

RESEARCH TITLE

Estimation of Vitamin D, B12, Zinc, and Ferritin in Women Have Hair-Loss

Ghadeer Hamid AL- Ardhi¹

¹ DNA research Center, University of Babylon, Babylon, Hillah, Iraq.

Email: Ghadeer.hamid@uobabylon.edu.iq

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Abstract

Hair loss (Alopecia) is a common condition among women, defined as an abnormal loss of hair density, and may have multiple causes including genetics, hormonal, and psychological factors, as well as deficiencies in certain micronutrients. The objective of this study was to evaluate the levels of a number of essential nutrients associated with hair health, included: vitamin D, vitamin B12, ferritin, and zinc in women with hair loss compared to group of healthy women (control group). One hundred and twenty (120) women their age around (20-45) years were collected, (90 women) with hair loss and (30 women) as a control group. ELISA kit was used to measure vitamins and elements levels in serum of blood. The findings of the study indicated a significant decline in vitamin D and ferritin levels in affected women compared to control subjects ($p \leq 0.05$). Statistically positive correlations were detected between vitamin D and ferritin, and between vitamin D and vitamin B12, and between zinc and vitamin B12. These findings indicate the interaction between these elements and their potential role they play in the possibility of hair loss, which confirms the importance of an integrated nutritional assessment in these cases, indicating a potential role of these micronutrient in regulating scalp health and hair growth.

Key Words: vitamin D3, Zinc, B12, Ferritin, Hair-loss.

تقدير مستويات فيتامين د، ب12، الزنك، والفيريتين لدى النساء اللاتي يعانين من تساقط الشعر

المستخلص

تساقط الشعر (الثعلبة) هو حالة شائعة بين النساء، ويعرف بفقدان غير طبيعي في كثافة الشعر، وقد يكون له عدة أسباب تشمل العوامل الوراثية، الهرمونية، والنفسية، بالإضافة إلى نقص بعض المغذيات الدقيقة. هدف هذه الدراسة هو تقييم مستويات عدد من العناصر الغذائية الأساسية المرتبطة بصحة الشعر، والتي تشمل: فيتامين د، فيتامين ب12، الفيريتين، والزنك لدى النساء اللاتي يعانين من تساقط الشعر مقارنةً بمجموعة من النساء الأصحاء (مجموعة التحكم). تم جمع بيانات من مئة وعشرون (120) امرأة تتراوح أعمارهن بين (20-45) سنة، حيث كانت (90 امرأة) يعانين من تساقط الشعر و(30 امرأة) كمجموعة تحكم. تم استخدام مجموعة ELISA لقياس مستويات الفيتامينات والعناصر في مصل الدم. أظهرت نتائج الدراسة انخفاضاً ملحوظاً في مستويات فيتامين د والفيريتين لدى النساء المصابات مقارنةً بمجموعات التحكم ($p \leq 0.05$). كما تم اكتشاف ارتباطات إيجابية إحصائية بين فيتامين د والفيريتين، وبين فيتامين د وفيتامين ب12، وبين الزنك وفيتامين ب12. تشير هذه النتائج إلى التفاعل بين هذه العناصر والدور المحتمل الذي تلعبه في إمكانية تساقط الشعر، مما يؤكد أهمية التقييم الغذائي المتكامل في هذه الحالات، مشيراً إلى دور محتمل لهذه المغذيات الدقيقة في تنظيم صحة فروة الرأس ونمو الشعر.

الكلمات المفتاحية: فيتامين د3، الزنك، فيتامين ب12، الفيريتين، تساقط الشعر

Introduction

Hair-loss is a prevalent case that influences a high ratio of women of all ages, and its causes variable based on multi factors such as; genetics, hormonal, psychological, and nutritional factors (1). Studies have shown that deficiencies in certain micronutrients play an important role in disrupting the hair growth cycle, causing an increased rate of hair loss (2,3). Vitamin D, zinc, ferritin, and vitamin B12 have been given a special attention due to their vital physiological role in maintaining a healthy scalp and hair follicles (4).

Vitamin D is a key regulator in the hair growth cycle through its effect on vitamin D receptors found in hair follicles, and its deficiency is thought to be related to various types of hair-loss as “alopecia areata” so “alopecia”(5). Zinc is an essential element implicated in cell division as well as protein production, and its deficiency can lead to brittle, weak, and easily lost hair (6).

On the other hand, ferritin, the stored form of iron, is an important indicator of iron status in the body, and low levels have been shown to be strongly associated with chronic hair-loss in women, even in the absence of overt anemia (7). Vitamin B12 is involved in metabolism, blood cell formation, and neurotransmitters, and it's thought that its deficiency may contribute to hair loss through its effect on scalp circulation and cell regeneration (8).

Objective of current research is to estimate the concentrations of these nutrients in female patients experiencing hair loss. The findings may elucidate the correlation between nutrient deficiencies and hair loss, thereby providing a foundation for treatment recommendations that are informed by meticulous nutritional assessments.

Material and Method

The study comprised a sample of 120 women aged 20-45 years, who has been recruited from various dermatology clinics in the city of Al- Hilla, which is situated within the province of Babylon for this study, during the period from September 2024 to March 2025.

The samples divided into two groups: the first group (n=90): women with hair loss not caused by known skin diseases. The second group(n=30): control group, not suffering from hair loss.

Blood sample were collected from all participants to measure levels of vitamin D(25(OH)D), vitamin B12, ferritin, and zinc. Five milliliters of blood were obtained via venipuncture after an overnights fast between 8:30 a.m. and 11:30 a.m. Serum levels of Vitamin D₃ were measured using commercially available enzyme-linked-immunosorbent-assay(ELISA)kit “Pars-Biochem-Nanjing-Jiangsu-China” in strict accordance with the “manufacturer’s instructions”.

Statistical analysis: The analyses were conducted utilizing [IBM,SPSS] statistics, version 23 (IBM-Armonk- New York-USA). T- test was used to compare means, and Pearson’s correlation coefficient was used to examine relationship between variables.

Results

The finding indicated a significant decline ($p<0.05$) in the mean levels of vitamin D₃(18.35 ± 0.68) and ferritin (71.04 ± 8.15) in affected women compared to the control group (31.26 ± 1.53), (142.80 ± 15.40) respectively.

That study found that there are unavailable statistically significant differences in vitamin B12 and zinc levels between the two groups, but relatively lower levels were recorded in the case group as showed in figure 1.

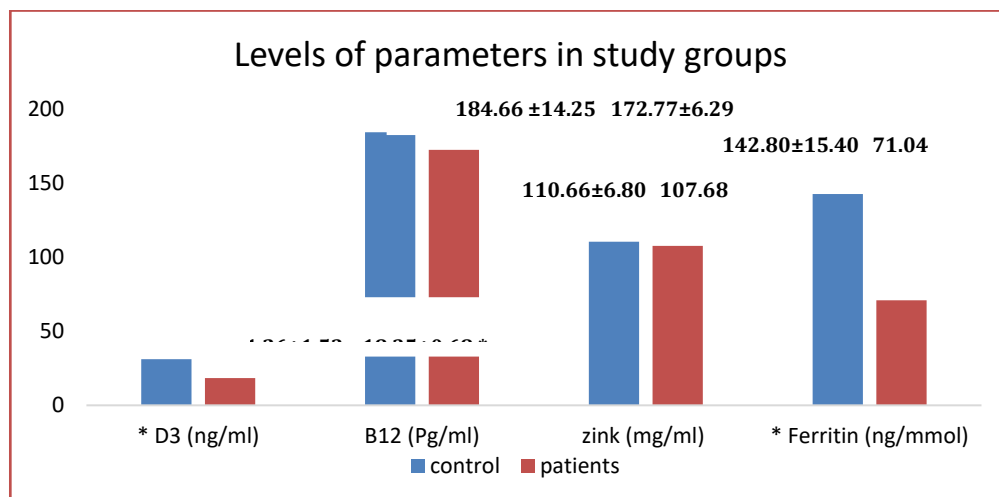


Figure 1: Measured parameters {vitamin D, vitamin B12, zinc, and ferritin} in study group

- The values represent mean $\pm$ SE
- * statistically significant of patients VS normal subjects ($p \leq 0.05$).

There was a significant positive correlation observed between: vitamin D and ferritin ($r=0.195$, $p=0.03$), vitamin D and vitamin B12 ($r=0.173$, $p=0.04$), so zinc and vitamin B12 ($r=0.50$, $p=0.00$) as exhibit in table 1.

Table 1: Relationship between vitamin D, vitamin B12, zinc, and ferritin levels in Study Groups

Correlations	Vitamin D3		B12		Zink		Ferritin	
	r	p	r	p	r	p	r	p
Vitamin D3	1		0.173*	0.04	0.02	0.76	0.195*	0.03
B12	0.173*	0.05	1		0.50*	0.00	- 0.16	0.08
Zink	0.02	0.76	0.50*	0.00	1		- 0.03	0.68
Ferritin	0.195*	0.03	- 0.16	0.08	- 0.03	0.68	1	

*sign statistical significant at 0.05., **sign statistical significant at 0.01.

Discussion

The discovered correlations between the studied elements also reflect the overlap of their biological functions, with vitamin D and vitamin B12 involved in cell proliferation, while zinc in several enzymatic reactions that affect hair growth.

The data indicate that vitamin D and ferritin deficiency is significantly associated with female hair-loss, which is compatible to previous studies indicating the role of vitamin D in regulating the hair follicle cycle and the role of ferritin as an indicator of iron stores, essential for hair follicle cell proliferation(9,10).

Recent studies indicate that there is a strong correlation between deficiency of certain vitamins and minerals and hair loss in women, especially in cases of chronic or patterned hair loss (11,12). The positive correlation of vitamin D3 and ferritin, this result corresponding with the study demonstrated that ferritin and vitamin D levels were significantly lower as comparison to the control subjects (13). These finding suggest that ferritin and vitamin D deficiency may have a contributory function in hair-loss in women, so patients should have

their levels assessed and supplementation provided as needed.

The findings of correlation study indicated a positive correlation between vitamin D and vitamin B12, as well as ferritin. Some studies have proposed a relationship of vitamin D so both vitamin B12 and ferritin, Banihashemi *et al*, showed a subjects having loss of hair had a decline in concentration of vitamin D and ferritin than normal subjects (control) (14). However, there are not enough studies showing a direct relationship between vitamin D and vitamin B12, requiring further studies to investigate this condition.

The positive correlation of vitamin B12 and zinc in this study corresponding with study showed that a positive relationship between vitamin B12 and zinc levels, this finding suggest that zinc deficiency may affect vitamin B12 levels, warranting evaluation of the levels of both elements in patients with hair-loss or other symptoms associated with deficiency of these elements(15,16).

Conclusion

The study found that female subjects experiencing hair loss exhibited significantly decline levels of vitamin D and ferritin in comparison to healthy subjects. there are clear correlations between the elements studied, highlighting the importance of an integrated nutritional assessment in cases of hair loss. Periodic assessment of vitamin and mineral levels in affected women and evidence based nutritional and therapeutic interventions are recommended.

Recommendations

- 1) **Nutritional Supplementation:** Regular supplementation of Vitamin D3 and ferritin for women with deficiencies should be considered as part of hair loss management.
- 2) **Routine Nutritional Assessment:** Routine evaluation of Vitamin D, B12, Zinc, and Ferritin levels should be incorporated into dermatology clinics for women experiencing hair loss.
- 3) **Dietary Counseling:** Advise women with hair loss to include nutrient-rich foods such as fatty fish, red meat, legumes, nuts, and fortified cereals.
- 4) **Further Research on Vitamin D and B12:** Investigate the interaction between Vitamin D and Vitamin B12 and their collective role in hair health.
- 5) **Longitudinal Studies:** Conduct longer-term studies to observe changes in nutrient levels and hair growth over time.
- 6) **Psychological and Hormonal Assessments:** Incorporate assessments for psychological and hormonal factors, as they can also influence hair loss.

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