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Serum 25 hydroxy vitamin D level in patients with telogen effluvium

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Abstract

In order to better understand Telogen Effluvium (TE) and its relationship to vitamin D status, this study set out to measure vitamin D levels in individuals with the condition. Group A consisted of 45 patients having a diagnosis of TE, whereas Group B consisted of 45 healthy individuals who were age and sex-matched but had no history of TE. The Beni Suef University Hospitals Dermatology and Andrology Department's Outpatient Clinic recruited the patients. Lab tests, a dermatological evaluation, a trichoscopic evaluation, a general physical examination (to identify systemic reasons of hair loss), and a medical history (including age, beginning of disease, duration of sickness, and family history) were all part of each patient's thorough evaluation. With the use of ELISA kits, we were able to measure the concentrations of 25-hydroxyvitamin D in the blood A statistically significant reduction in vitamin D levels was seen in the case group compared to the control group. Furthermore, there was a statistically significant rise in the prevalence of inadequate and insufficient vitamin D levels among the patients in comparison to the control group. There was no proven correlation between age and vitamin D levels. Nevertheless, we found a significantly negative correlation between duration and vitamin D levels in the case group. Vitamin

D 25 (OH) levels were significantly lower in those whose families had a history of the disease compared to those whose families did not.

1. Introduction

A kind of alopecia that does not leave scars is telogen effluvium (TE) that causes hair to fall out in large areas. There is a wide range of hypotheses put forth to explain its origin. No matter what causes hair loss, the follicle usually stops anagen early. The hair follicle then goes through a resting phase similar to telogen after entering catagen. Severe recurrent TE, chronic TE (lasting six months or more), and acute TE (lasting less than six months) are the three main categories of TE. For unknown reasons, chronic TE only affects females [1]. Recognized possible causes include high fever, chronic systemic diseases, severe iron deficiency anemia, metabolic abnormalities (liver failure, chronic renal failure, etc.), delivery, surgical trauma, severe bleeding, and emotional swings [2].

One of the hormone-like vitamins, vitamin D is fat-soluble. The main ways that people get vitamin D are from diet, sun exposure, and supplementation. The active form of vitamin D, 1,25-dihydroxyvitamin D [1,25(OH)2D], is involved in calcium and phosphorus balance, bone metabolism, and skeletal development, among other important functions in the body. When it comes to the body's mineral metabolism and absorption, vitamin D is an essential player. Vitamin D has an important role in several metabolic processes, including those involving calcium, phosphate, and magnesium, as well as in the absorption of calcium from the intestines via increased protein production. Vitamin D also reduces the likelihood of infections, autoimmune diseases, and type 2 diabetes.

The parathyroid glands, skin, intestines, liver, and kidneys are all involved in the intricate process of vitamin D metabolism. In addition to rickets, other symptoms of vitamin D insufficiency include weak muscles, stridor, convulsions, tetany, respiratory tract infections, and failure to grow.

Everyone, regardless of age, race, or gender, is at risk for vitamin D inadequacy. People of all ages suffer from vitamin D inadequacy. People suffering from dermatological issues, especially hair diseases, often have this vitamin deficiency [6].

The study's overarching goal is to determine how vitamin D concentration relates to TE by measuring vitamin D levels in individuals with TE.

2. Patients and Methods:

Group A consisted of 45 people who had a TE diagnosis. In addition, Group B consisted of 45 apparently healthy individuals of the same age and gender. The Beni Suef University Hospitals Dermatology and Andrology Department's

Outpatient Clinic recruited the patients. The study was approved by our institutional ethical committee. The approval number is FMBSUREC/03052020/EL-Biomy.

2.1 Inclusion criteria:

All instances with chronic TE were included based on a history of sustained increased hair loss for over six months, accompanied by intermittent variations, without central part enlargement.

2.2 Exclusion criteria:

- Individuals with a history of chronic diseases, including renal or hepatic diseases
- Individuals with a documented history of any pharmacological interventions, such as corticosteroids, Pharmaceuticals linked to alopecia, vitamin D supplements.
- Women who are menopausal, pregnant, or nursing.

2.3 Methods:

All patients underwent the following procedures:

I. History Taking: Clinical data including patients' age, age of onset, illness duration, and familial history.

II. Comprehensive assessment: To exclude systemic etiologies of alopecia

III. Dermatological Assessment:

- Visual inspection of shed or extracted hairs revealed a depigmented bulb.
- Scalp inspection revealed a loss of less than 50% of scalp hair.
- Diffuse hair loss throughout the whole scalp or bilateral temporal hair thinning.
- Positive hair pull test in more than one scalp location.

IV. Trichoscopic examination was conducted for all participants.

V. Measurement of level of 25-hydroxy vitamin D:

Vitamin D levels below 20 ng/ml were categorized as “vitamin D deficiency,” while levels below 5 ng/ml were designated as “heavy vitamin D deficiency.” Vitamin D levels ranging from 20 to 30 ng/ml were identified as “vitamin D insufficiency,” while levels exceeding 30 ng/ml were designated as “normal” [7].

The kit utilizes a solid phase enzyme-linked immunoassay (ELISA) method, grounded in the concept of competitive binding.

Statistical methodology

Data were analyzed using Epi-Info version 6 and SPP for Windows version 8. Data were expressed as; mean, standard deviation (SD), Interquartile range (IQR) and median. The analysis was according to: Mann Whitney-U test (MW), Student t test (t), Chi-squared test (χ^2) Validity of screening test, ROC curve and correlation coefficient “r”. *p* is significant if <0.05.

3. Results:

Table (1): Demographic data of the studied groups

Variable		Cases (*n*=45)		Control (n=45)		t	P
Age: (years)	*Mean ± Sd*	24.62±4.77		26.93±5.71		1.98	0.06
	Range	17-36		17-37			NS
Variable		**No**	**%**	**No**	**%**	χ^2	**P**
Sex:	*Female*	26	58.7	21	46.7	1.11	0.29
	Male	19	42.2	24	53.3		NS

This table shows that there were no statistical significance differences between the studied groups in age or sex distribution.

Figure (1): Family history among the studied cases group

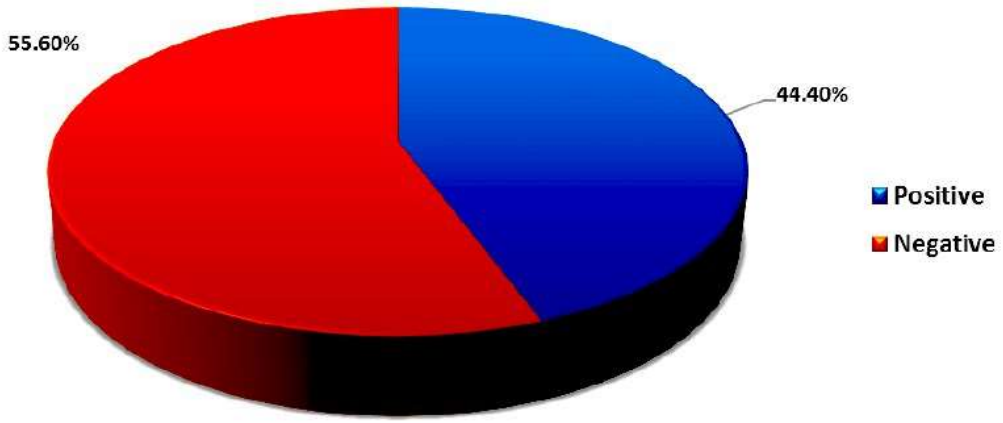


Table (2): vitamin D among the studied groups

Variable		Cases (*n*=45)	Control (n=45)	MW	P
25(OH) vit D: (ng/ml)	*Mean ± Sd*	10.74±6.43	22.91±8.41	6.61	<0.001
	Median (IQR)	10.7 (6-13.5)	21.9(16.6-27.2)		**
	Range	3.1-34.8	7.1-44.3		

This table shows that there was a statistical significance decrease in vitamin D level among cases group compared to control group.

Table (3): Vitamin D status among the studied groups

Variable		Cases (*n*=45)		Control (n=45)		χ^2	P
		No	%	No	%		
Vit D:	*Deficient (<30 ng/ml)*	43	95.6	35	77.8		
	Insufficient (30-<50 ng/ml)	2	4.4	10	22.2	6.15	0.01
	Sufficient (≥50 ng/ml)	0	0	0	0		*

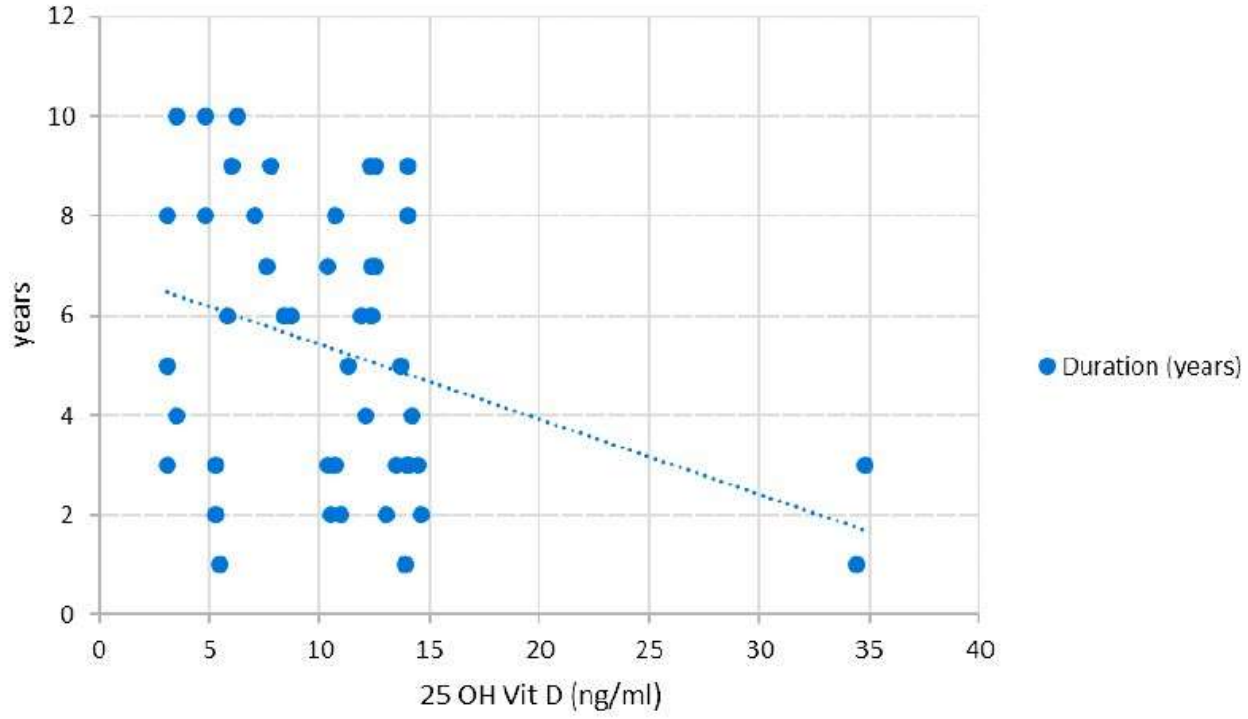
This table shows that there was a statistical significance increase in frequency of deficient vitamin D level among cases compared to control group.

Table (4): Correlation between vitamin D and age and duration of the cases group

Variable	25 OH vit D (*n*=45)	
	r	P
Age: (years)	0.106	0.70 NS
Duration: (years)	-0.29	0.04*

r: Spearman's correlation coefficient

Figure (3): Correlation between vitamin D and duration of the cases group



There was no statistical significance correlation between vitamin D and age but there was a statistical significant –ve correlation between duration and vitamin D level among the cases group.

Table (5): Relation between vitamin D deficiency and sex of the cases group

Variable		N	25 OH vit D (ng/ml)			MW	P
			Mean±Sd	Median	IQR		
Sex	*Male*	19	8.5±3.83	8	5.3-11.9	**2.83**	**0.005**
	Female	26	13.82±7.96	12.6	10.7-13.95		*

Table (6): Relation between vitamin D and clinical data of the cases group

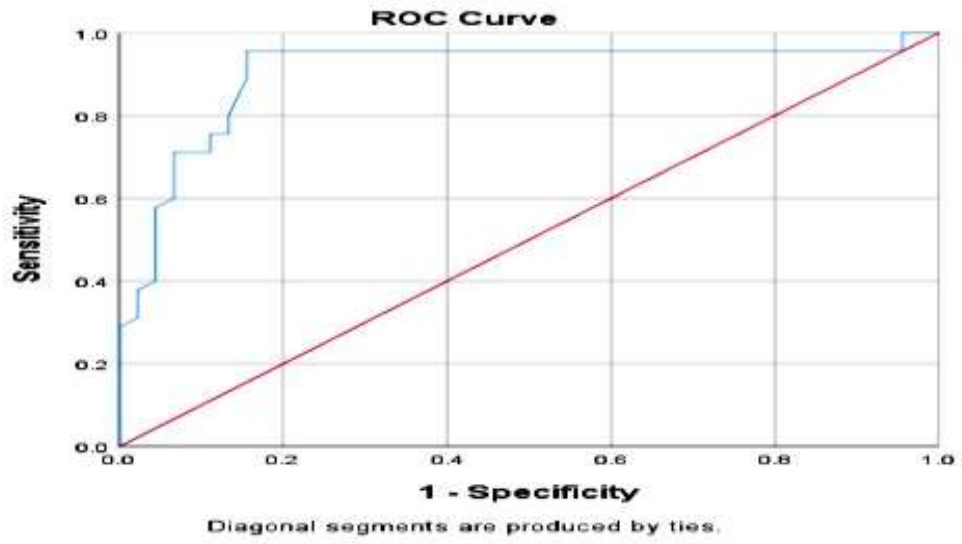
Variable		N	25 OH vit D (ng/ml)			MW	P
			Mean±Sd	Median	IQR		
Family history:	*-ve*	25	12.66±7.24	12.1	10.4-13.5	**1.96**	**0.04***
	+ve	20	8.36±4.32	7.35	4.8-13.15		
State:	*Acute*	23	11.42±6.47	11.3	7.95-13.95	**1.98**	**0.04***
	Chronic	22	10.04±6.46	8.55	6-12.4		

This table shows that there were a statistical significance decreases in vitamin D among +ve family history cases compared to –ve cases and also there was a statistical significance decrease in vitamin D among chronic cases compared to acute cases.

Table (7): Validity of vitamin D in diagnosis of TE among the studied group

Cut off	AUC (95% CI)	P	Validity				
			Sensitivity	Specificity	PPV	NPV	Accuracy
<14.35	0.90 (0.83-0.98)	**<0.001 ****	91.1	84.4	85.4	90.5	87.8%

Figure (4): Roc curve for Validity of Vitamin D in diagnosis of TE among the studied cases



25OH vit D at cut off <26.4 ng/ml had sensitivity 91.1%, specificity 88.9% and accuracy 90% in diagnosis of TE.

4. Discussion:

In their daily work, dermatologists often encounter patients with TE. Kligman first described it as, a hair cycle aberration defined by the shedding of telogen hair, which is the main cause of diffuse hair loss. Acute TE doesn't endure more than six months, chronic TE does, and chronic-repetitive TE does not. For some reason, only females may have chronic TE [8]. Recognized possible causes include high fever, chronic systemic diseases, severe iron deficiency anemia, metabolic abnormalities (such as liver or renal failure), birth complications, surgical trauma, substantial bleeding, and emotional swings. Stress, fever, pharmaceuticals, hormonal imbalances, and nutritional deficits are all potential pathogenic factors [2]. One of the most important hormones for maintaining a healthy calcium balance and promoting bone mineralization is vitamin D, a lipophilic steroid. Sunlight exposure often results in the skin synthesizing 90–95% of the vitamin D the body needs. Vitamin D's autocrine and paracrine actions are most pronounced on the skin. Seasons, sunglasses, leather protectors, traditional clothing, food, smoking, alcohol intake, BMI, genetic susceptibility, exercise, weight, medicines, ethnicity, and latent zones all have an impact on vitamin D levels [9]. In the current study, group A consisted of 45 patients having a diagnosis of TE, whereas group B consisted of 45 healthy individuals. Our study included patients whose ages ranged from 17 to 36 years old, with an mean ± SD of 24.54 ± 4.97 years. The mean age ± SD of the control group was 26.54 ± 5.54 years, and their ages ranged from 17 to 36 years. With respect to the statistical analysis, the age distribution of the groups that were considered showed no significant variance. The range of ages described by Seleit et al. [10] for patients with TE was 19–44 years, with a median age of 28.5 years and an average ± SD of 29.83 ± 7.65 years. With a median age of 29 years and an average ± SD of 29.93 ± 6.60 years, the control group's ages ranged from 19 to 44 years. Based on our findings, the patient group consisted of 28 females and 22 males, whereas the control group included 23 females and 27 males. In terms of statistical significance, the gender distribution of the groups under consideration was not significantly different. By taking their vitamin D levels, Aslan [11] was able to determine how vitamin D affected TE. We compared the 25-hydroxyvitamin D

serum levels of 155 TE patients to those of 168 healthy controls. There were 149:6 females for cases and 155:13 males for controls (p = 0.14). Our research showed that chronic TE was present in 46% of individuals and acute TE in 54%. More specifically, Mohammad et al. [12] looked at vitamin D levels in those who had acute and chronic TE. Fifteen patients (or 50% of the total) showed signs of the acute form of the disease, whereas fifteen (or 50% of the total) showed signs of the chronic type.

When we analyzed the vitamin D levels of the case and control groups, we found that the former had much lower levels. According to Gerkowicz et al. [13], TE was associated with significantly decreased blood vitamin D2 concentrations in females compared to healthy controls. As the disease became more severe, the quantities dropped. According to Aslan [11], the ill group had an average Vitamin D level of 13.42±6.28 ng/ml, whereas the control group had 14.62±6.56 ng/ml. Although TE patients had lower average levels of vitamin D, this difference did not reach statistical significance. TE may have vitamin D insufficiency as one of the major causes. But this goes against what Karadag et al. [14] found, which they ascribed to a small sample size, which was that those with TE had higher vitamin D levels.

When we compared cases to controls, we found that the incidence of low vitamin D levels was much higher in the former. Cheung et al. [15] concurs with this. On the other hand, Aslan [11] found no statistically significant difference ($p>0.05$) between the groups according to vitamin D categories. Deficiency of vitamin D (5-20 ng/ml) was common in both groups.

Vitamin D levels were one of several variables that our study sought to explain. There was no proven correlation between age and vitamin D levels. In addition, Mohammad et al. [12] showed that vitamin D levels did not change significantly across different age groups (≤30). According to Aslan [11], vitamin D levels are unrelated to TE.

In the group of those who were really sick, there was a negative correlation between duration and vitamin D levels. But there was no link between vitamin D levels in the blood and the length of time on TE, according to Mohammad et al. [12].

We found no statistically significant correlation between the sex of the case group and vitamin D levels. In addition, there was no statistically significant difference in vitamin D levels between

boys and females, according to Mohammad et al. [12]. Our study found that vitamin D levels were significantly reduced in those with a positive family history compared to those with a negative one, and that vitamin D levels were significantly reduced in chronic cases compared to acute ones. In addition, compared to the control group, individuals with acute and chronic TE had significantly different vitamin D blood levels, according to Mohammad et al. [12]. Prior investigations have shown that people with TE tend to have lower vitamin D levels. Many researches have measured vitamin D levels in patients with TE, as far as we are aware. Researches have shown that vitamin D levels are significantly reduced in TE patients when compared to healthy controls [16]. On the other hand, it was noted by Karadağ et al. [14] that those with TE had higher levels of vitamin D. A compensating response in TE, they noted, is these higher vitamin D levels.

5. Conclusion and Recommendations

When people experience intense mental or physical stress, their hair follicles go into a premature telogen phase and eventually shed. Our results showed that vitamin D deficiency was more common among the patients. To further understand the connection between vitamin D levels and TE, we propose more prospective studies. Based on this study, it is recommended to: Conduct comparative investigations on bigger examples, study the impact of treating hair fall dependent on serum vit D levels and assessment of levels of CBC, TSH, T3,T4, serum ferritin, serum zinc in further studies.

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