



Evaluation of Zinc, Vitamin B12, Folic Acid and Iron Levels and Thyroid Functions in Patients with Chronic Telogen Effluvium

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Abstract

Background and Aim: Telogen effluvium (TE) is a hair disorder characterized by abrupt onset, diffuse, self-limited and excessive shedding of club hairs. The purpose of this study was to investigate serum zinc, vitamin B12 and folic acid levels as well as parameters of iron metabolism and thyroid functions in patients with chronic telogen effluvium (CTE) and compare the results to those of the controls.

Methods: In this study, a total of 260 patients with CTE who were admitted to the outpatient dermatology clinic of our hospital were retrospectively evaluated. The control group consisted of 117 healthy volunteers who matched the patient group in respect of age and sex. Data on age, sex and duration of hair loss were obtained from the patient files. Levels of serum zinc, vitamin B12 and folic acid, parameters of iron metabolism and thyroid functions were recorded in both groups.

Results: Out of 260 patients, 212 were female and 48 were male. On the other hand, out of 117 controls, 95 were female and 22 were male. The mean duration of hair loss was 8.06 ± 1.48 months in the patients. According to the statistical analyses, parameters of only iron metabolism were significantly lower in the patients compared to the controls conversely the other laboratory parameters.

Conclusions: It is principally recommended that iron deficiency be screened in patients with CTE.

Keywords

Telogen effluvium, Zinc, B12 vitamin, Folate, Parameters of iron metabolism, Thyroid function tests

if persists more than 6 months. There may be no identifiable cause for TE. However, endocrine disorders, autoimmune aetiology, stressful events, nutritional disorders, localised and systemic skin diseases, intoxication, drugs, genetics and environmental factors can be listed among many causes of hair loss [2,3]. If the hair goes unwashed for more than 24 hours, usually more than 10% of the total hair is easily extracted from any part of the scalp in the acute phase of TE. In the light pull-test, a negative result (≤ 6 hairs obtained) indicates normal shedding of hair while a positive result (> 6 hairs obtained) indicates active shedding of hair [4].

Up to date, the studies have always investigated iron parameters, some hormones, zinc, vitamin B12 and folate in patients with hair loss [5-19]. However, to the best of our knowledge, there are no studies in the literature which evaluate all the parameters that were checked in this study in patients with chronic telogen effluvium (CTE).

TE is one of the common manifestations of diffuse alopecia in general population [5,6]. Excessive telogen hair loss or TE, in other words, is a problem that clinical dermatologists frequently encounter in daily practice. Many TE cases are subclinical, which makes it difficult to know the true incidence of this condition in the community. TE is an abnormality of hair cycling those results in excessive loss of telogen hair and is one of the most common causes of diffuse hair loss in women. No etiological factor can be identified in almost 33% of patients with TE whereas usually a pathological condition is blamed in the remaining [2,20]. To establish the cause of hair loss, history of the patient should be taken carefully to identify the known triggers. Causes may vary from common and easily treatable nutritional or hormonal problems such as thyroid metabolism defects to less common zinc deficiency. TE usually ceases within 3-6 months upon removal of the stimulus whereas CTE may last 3-10 years [7].

In the present study, we aimed at investigating serum zinc, vitamin B12 and folic acid levels as well as parameters of iron metabolism and thyroid functions in patients with CTE and comparing results between the two study groups.

Material and Method

In this study, 260 patients with chronic telogen effluvium who were

Introduction

Hair loss affects more than 25% of female population in developed countries. In the United States of America, 50% of women have been reported to suffer hair loss until they reach 50 years of age [1]. Telogen effluvium (TE) and diffuse cyclical hair loss in women are two clinical conditions characterized by chronic and fluctuating increases in shedding of hair without loss of hair volume. TE is a rapid onset condition which is characterized by diffuse shedding of telogen hair from the scalp and is considered chronic

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Table 1: Laboratory parameters of the patients and the controls

Laboratory parameters/ The reference range	Patients	Control Subjects	P value
Hemoglobin/ 12-17.00 g/dl	11.12 ± 1.59	13.56 ± 1.23	0.00
MCV/ 80.0-100.0 fl	80.80 ± 7.79	85.72 ± 5.23	< 0.05
SIB 220-420 ug/dl	394.72 ± 98.65	348.28 ± 27.90	0.000
SI 50-170 ug/dl	63.47 ± 27.28	87.89 ± 23.52	< 0,05
Ferritin/ For man 30-400 ng/ml / for female 13-150 ng/ml	34.11 ± 20.46	57.66 ± 21.03	0.00
Zinc/ 70-150 µg/dL	75.90 ± 25.38	77.69 ± 14.01	> 0,05
Folic acid/ 3,1-17,5 ng/ml	4.88 ± 2.38	5.03 ± 1.77	> 0,05
B12 vitamin/ 197-866 pg/ml	327.72 ± 106.55	332.29 ± 111.73	> 0,05
TSH/ 0.27 - 4.20 mikrolU/mL	1.77 ± 1.44	1.56 ± 0.50	> 0,05
FT3/ 1,8-4,6 ng/mL	2.61 ± 1.55	2.28 ± 0.41	> 0,05
FT4/ 0,89-1,80 ng/mL	1.32 ± 1.22	1.24 ± 0.53	> 0,05
Antinuclear antibody titers	Negative	Negative	-
VDRL	Negative	Negative	-

MCV: Mean corpuscular volume, **SIB:** Serum iron binding globulin, **SI:** Serum iron, **TSH:** Thyroid Stimulating Hormone, **FT3:** Free triiodothyronine, **FT4:** Free thyroxine, **VDRL:** Venereal Disease Reserach Laboratory

admitted to the outpatient dermatology clinic of our hospital between January 2010 - March 2011 were retrospectively evaluated. The control group consisted of 117 healthy volunteers who matched the patients in respect of age and sex and had no complaints of hair and nail but still were subject to an evaluation of laboratory parameters for check-up purposes. Data on age, sex and duration of hair loss were obtained from the patient files. The patients with a positive light pull test result who were diagnosed with TE when more than 20% of the hair extracted were determined, either dermatoscopically or microscopically, to be at telogen phase were included in this study.

SPSS® version 16 was used to analyses patient's data. As to the methods used for comparison of continuous variables between the groups, independent sample t-test was used for comparison of parametric variables and Mann-Whitney U test was used where parametric criteria were not met. Comparison of results between multiple groups was made by Kruskal-Wallis test. In addition, categorical variables were compared by χ^2 analysis. A p value < 0.05 was considered statistically significant.

Results

Out of 260 individuals included in the patient group, 212 were female and 48 were male. On the other hand, out of 117 individuals included in the control group, 95 were female and 22 were male. The mean age of the patients and the controls was 29.63 ± 12.05 and 30.76 ± 12.12 , respectively. The mean duration of hair loss was 8.06 ± 1.48 months in the patients. It was accepted that the patients had CTE. All of the patients with CTE were without an obvious cause. The patients' syphilis serology and antinuclear antibody (ANA) titers were negative. According to the statistical analyses, the patients had significantly lower levels of iron parameters such as serum iron (SI), hemoglobin (Hg) and ferritin and significantly higher levels of serum iron binding capacity (SIB) than the controls. There was no statistically significant difference between the groups in levels of zinc, vitamin B12 and folic acid and results of thyroid function tests (Table 1).

Discussion

CTE is a rapid onset condition which is characterized by diffuse shedding of telogen hair from the scalp and is considered chronic if persists more than 6 months. The mean duration of hair loss was $8,06 \pm 1,48$ months in the present study.

In addition to complete blood count and routine urine examination results, levels of serum ferritin and results of thyroid function tests should also be checked in all patients with diffuse hair loss who show no apparent cause [8].

There are no significant data in the literature suggesting a clear relation between nutritional factors and hair loss. Iron deficiency is one of the most common nutritional deficiencies that dermatologist can encounter in daily practice [9]. Duration of hair loss at presentation helps predict in which patient further investigation will produce the highest yield. In premenopausal women, the most common causes of iron-deficiency anaemia are menstrual blood loss and pregnancy. In this respect, hemoglobin concentration can be used for iron-deficiency screening whereas serum ferritin concentration can be used to confirm the diagnosis [10]. Presence of iron deficiency with or without anaemia is considered to be a cause of TE, and there are some studies conducted on this subject previously [11-15]. Authors of these studies screened even those patients with no anaemia for iron deficiency and believed that treatment of hair loss was enhanced when serum ferritin concentration was raised to 70 µg/ml. Different levels of serum ferritin ranging from 20 to 70 µg/ml are used for determining iron deficiency; however, a cut-off value below 41 µg/ml has a sensitivity and specificity of 98% [11-15]. In the present study, levels of ferritin in the patient group were lower than both this cut-off value and the levels obtained in the control group [6,11].

It is not known how reduced iron stores affect hair loss. But, iron is a known cofactor in ribonucleotide reductase, a rate-limiting enzyme for DNA synthesis. Hair follicle matrix cells are among the most rapidly dividing cells in the body. They may be very sensitive even to a small reduction in iron availability, hence resulting in reduced hair growth in the presence of iron deficiency [16]. Several studies have examined the relation between iron deficiency and hair loss. However, there is no sufficient evidence currently to recommend a routine screening for iron deficiency in patients with hair loss and replacement of iron in the absence of iron-deficiency anaemia [11-13]. For example, Sinclair et al. [12] reported that iron deficiency is not increased in patients with female pattern hair loss or chronic TE versus control subjects. The present study, on the other hand, found relatively low levels of hemoglobin and ferritin among multiple parameters in patients with CTE.

Zinc is extremely important for maintaining homeostasis in human body and is one of the major components of hormones, signal molecules and enzymes. Zinc deficiency is caused by insufficient uptake of zinc from food or by malabsorption syndromes, increased gastrointestinal and urinary loss and administration of various medications. It is a frequently encountered problem that may cause anaemia in women. There is a common belief that zinc deficiency is associated with hair loss. On the other hand, there are some reports which, in agreement with the present study, suggest no relation between zinc deficiency and TE [17]. In the present study, no significant difference was found in serum zinc levels between the patients with CTE and the control group.

Hormonal problems such as thyroid metabolism defects may cause hair loss. However, there was no significant difference in the results of thyroid function tests between the patients with CTE and the control group in the present study. When no apparent cause is found, screening for T3, T4 and TSH is recommended [17].

Gonul et al. [18] found that serum ferritin, iron, vitamin B12 and folate levels of the patients with alopecia areata were no different from those of the controls. Serum ferritin, iron, vitamin B12 and folate levels did not vary according to the duration of disorder or the accompanying alopecia areata.

Durusoy et al. [19] investigated the role of psychological factors and serum zinc, folate and vitamin B12 levels in the aetiology of trichodynia in a case-control study. Data that they found provided no evidence that serum zinc, folate or vitamin B12 levels were involved in the pathogenesis of trichodynia. In the present study, no significant difference was found between the patients and the controls in vitamin B12 and folate levels.

To the best of our knowledge, although there are some studies in the literature which are similar to this one, no study has ever investigated all the parameters investigated in this study before. Investigating all these parameters in such a large number of patients boosted the value of this study.

A major limitation of the present study is retrospective and don't be compared with other alopecia.

We think that iron deficiency anaemia is an important risk factor for CTE in otherwise healthy female patients and recommend screening for iron deficiency in patients with CTE. However, further clinical and experimental studies with a larger number of participants and a wider range of potentially influential parameters are required.

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