss.

Materials and methods: A cross-sectional study was conducted in Delta Medical College and Hospital among the 50 female patients aged between 12-58 years.

Results: According to the findings of our research, a total of 89% of the female patients had blood vit-D levels that were both deficient and insufficient level, which indicates that deficiency of Vit-D can enhance the hair loss in female patients. Also, the ferritin value was quite deficient in range among the participants.

Conclusion: This study had a small sample size, was conducted in just one site, and didn't use a standardized method to examine the dietary intake of FPHL patients. For this reason, it is recommended that, in addition to other hormonal tests, blood D3 levels and other mineral tests be analyzed to assess a patient's health.

Key words: Androgen; FPHL; Ferritin; Vitamin D.

Introduction

It's no secret that people of all ages and both sexes can experience hair loss. Cosmetic issues are the most common reason women seek care from dermatologists. Hence, women appear to be affected by hair loss more frequently than males.¹ Almost a hundred thousand hair follicles may be found on the average human scalp. Ninety percent of these hairs are in the non-balding anagen phase and might benefit from a diet rich in proteins, vitamins, and minerals.² Vitamins and minerals at the trace mineral level are examples of micronutrients that are essential to our diet.³ A hundred of his 160 sailors perished from scurvy in 1497 recorded by Vasco de Gamma and three hundred years later, James Lind connected scurvy with vitamin C insufficiency, writing of skin bleeding and hair loss.^{4,5}

Examples of protein-energy malnutrition that manifest themselves outwardly in the skin and hair include kwashiorkor, marasmus, and marasmic-kwashiorkor in children.⁶ Hair loss occurs when carbohydrates are severely restricted.⁷

There are three major phases in the hair growth cycle. The three phases are known as anagen (Active growth phase) catagen (Active regression phase) and telogen (Dormant cells) (Resting phase).⁸ Hair-follicle development and cycling are controlled by a wide range of hormones, growth factors, and receptors, including oestrogens, androgens, thyroid hormones, glucocorticoids, retinoids, prolactin and growth hormone.⁹ It is considered typical for 50–150 telogen hairs to fall out of the scalp per day. Yet, significant hair loss occurs when the proportion of telogen follicles increases.¹⁰ Anagen-stage hair loss, such as that seen in chemotherapy patients, is pathological because it occurs during the active growth phase of the hair follicle. Diffuse hair loss can be caused by anything from genetic susceptibility to stress (Both physical and mental) medication, disease or nutritional deficiencies.¹¹ Whether or not it is necessary to investigate a person's nutritional state and the impact of supplements in the management of hair loss is a matter of some debate. Hair loss can be caused by a number of different things, including stress (Both physical and mental) medication and an inadequate diet. The underlying etiology of hair loss is investigated by a number of laboratory tests, the

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results of which might differ from patient to patient. Moreover, it is advised that all patients with diffuse hair loss be tested for iron deficiencies and checked for thyroid hormone problems.¹²

In order to determine the roles that ferritin and vitamin D play in the etiopathogenesis of hair loss. The purpose of this study is to find-out association of the blood levels of ferritin and vitamin D in Female Pattern of Hair Loss (FPHL) at a tertiary care hospital of Bangladesh.

Material and methods

A cross-sectional study was conducted in Delta Medical College and Hospital, during the period October 2022 to February 2023.

A total of 50 female patients with hair loss were selected from Dhaka. The ranged between 1-58 years.

The information was collected by ferritin and vitamin-D test in Delta Medical College and Hospital. After an overnight fast (12-14 hours), the patients were asked to return early in the morning and their intravenous blood sample about 3 cc was sent to Pathology Laboratory, Delta Medical College and Hospital.

The Microsoft Office Excel 2013 software was used to analyze the data about age, ferritin and Vitamin-D deficiency that associated with hair loss.

Results

The age section is divided into five groups (A, B, C, D & E). The age range for group A is 11 – 20 years, for group B is 21 – 30 years, for group C is 31 – 40 years and for group D is 41 – 50 years and group E 51 – 60 years. The median age value were 31.5 years among the participants.

Table I Age distribution among the patients

Group	Age Range	Patient Count	Median Age Value (Years)	Mean Age Value (Years)
A	11 – 20 years	11		
B	21 – 30 years	13		
C	31 – 40 years	14	31.5	31.48
D	41 – 50 years	09		
E	51 – 60 years	03		

Fifty women with hair loss were involved in the research, with ages ranging from 12 to 58 (The mean age was 31.48) years. Hair loss in these instances lasted anywhere from six months to 2 years. Serum ferritin levels were measured and found to vary from 4-120 µg/L, with a mean of 18.51 µg/L among the patients. Case values for Vitamin-D were, while on the other hand, found to be between 5.8 and 50 ng/ml.

Table II Vitamin-D and ferritin status among the female patients

Parameters	Mean	Median	Maximum	Minimum	p-Value
Vitamin-D (Calciferol)	48.426 (Approx.)	43.5	50	5.8	1.42325E-28
Ferritin	18.51 (Approx.)	18.5	120	4	5.34529E-43

Here, only 11 percent of female having sufficient vitamin-D. Majority of female in the study were suffering from Vitamin-D deficiency. The range is above 50%. Also the value for ferritin, majority of participants having lower ferritin value, only thirteen participant were having normal ferritin value. Here, p-value of Vit-D is more smaller than ferritin, so significant level would be considered for vitamin-D.

Table III Vitamin-D and ferritin level among the female patients

Vitamin-D (Calciferol)			
Patient Count	Percentage (%)	Reference value (ng/ml)	Classification
27	54	<20	Deficiency
19	38	20-29	Insufficiency
4	11	30-100	Sufficiency
-	-	>100	Potential Toxicity
Ferritin			
Patient Count	Percentage (%)	Reference value (µg/L) [19]	Classification
20	40	<30	Very Low
17	34	31-70	Low
13	26	≥70	Normal

Discussion

Vitamin and mineral supplements may be helpful for those experiencing hair loss. Hair loss may be caused by a lack of vitamins and minerals, which are essential for healthy cell development and function. Iron and vitamin-D are two nutrients that have been hypothesised to have a role in the development of hair via a variety of different methods. When it comes to the function of iron, the dietary reasons of hair loss that are most often stated include iron, which is one of the main micronutrients in the metabolism of our body. Nevertheless, the role that iron deficiency plays in hair loss is not yet clearly established despite the fact that it is generally recognized that iron deficiency is linked to a variety of clinical disorders due to its many activities.¹³The relevance of Vitamin-D in hair may be explained by the fact that it has been hypothesised that an adequate concentration of Vitamin-D is required to postpone ageing phenomena, including hair loss.

Animal studies have shown that Vitamin-D receptor activation is crucial for the commencement of the anagen phase of the hair follicle cycle.¹⁴ There is evidence to indicate that the Vitamin-D receptor has a role in controlling the expression of genes involved in hair follicle cycling.¹⁵ Vitamin D's effect on a variety of hair diseases has been the subject of a number of research, with conflicting findings. Vitamin-D deficiency has been linked to persistent telogen effluvium, female pattern hair loss and alopecia areata in women.¹⁶

According to the findings of this research, a total of 89% of the female patients had blood Vit-D levels that were both deficient and insufficient level. Because of this, it is advised to analyse serum Vit-D3 levels in addition to other hormonal assays in order to determine a patient's condition. Also 74% of patients were suffering from lower Iron value. Thus, indicate that insufficient level of Vitamin-D and iron value are responsible for the patient's hair loss.

Limitation

Our research included a number of important limitations. This research took only place at one location and had a limited number of participants. We also did not have a standard monitor to evaluate the diet of FPHL patients and it was not possible to determine the quantity of Vitamin-D3 or its precursors that are being consumed daily by the patients their diet.

Conclusion

Dermatologists agree that hair loss is very distressing for patients, both mentally and emotionally, and it is a prevalent condition. Nevertheless, the precise role that micronutrients like vitamins and minerals play in maintaining regular hair follicle growth and immune cell activity is still up for debate. Here, Serum Vit-D and ferritin concentrations were significantly decreased in Female Pattern Hair Loss (FPHL).

Disclosure

All the author declared no competing interest.

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