

# Evaluation of Vitamin D Levels in Chronic Telogen Effluvium Patients

## Kronik Telogen Effluvium Hastalarının D Vitamini Düzeylerinin Değerlendirilmesi

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**ABSTRACT Objective:** Telogen effluvium (TE) is most commonly seen type of hair loss and multiple factors play role in etiopathogenesis of this disease. Vitamin D is closely related to hair and skin diseases due to its immunomodulatory and anti-inflammatory effects. In this study we aimed to determine the effect of vitamin D on TE by evaluating the levels of Vitamin D in these patients. **Material and Methods:** The medical records of the patients who were admitted to our hospital dermatology polyclinic between January 2015 and March 2018 were evaluated retrospectively. The control group was created retrospectively from medical records of the individuals who visited other outpatient clinics and whose vitamin D levels were measured. In the both groups, individuals with history of other systemic and dermatologic disease were excluded. The demographic characteristics and the levels of serum vitamin D levels were recorded. Statistical analysis was performed using SPSS 17 (Chicago, IL) pack program. **Results:** There were 155 patients in the study group, 168 age- and sex- matched healthy individual in the control group. Mean 25-hydroxy vitamin D (25OHD3) levels of the patient and control group were 13.42±6.28 ng/ml and 14.62±6.56 ng/ml, respectively. The difference was not statistically significant (p=0.09). **Conclusion:** Vitamin D levels were found to be lower in our patient group but the difference statistically insignificant. Our results indicate that there is no correlation between TE and vitamin D levels. However, more scrutinized and prospective studies are warranted to address the issue of vitamin D deficiency in TE.

**Keywords:** Vitamin D; hair loss; vitamin D deficiency

**ÖZET Amaç:** Telogen effluvium (TE) en sık görülen difüz saç dökülmesi sebebidir ve etiolojisinde pek çok faktör rol oynamaktadır. D vitamininin immünmodülatör ve antiinflamavur etkilerinden dolayı pek çok deri ve saç hastalıklarıyla yakından ilişkisi olduğu bilinmektedir. Biz, bu çalışmamızda, TE hastalarının D vitamini düzeylerini inceleyerek, D vitamini ile TE arasındaki ilişkiyi değerlendirmeyi amaçladık. **Gereç ve Yöntemler:** Ocak 2015- Mart 2018 tarihleri arasında Dermatoloji polikliniğine saç dökülmesi şikayeti ile başvuran ve telogen effluvium tanısı alan tüm hastaların dosyaları retrospektif olarak tarandı. Hastanemiz diğer polikliniklerine başvuran, D vitamini düzeyi bakılmış olan bireylerin dosyaları retrospektif olarak incelenerek kontrol grubu oluşturuldu. Her iki grup için, diğer dermatolojik hastalığı ve sistemik hastalığı olan bireyler çalışma dışı bırakıldı. Çalışma grubumuzun demografik özellikleri, klinik ve laboratuvar bulguları SPSS 17 programında analiz edildi. **Bulgular:** Hasta grubunda 155, kontrol grubunda benzer yaş ve cinsiyet dağılımında 168 sağlıklı birey vardı. Hasta ve kontrol grubunun ortalama D vitamini düzeyleri sırasıyla 13.42±6.28 ng/ml ve 14.62±6.56 ng/ml idi. Aradaki fark istatistiksel olarak anlamsızdı (p=0.09). **Sonuç:** D vitamini TE hastalarında düşük bulundu fakat aradaki fark istatistiksel olarak anlamlı değildi. Bizim sonuçlarımız D vitamini düzeyleri ile TE arasında anlamlı bir ilişki bulunmadığını göstermektedir. Yine de D vitamini eksikliği ile TE arasındaki ilişkiyi ele alan daha detaylı prospektif çalışmalar yapılması gerekmektedir.

**Anahtar Kelimeler:** D vitamini; saç dökülmesi; D vitamini eksikliği

**T**elogen effluvium (TE), the loss of telogen hair that is first described by Kligman, is the most common cause of diffuse hair loss and it known as a hair cycle abnormality.<sup>1,2</sup> High fever, chronic systemic diseases, severe iron deficiency anemia and metabolic disorders such as liver

failure, chronic renal failure, childbirth, surgical trauma, severe bleeding and emotional changes are known as possible causes.<sup>3,4</sup>

Chronic TE was first described in 1996 as a primary idiopathic disease.<sup>5</sup> This disease is characterized by loss of telogen hair and usually occurs in middle-aged women, without a trigger could be defined and lasting more than six months.<sup>6</sup> Clinically, it is easily distinguished from androgenic alopecia, cicatricial alopecia, alopecia areata because there is no scarring or atrophy and no significant hair loss in a particular region, such as in the central scalp region or frontal region. The incidence of chronic TE is reported to be 30-35% in different countries.<sup>7</sup>

Vitamin D known as the major hormone that control bone metabolism. There are two sources of vitamin D, cholecalciferol (D3) which is synthesized in skin, and ergocalciferol (D2) taken orally with food. Vitamin D is the common name of D2 and D3. Under normal conditions, 90-95% of vitamin D in the human body is produced on the skin with the effect of sunlight. Skin is the tissue in which vitamin D is synthesized and activated by the effect of sunlight. and it is also the organ targeted as autocrine and paracrine functions of vitamin D.<sup>8-14</sup> Regulation of hormone secretion, immunological functions, cell proliferation and differentiation are important autocrine / paracrine functions of vitamin D.<sup>10-14</sup> Due to these effects, vitamin D have the potential to be used in clinical treatment for a number of diseases, including immune system diseases, skin diseases and cancer.<sup>15</sup>

Vitamin D deficiency is a major public health problem that affects all ages, races and genders. Studies from our country and from the world have shown that vitamin D deficiency is common in both children and adults, especially in the winter months.<sup>8,9</sup>

In previous studies this vitamin deficiency is reported in the dermatologic group of patients. There are also studies evaluating the effect of vitamin D on hair diseases.<sup>4,16-24</sup>

To our knowledge there are limited number of studies investigating the relationship between TE

and vitamin D and results of these studies were contradictory.<sup>4,21-24</sup>

We planned this study to evaluate the vitamin D levels in TE patients and to investigate whether there is a relationship between vitamin D status and TE.

## MATERIAL AND METHODS

The ethics committee approval was obtained from both the Kocaeli Health Directorate and ethics committee of Health Sciences University. Medical records of the individuals in patient and control groups were examined retrospectively. Patients groups was formed by the individuals that were diagnosed as chronic TE in dermatology outpatient clinics between January 2015 and December 2018. Control group was formed by the age and sex matched healthy individuals. Control group was created retrospectively from medical records of individuals who visited other outpatient clinics mainly checkup polyclinic and had their vitamin D levels measured.

For both groups, individuals with a history of chronic diseases including renal or hepatic diseases, thyroid diseases, rheumatological diseases, bone metabolic diseases, malabsorption, type 1 diabetes mellitus or malignancies were excluded from the study. Individuals with a history of any drug use such as multivitamin, corticosteroids and drugs affecting metabolism in their medical records were also excluded.

Levels of serum 25-hydroxivitamin D were measured in the Gamma Counter device by using 25OH-vit D3 radioimmunoassay (RIA) kits (Beckman Coulter, Brea, CA, USA). Vitamin D levels lower than 20 ng/ml were classified as "vitamin D deficiency" and lower than 5 ng/ml were classified as "heavy vitamin D deficiency" category. Vitamin D levels between 20-30 ng/ml were classified as "vitamin D insufficiency" and higher than 30 ng/ml of vitamin D were categorized as "normal".<sup>11</sup>

Data including 25-hydroxivitamin D levels and demographic features of both groups were recorded. Demographic features of groups were analyzed by using descriptive statistics. Serum vita-

min D levels of patients and control groups were analyzed with crosstabs. A two-sided p-value < 0.05 was considered statistically significant. Statistical analysis was performed using SPSS 17 (Chicago, IL) pack program.

## RESULTS

25-hydroxyvitamin D serum values of 155 patients with TE and 168 age- and sex-matched healthy controls were compared. The female/male ratio of patients and controls was 149/6 and 155/13, respectively (p=0.14). The mean Vitamin D levels in the patient group and control group were 13.42±6.28 ng/ml and 14.62±6.56ng/ml, respectively. The mean 25-hydroxyvitamin D was lower in TE patients but this was not statistically significant (p=0.09). Table 1 shows the demographic features and the mean 25-hydroxyvitamin D levels of groups (Table 1).

Table 2 shows the distribution of measurement of vitamin D according to seasons in both groups (Table 2). The number of subjects whose vitamin D levels were measured for the same season were similar between two groups (p=0.28).

Table 3 shows the vitamin D categories in both groups (Table 3). There was no statistically significant difference between groups according to vitamin D categories (p>0.05). Vitamin D deficiency (5-20 ng/ml) was common in both groups.

## DISCUSSION

Excessive telogen hair loss is a problem that is commonly seen by dermatologists in daily practice. TE is defined as a non-scarring, diffuse hair loss that usually occurs 3 months after exposure to a trig-

gering factor and is usually self-limiting. In nearly 33% of cases there is no identified etiological reason; however, in other patients usually a pathological condition could be identified as the underlying cause of TE. Causative factors considered in the pathogenesis include: stress, febrile states, drugs, endocrine abnormalities, and nutritional disturbances.<sup>1-7</sup>

Vitamin D plays an important role in human health. It is mainly synthesised in the skin, whereas lower amounts are derived from nutrition and diet supplements. Any condition that prevents ultraviolet B (UVB) rays from reaching to the human skin results in vitamin D deficiency. Seasons, using sun protective agents, wearing glass, leather protectors, traditional clothing style, nutrition, smoking habits, alcohol usage, body mass index, genetic predisposition, physical activity, aging, diet, medications used, obesity, ethnicity and latent zone affect the levels of vitamins D.<sup>8,9</sup>

The main role of vitamin D until recent years was considered to regulate calcium and bone metabolism. However, vitamin D exerts many other important physiological effects, including immunoregulation and protection against UV radiation, infectious agents, oxidative stress, and cancer.<sup>10,15</sup>

After the immunomodulatory effect of vitamin D was demonstrated, its potential role has been studied in many areas of medicine including skin and hair diseases.<sup>10,12-24</sup>

It was demonstrated that keratinocytes are capable of metabolizing vitamin D to the active form.<sup>25</sup> Other cells including macrophages and dendritic cells are also capable of synthesizing the active form of vitamin D, and this process is predominantly regulated by immune signals.<sup>26</sup> This is important because many of those cells are involved in the pathogenesis of different skin diseases.<sup>25,26</sup>

Vitamin D exerts its action through the vitamin D receptor (VDR).<sup>24,25,27</sup> VDR is expressed in keratinocytes, dendritic cells, macrophages, B and T lymphocytes, and in two major cell populations in the hair follicle: epidermal keratinocytes and mesodermal dermal papilla cells. VDR is important

**TABLE 1:** The demographic characteristics and the mean 25-hydroxyvitamin D levels of the patient and control groups.

	Patients	Controls	p
Number of individuals (n)	155	168	-
Age (Mean±SD), years	30.70±9.80	30.76±8.80	0.96
Female/male, (n)	149/6	155/13	0.14
25-hydroxyvitamin D levels (ng/ml)	13.42±6.28	14.62±6.56	0.09

**TABLE 2:** Distribution of measurement of vitamin D according to seasons in both groups.

Group	Spring	Summer	Autumn	Winter	Total	p
Patient	41	26	48	40	155	
Kontrol	50	36	34	48	168	0.16
Total	91	62	82	88	323	

**TABLE 3:** Vitamin D categories in the study groups.

Groups	25-hydroxyvitamin D groups				Total	p
	Sufficient (>30ng/ml)	Insufficient (29-21ng/ml)	Deficiency 20- (5ng/ml)	Heavy deficiency (<5ng/ml)		
Patient	5	17	124	7	153	
Control	7	18	142	1	168	0.14
Total	12	35	266	8	321	

for hair follicle integrity.<sup>27</sup> VDR expression is required for normal hair follicle cycling but not for morphogenesis, and its deficiency can inhibit keratinocytes differentiation and disturb the normal hair follicle cycle.<sup>20,25-28</sup>

Role of VDR in the hair follicle cycle was confirmed in many studies.<sup>20,27-32</sup> Because any disturbances in the hair follicle cycle may lead to hair loss, studies had done to investigate the possible role of vitamin D in hair loss.

There were studies investigating the relationship between alopecia areata and vitamin D.<sup>16-19</sup> In most of these studies, patients with alopecia areata had lower levels of vitamin D than the control group.<sup>16,17,19</sup> Only in one study vitamin D level was found to be similar in patient and control group.<sup>18</sup>

Depending on these previous studies, one expects to observe decreased levels of vitamin D in patients with TE. To our knowledge there are 4 prospective case control studies evaluating vitamin D levels in TE patients.<sup>4,21-23</sup> In 3 of these studies vitamin D levels were found to be significantly lower in TE patients than controls.<sup>21,23,24</sup> Contrary to these studies, Karadağ et al. reported an interesting result that they found vitamin D levels higher in patients with TE.<sup>4</sup> They commented these high levels of vitamin D as a compensatory response in TE.

Cheung et al. reported a wider retrospective study with 413 TE patients and without control

group and they also reported low serum Vitamin D levels.<sup>22</sup>

Vitamin D deficiency was common in both patient and control groups in our study. This is compatible with previous studies from our country.<sup>33</sup> In our study vitamin D levels were found to be lower than control group but it was not statistically significant. On the other hand heavy deficiency (< 5 ng/ml) was more frequent in patient group and it was detected only in one individual in control group.

To our knowledge our study is the widest case-control study. Also in our study, seasonal variabilities were excluded in order to make a reliable analysis. In our study the distribution of individuals according to seasons were found to be statistically similar.

On the other hand the study had some limitations. Because it was retrospective, so we could not evaluate some factors such as nutrition, smoking habits, alcohol usage, body mass index, genetic predisposition, physical activity, clothing style of patients and controls. In addition, there were no information about laboratory parameters of inflammatory mediators and receptors. Since D vitamins act on hair follicles through these inflammatory mediators and receptors we believe that prospective studies are needed to evaluate these parameters. On the other hand, control group was

created retrospectively from medical records of individuals who visited other outpatient clinics. There was no history of chronic disease and drug use that can affect the vitamin D levels, but they had a health problem that would cause them to come to the hospital such as fatigue and nonspecific pain. There is a possibility of presence of unrecorded, illnesses and medications for these individuals.

There are limited number of studies with different methodologies and different results. According to our study, even though mean vitamin D level were found to be similar to the control group, heavy deficiency was more frequent in the patient group. So we thought that there is need for further prospective wider studies to evaluate the relation between vitamin D levels and TE.

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### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

*This study is entirely author's own work and no other author contribution.*

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