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Vitamin D level and telogen hair loss: A Case control study

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Abstract:

Background: Hair loss is a common skin condition. Telogen effluvium was found to be the commonest non-inflammatory cause to diffuse hair loss. However, limited information is available on the possible role of vitamin D in the pathogenesis of this condition. Therefore,

Objectives: the aim of current study was to determine the association between Telogen effluvium and vitamin D level.

Methods: This was a case-control study performed in the period between December 2018 and June 2020; at Baghdad Dermatology Center IN the Medical City/ Baghdad. One hundred women who were seeking treatment for diffuse hair shedding and who hadn't received treatment or supplements yet and one hundred and fifty control subjects were chosen from patients who were referred to the dermatology clinic for the treatment of nevi, were included in current study. Full History and physical examination were performed for all cases including looking for cutaneous diseases, supplements and drug intake. Serum Vitamin D3 was measured for all participants using (Ichroma (TM), Boditech Med Inc., Korea).

Result: A total of 250 females were included in this study, 100 of them got telogen effluvium and 150 controls who were patients attend dermatology clinic seeking treatments for nevi or skin tag. The mean age of cases was (22.59 ±4.837 year) that wasn't significantly different from mean age of control group (23.647±6.022 years) (*P*-value =0.127). The mean level of Vitamin D in patients was significantly lower than that of control group (11.16±4.49ng/ml) vs (18.98±10.65ng/ml) (*P* value <0.001). Vitamin D mean level in acute phase patients was significantly higher than that of chronic phase patients (11.68±4.77 and 9.93 ±3.55ng/ml, respectively; *P* value=0.04) Mean vitamin D among symptomatic patients was (9.7±3.5ng/ml) which was significantly lower than that among controls (13±4.19ng/ml; *P*=0.001). No significant association were noticed between job or residence of patients and occurrence of the disease (*P* values =0.283 and 0.069, respectively.

Conclusion: Age was not a significant cause of TE. In addition, deficiency in vitamin D may be assumed as a possible leading cause of telogen effluvium among women with hair loss. Cases of TE were significantly associated with low level of Vitamin D3 than controls. Low level of vitamin D was dominant among housewives, urban women, and among symptomatic patients in the acute phase of the disease.

Keywords: Telogen effluvium, vitamin D, hair loss, Alopecia**.**

Introduction:

Hair loss is a common skin condition. Hair is not a vital organ but losing it has a worse effect on the psychological state of the patient and may interrupt his/her daily social activities. Telogen effluvium (TE) found to be the commonest non-inflammatory cause to diffuse hair loss. It is of two types; acute (the classic one) and chronic. In acute type, hair falling started after two to three months of an acute stressful situation (major surgeries, febrile illness/ or childbirth (1, 2). When telogen hair loss continues for more than 6 months due to the persistence of an underlying factor, it's called chronic telogen effluvium. It can be either due to idiopathic, primary, cause or secondary to many causes. It is most common in females in the 2nd to 5th decade of life (3). There are different causes that lead to change in the normal hair cycle, and the severity of its consequences is related to the severity and duration of the stressor as well as the patient's susceptibility to injury. The most common causes are imbalance of nutrition, chronic disease, malnutrition, thyroid disease and malignancy (4-8). Vitamin D is one of the fat-soluble vitamins (9). It occurs with some clinical

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diseases such as malnutrition disorders, intestinal malabsorption, obesity and some paraneoplastic syndromes 10). Vitamin D deficiency occurs among 30% of healthy adults in the population especially people with darker skin or who live in areas with low exposure to sunlight. In addition, it occurs in multiparous females (11). Vitamin D receptor (VDR) has been found to be important for hair follicle health and hair follicle cycle (12, 13). A significant decrease in the level of 25(OH) vitamin D in the serum, less than 20ng/ml, was noticed among alopecia areata patients. The severity of hair loss in alopecia areata is inversely related to the levels of vitamin D in the blood (14). An interesting study about comparison of 25(OH) vitamin D levels in serum of women with chronic TE and healthy controls reported a significant reduction in serum 25(OH) vitamin D levels compared to the control group. The lowest level was observed in patients with the most severe hair loss. According to this study, the results probably indicated that vitamin D was involved in pathogenesis TE (12-14). Vitamin D assay may be helpful in managing TE, but data on the effect of vitamin D supplementation on hair loss is lacking. Because of the limited number of different studies and methodologies, the results are difficult to compare. However, since nutritional disorders are one of the causes of hair loss, the potential role or deficiency of Vitamin D should be studied. This study aimed to investigate the relationship between telogen hair loss and vitamin D deficiency.

Materials and Methods

A case-control study was conducted from December 2018 until June 2020. One hundred women presented to dermatology outpatient clinic at Baghdad dermatology center in the Medical City/ Baghdad, who were seeking treatment for diffuse hair loss, were included in this study. All young healthy females aged 15-45 years diagnosed with telogen effluvium (100 cases) who hadn't received treatment or supplements yet, and 150 control subjects were chosen from patients who were referred to our clinic for the treatment of nevi and had no systemic disease and/or hair shedding were included in the study.

Exclusion criteria: Patients with signs of hyper-androgenism, alopecia areata and other types of alopecia, pregnant and lactating women, those taking drugs that may alter the blood level of vitamin D; women having malignancy, systemic and local scalp disease. Full history and physical examination were performed for all cases. Then a blood sample was taken from all patients. Serum 25-hydroxyvitamin D3 (25(OH) D3) was measured.

Vitamin D level of <10ng/mL was considered deficient, level between 10-30ng/mL was considered insufficient, while a level between 30-100ng/mL was considered sufficient. Diagnosis of TE was proposed when patients did present with increased hair fall from the entire scalp more than the normal rate of 100hairs/day with no other problems encountered in the scalp. Physical examination for TE was performed by counting the daily falling hairs by the patient or by doing a hair-pulling test. A positive hair pull test defined as more than 10% hair pulled out easily from any part of the scalp (around 60 hairs are held between the thumb, index and middle fingers and gently pulled, if ≤6 hairs attained, indicated normal hair falling and pulling test is negative). However, more than 6 hair shedding is regarded as abnormal, and the patient's hair pull test is positive. If the patient has shampooed within a few hours before the test, four extracted hairs, indicate positive test (15, 16). An official approval from the Committee of Iraqi Board for Medical Specializations was taken, consent was obtained from administration of Dermatology Center at the Medical City and, after explaining the aim and procedure of the study, and verbal consent was taken from all patients.

Statistical analysis: using Microsoft Excel 2016, and SPSS Version 24, descriptive statistics were used to present data from current study using tables (frequency, percentage, means ±standard deviations) and graphs. Chi-squared test was used to find out significance of association between related categorical variables. The *t*-test and ANOVA were used to compare the mean values of vitamin D between the control and patients groups. *P* value ≤0.05 was considered as cutoff point for significance.

Results:

A total of 250 females were contributed in this study, 100 of them had telogen effluvium hair loss (cases), and 150 did not have hair loss (control). The mean age of cases was (22.59 ±4.837 year), which was not significantly different from mean age of control group (23.647±6.022 year) (*P* value=0.127; Table 1). The mean level of vitamin D in cases group was (11.16±4.49) which was significantly lower than that of control group,(18.98±10.65) (*P* value<0.001; Table 1).

Table 1: Age and vitamin D levels of the studied group

Variables	Group	Mean	Standard Deviation	*P* value
Vitamin D level (ng/ml)	Cases (n=100)	11.160	4.496	<0.001
	Control (n=150)	18.980	10.653	
Age (year)	Cases (n=100)	22.590	4.837	=0.127
	Control (n=150)	23.647	6.022	

As shown in Table (2), Chi-squared test revealed no significant associations were noticed between job or residency and occurrence of TE in patients included in current study.

Table 2: Association between job, residency and occurrence of telogen effluvium

		Cases (n=100)		Control (n=150)		*P* value
		No.	%	No.	%	
Job	House wife (n=150)	66	44.0	84	56.0	0.283
	Student (n=60)	20	33.3	40	66.7	
	Employed (n=40)	14	35.0	26	65.0	
Residency	Urban(n=140)	49	35.0	91	65.0	0.069
	Rural (n=110)	51	46.4	59	53.6	

Moreover, Figure (1) showed the distribution of patients (cases) according to their age group, disease chronicity, presence of symptoms, residency and employment.

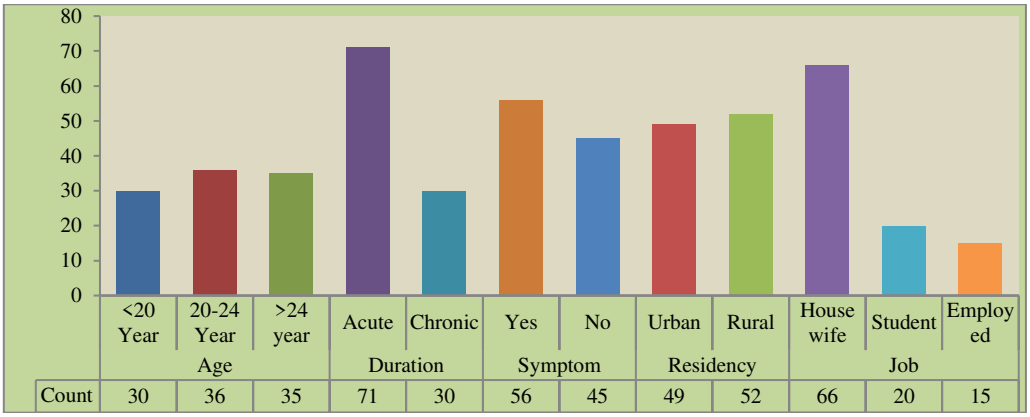

Figure (1): Distribution of cases according to different variables

Table 3: Means vitamin D levels among telogen effluvium patients according to the studied variable

Variables		No.	Vitamin D level		*P* value
			Mean	Standard Deviation	
Duration of disease	Acute	70	11.686	4.771	0.046*
	Chronic	30	9.933	3.551	
Symptom	Yes	56	9.714	4.219	0.001*
	No	44	13.000	4.193	
Job	House wife	66	10.970	4.475	0.084**
	Student	20	10.150	3.513	
	Employed	14	13.500	5.302	
Age	<19 year	30	10.800	3.977	0.873**
	20-24 year	36	11.333	4.401	
	>24 year	34	11.294	5.102	
Residency	Urban	49	10.837	4.674	0.484*
	Rural	51	11.471	4.342	

*According to independent 2 samples *t*-test, **According to ANOVA test.

Table (3) showed that vitamin D level among patients in acute phase was significantly higher than that in chronic phase patients (11.68±4.77 and 9.93±3.55, respectively), (*P* value= 0.046).The mean level of vitamin D among symptomatic patients was 9.714± 3.551 which was significantly lower than that among those without symptoms (13±4.19) (*P*= 0.001). The mean level of vitamin D among employed patients was 13.500± 5.302 with no significant difference between students or housewives (*P*= 0.084). No significant differences were noticed between means of vitamin D according to age (*P* value= 0.873) and residence (*P* value= 0.484).

Furthermore, Table (4) showed that mean age of patients with vitamin D level <20ng/ml was (22.5 ∓ 4.5719 years), while that of those with vitamin D level ≥20ng/ml was (24.7∓6.147 years). There was no significant association between mean age of patients and level of vitamin D (*P*= 0.175; Table 4).

Vitamin D level (ng/ml)	No.	Mean age/years	Std. Deviation	*P* value
<20	90	22.5	4.5719	0.175
≥ 20	10	24.7	6.1473	

Table 4: Mean age and vitamin D levels among telogen effluvium patients

Discussion:

Hair loss is a common problem and has a profound negative mental and emotional effect on patients. Micronutrients, such as vitamins and minerals, play an important role in normal hair follicle growth and immune cell function (17). Vitamin D deficiency is known to be frequent in developed countries and it is not limited to under-developed countries. In the United States, it equally affects children and adults (18).

In present study, the mean age of cases was (22.59±4.837 year), which was not significantly different from mean age of control group (23.647±6.022 year) (*P* value= 0.127; Table 1). This result resembled previous studies suggested that there was no significant difference in age between cases and controls (19, 20). The mean level of Vitamin D in the cases group was (11.16±4.49ng/ml) and was (18.98±10.65ng/ml) in control group. Vitamin D level among cases was significantly lower than that among control group (*P* <0.001; Table 1). This result supported the suggestions of many studies concluded that the increased hair loss present in patients may be associated with decreased levels of vitamin D (21). There was no significant association between occurrence of the disease and job or residency of the patients (*P* value =0.283 and 0.069, respectively; Table 2). Although, in current study, vitamin D level was significantly associated with duration and symptoms of telogen effluvium (*P*=0.046; Table 3), this finding was inconsistent with another study that suggested that there was no significant relation between level of vitamin D and duration of the disease (22, 23). Vitamin D level among patients in acute phase was significantly higher than that among those with chronic phase (11.68±4.77ng/ml and 9.93±3.55ng/ml, respectively, *P* value=0.046; Table 3).The mean level of vitamin D among symptomatic patients was 9.714± 3.551ng/ml which was significantly lower than that among those without symptoms (13±4.19ng/ml, *P*=0.001; Table 3). The mean level of vitamin D among employed patients was 13.500±5.302ng/ml with no significant difference from student or housewife patients (*P*=0.084; Table 3). Also, no significant differences were noticed between means of vitamin D according to age (*P* value=0.873) and residence (*P* value=0.484) (Table 3). These data were inconsistent with those reported by a study done in Pakistan that suggested that there was a significant association between patients with TE and their jobs 26).

Conclusion:

Age was not a significant cause of TE. In addition, deficiency in vitamin D may be assumed as a possible leading cause of telogen effluvium among women with hair loss. Cases of TE were significantly associated with low level of Vitamin D3 than controls. Low level of vitamin D was dominant among housewives, urban women, and among symptomatic patients in the acute phase of the disease.

Conflict of interest: None.

Funding: Self-funded study.

Authors' contributions:

Dr. Taiceer Abdul Kareem Turkan: study conception, study design, data analysis, interpretation of data, drafting of manuscript.

Dr. Jamal Rasheed Al-Rawi: supervisor, support Dr. Taiceer Abdul Kareem Turkan to perform the analytic calculations and supervised the findings of this work.

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العلاقة بين تساقط الشعر الكثيف ومستوى فيتامين دي بالدم :دراسة سريرية مختبرية ضابطة

تيسير عبد الكريم تركان :بكالوريوس طب وجراحة عامة, طبيبة مقيمة قدمى/ المرحلة الرابعة / المجلس العراقي للاختصاصات الطبية في الأمراض الجلديه والزهريه/ مركز بغداد التدريبي.
الأستاذ الدكتور جمال الراوي : بروفيسور في الامراض الجلديه والزهريه /تدريسي في كلية الطب / الجامعة المستنصرية.

الخلاصة:
المقدمة : يعتبر تساقط الشعر حالة جلدية شائعة جدًا عادة ما يكون مصحوبا بأثار نفسية كبيره على المرضى,تساقط الشعر الكربي من الاسباب الأكثر شيوعًا لتساقط الشعر وبما أن الاضطرابات الغذائية هي أحد العوامل المحفزة له من ضمنها فيتامين دال حيث انه أحد الفيتامينات المهمة.فيتامين دال قد يكون مفيدًا في علاج تساقط الشعر الكربي ونظرًا للعدد المحدود من الدراسات وقلة المعلومات المتوفرة حول هذا الموضوع ، يجب دراسة الدور المحتمل لفيتامينداالأو (نقصه بالتحديد) في تساقط الشعر.
االهدف من الدراسة : تهدف هذه الدراسة إلى معرفة العلاقة بين تساقط الشعر الكربي ونقص فيتامين دال.
طريقة الدراسة: هذه الدراسة عبارة عن دراسة مقارنةأجريت في الفترة ما بين كانون الاول 2018 حتى حزيران 2020 في مركز بغداد للأمراض الجلدية في مدينة الطب. حيث ان مائة امرأة ممن يعانين من تساقط الشعر العامولم يتناولن أي ادوية أو مكملات غذائية بعد تم ضمهم لهذه الدراسة, وكذلك تم اختيار مجموعة ضبط مكونه من مائة وخمسين شخصًا تم اختيارهم من المرضى المراجعين لعيادة الأمراض الجلدية لعلاج الشامات ,تشمل معايير شمول المرضى جميع الفئات العمرية والجنس الذين تم تشخيصهم بتساقط الشعر الكربي. معايير الاستبعاد تشمل المرضى الحوامل أو المرضعات والذين يعانون من أمراضجلدية في فروة الرأسمثل داء الثعلبة والصدفية والبهاق وامراض جهازية موثقة مثل أمراض الكلى والكبد. تم تقييم جميع المرضى من خلال اخذالتاريخ الطبي الكامل والفحص البدني السريري وفحص مستوى فيتامين دال في مصل الدم.
النتيجة: تم تضمين ما مجموعه 250 أنثى في هذه الدراسة ، 100 يعانون من على تساقط الشعر الكربي و 150 من المرضى الذين ذهبوا إلى عيادة الأمراض الجلدية بحثًا عن علاج للشام أو الزوائد الجلدية (المجموعة الضبط) وكان متوسط عمر الحالات (22.59 ± 4.837 سنة)) لم يكن مختلفًا بشكل كبير عن متوسط عمر المجموعة الضابطة (23.647 ± 6.022 سنة) (القيمة الاحتمالية = 0.127). كان متوسط مستوى فيتامين دال أقل بكثير من مستوى المجموعة الضابطة (18.98 ± 10.65) مقابل (11.16 ± 4.49) ، قيمة .P <0.001 كان متوسط مستوى فيتامين (دال) في الحالات الحادة أعلى بكثير من الحالات المزمنة. (11.68 ± 4.77 & 9.93 ± 3.55 على التوالي) ، قيمة القيمة الاحتمالية0.04=. كان متوسط فيتامين دال بين نقاط الأعراض (9.7 ± 3.5) أقل بشكل معنوي من ذلك بين النقط بدون أعراض. (13 ± 4.19) (القيمة الاحتمالية = 0.001) لم يلاحظ أي علاقة بين العمل والإقامة لمرضى المجموعتين ، (القيمة الاحتمالية = 0.283 & 0.069) على التوالي.
الاستنتاج: لا توجد فروق ذات دلالة إحصائية بين متوسط العمر معنويًا بين الحالات و المجموعة الضابطة ، يفترض ان نقص فيتامين (دال) السبب الرئيسي المحتمل لتساقط الشعر الكربي بين النساء المصابات بتساقط الشعر العام. يبدو أن الارتباط بين الحالات بانخفاض مستوى فيتامين دال عن المجموعة الضابطة ذو دلاله احصائية .كان المستوى المنخفض من فيتامين (دال) هو السائد بين ربات البيوت ، والنساء في المناطق الحضرية ، وبين المرضى الذين ظهرت عليهم الأعراض مع فترة حادة.
الثعلبة. تساقط الشعر ، فيتامين د ، الكلمات المفتاحية: تساقط الشعر الكربي ،