Estimation of Serum Ferritin Level in Female Patients with Telogen Effluvium

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Abstract

Background: Telogen Effluvium (TE) is the most common cause of diffuse hair loss in adult females. TE may be a sequel of various metabolic alterations such as pregnancy, malnutrition especially iron deficiency anaemia in premenopausal women. Hemoglobin concentration can be used to confirm iron deficiency, whereas serum ferritin concentration can be used to confirm iron deficiency. In this study we tried to put a light spot on the role of serum ferritin level in female patients with TE.

Methods: A case control study was done including 100 female patients less than 40 years (their age ranged from 18 to 40 years) divided into 2 groups. The patient group containing 80 female patients with telogen effluvium the control group containing 20 normal females without hair loss. A full history was done with full clinical examination. Blood samples were collected from all studied groups and examined for: serum ferritin level (by Ferritin ELISA -EIA-1872 test kits), Unbound T4 (by FT4 RIA KITS) and Complete blood counts (Haemoglobin level, RBCs count and Blood Indices. Insignificant relation was found between control and study groups using SPSS statistical data analysis.

Results: The results of this study showed normal serum ferritin level in female patients suffering from telogen effluvium as well as normal serum Hg level, HCT value, RBCs count and Blood Indices. Insignificant relation was found between control and study groups using SPSS statistical data analysis.

Conclusion: There was no closely linked relationship between iron metabolism and TE.

Keywords: Ferritin; Iron deficiency anemia; Telogen effluvium

Introduction

The term telogen effluvium, first coined by Kligman in 1961, refers to the loss of club (telogen) hair in disease states of the follicle [1].

Telogen effluvium is the most common cause of diffuse hair loss in adult females. In the normal scalp, 90-95% of the follicles will be in the anagen phase and the remainder (5-10%) will be in the telogen phase (with about 50-100 hairs shed daily). Various metabolic alterations such as pregnancy, malnutrition and other stresses are capable of adjusting the biologic clock within hair follicles, and it is possible for abnormally large numbers of hairs to enter the telogen phase simultaneously. When this happens, the hair loss is termed a TE [2].

Telogen effluvium includes increased shedding of club hairs with diffuse hair loss from all over the scalp. There should be a positive pull test of telogen hairs. In some cases there may be bitemporal thinning of hair. In cases of resolving TE, shorter, re-growing frontal hairs can often be observed [2].

Investigators have addressed the relationship of iron stores to nonscarring scalp hair loss in 13 studies [3]. Some suggest that iron deficiency may be related to AA, AGA, TE and diffuse hair loss, while others do not [4].

In premenopausal women, the most common causes of iron deficiency anaemia (IDA) are menstrual blood loss and pregnancy. Hemoglobin concentration can be used to screen for iron deficiency, whereas serum ferritin concentration can be used to confirm iron deficiency [4].

Ferritin is a highly conserved protein complex that plays an important role in iron storage and is recognized as the main iron-binding protein in non-erythroid cells [1]. Intracellular ferritin is synthesized by the smooth endoplasmic reticulum. Serum ferritin is synthesized by the rough endoplasmic reticulum and glycosylated by the Golgi apparatus before being secreted. Generally, serum ferritin is directly related to intracellular ferritin and thus total body iron stores. Investigators consider serum ferritin to be the most powerful screening tool for iron deficiency. In iron overload, ferritin is increased [5].

Ferritin serves to store iron in a non-toxic form, to deposit it in a safe form, and to transport it to areas where it is required. The function and structure of the expressed ferritin protein varies in different cell types. The presence of iron itself is a major trigger for the production of ferritin, with some exceptions [6]. Ferritin concentrations increase drastically in the presence of an infection or cancer; this is necessary to counter the infective agent’s attempt to bind iron from the host’s tissue. The inflammatory response may cause ferritin to migrate from the plasma to within cells, in order to deny iron to the infective agent [7]. The objective of our study was to estimate the serum ferritin level in female patients with telogen effluvium.

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Patients and Methods

Subjects

This study (case control study) included 100 females under 40 years their age ranged from (18-40) years, they were selected from the attendants of the outpatient clinic of dermatology at Al-Hussein university hospitals.

Faculty of Medicine, Al- Azhar University, Cairo, Egypt. They were divided into two groups:

- The patient group included 80 female patients with telogen effluvium;
- The control group included 20 normal females without hair loss.

All members of the study were subjected to full history as regard:
- Age, occupation, history of physical and mental stress, family history of hair loss, previous operations, head trauma, excessive blood transfusion or donation, history of systemic diseases, medications (topical or systemic), diet, childbearing history including (menstruation, pregnancy and lactation), onset, course and duration of hair loss.

History of chronic telogen effluvium

The patients presented with abrupt, excessive, alarming, diffuse, generalized shedding of hair from a normal looking head. Chunks of hair were seen in the bathroom, pillow, brush, and comb. A hand full of hair was displayed by the patient to corroborate the complaint of excessive shedding.

Full clinical examination

Body built, scalp abnormalities, infections or scarring, manifestation of anemia, manifestation of hyperandrogenism (acne or hirsutism), lymph nodes examination, thyroid examination, liver and spleen examination and nail abnormalities.

Local examination

**Inspection:** Hair length, color, luster, density, diffuse or localized hair loss, scales, nets of pediculosis, signs of scalp inflammation, visible follicular openings (to exclude cicatricial alopecia); palpation, scalp abnormalities, infections or scarring, manifestation of anemia, manifestation of hyperandrogenism (acne or hirsutism), lymph nodes examination, thyroid examination, liver and spleen examination and nail abnormalities.

**Exclusion criteria**

Any patients with thyroid abnormality, haemochromatosis and androgenetic alopecia were excluded.

Methods

Blood samples were collected from all studied groups and examined for:

1- Serum ferritin level (by Ferritin ELISA-EIA-1872) test kits with normal range (12-150 ng/ml) by the following steps:

- Serum prepared from a whole blood specimen without any additives with avoidance of grossly haemolytic, lipemic or turbid samples [8];
- Specimens capped and stored for up to 48 hours at 2-8°C. Samples inverted several times prior to testing;
- Specimens mixed with kits for ferritin for 30 seconds then incubated at room temperature for 45 minutes;
- Manual pipetting of all samples was done and reading the optical density at 450 nm [9];
- 2- Unbound T4 (by FT4 RIA KITS) with normal range (0.89-1.79 ng/dl);
- 3- Complete blood counts (Haemoglobin level, RBCs, HCT values, MCV, MCH, MCHC).

Statistical analysis

Data was done using statistical package for social science (SPSS) statistical programs and described in terms of range, mean, median, standard deviation, frequencies (number of cases) and relative frequencies (percentages) when appropriate. Comparison of quantitative data between the control and subject groups was done using tests for independent samples. Analytical tests used included Pearson correlation (r), where all the parameters were tested for correlation. Significance and P value (P stands for probability) was used, were P value <0.05 was considered to be statistically significant.

Results

The obtained results were analyzed regarding the serum ferritin, hemoglobin, RBCs and RBCs indices. It shows insignificant difference between patient and control groups as regard age, hemoglobin level, RBCs count, HCT value, MCV, MCH, MCHC, serum ferritin level (P value=0.231, 0.123, 0.949, 0.078, 0.06, 0.557, 0.394) respectively (Table 1). Also there was insignificant correlation between age, hemoglobin, HCT, RBCs MCV, MCH, and MCHC and serum ferritin level with p value=0.080, 0.540, 0.682, 0.237, 0.860, 0.244, 0.127 respectively) (Table 2).

Discussion

Telogen effluvium is the most common cause of diffuse hair loss in adult females. In the normal scalp, 90-95% of the follicles will be in the anagen phase and the remainder (5-10%) will be in the telogen phase (with about 50-100 hairs shed daily). Various metabolic alterations such as pregnancy, malnutrition and other stresses are capable of adjusting the biologic clock within hair follicles, and it is possible for abnormally large numbers of hairs to enter the telogen phase simultaneously. When this happens, the hair loss is termed a TE [10].

In this study we tried to put a light spot on the role of serum ferritin level in female patients with telogen effluvium. The results of this study showed normal serum ferritin level in patients suffering from telogen

<table>
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<th>Table 1: Comparison between patient and control groups.</th>
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<tbody>
<tr>
<td>Age (years)</td>
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<tr>
<td>Mean ± SD</td>
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<tr>
<td>24.950 ± 6.042</td>
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<tr>
<td>11.698 ± 1.396</td>
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<tr>
<td>4.356 ± 0.534</td>
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<tr>
<td>36.053 ± 2.787</td>
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<tr>
<td>82.473 ± 5.128</td>
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<tr>
<td>27.303 ± 2.731</td>
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<tr>
<td>33.490 ± 1.824</td>
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<td>34.338 ± 29.250</td>
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Table 2: Correlation between ferritin level and other parameters.

<table>
<thead>
<tr>
<th>Age</th>
<th>Serum ferritin ng/ml</th>
<th>R</th>
<th>P-value</th>
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<tr>
<td>years</td>
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<tr>
<td>0.280</td>
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<td>0.080</td>
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<td>0.100</td>
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<td>0.540</td>
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<td>0.047</td>
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<td>0.682</td>
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<td>-0.134</td>
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<td>0.237</td>
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<tr>
<td>-0.020</td>
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<td>0.860</td>
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<td>0.132</td>
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<td>0.244</td>
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<tr>
<td>0.172</td>
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<td>0.127</td>
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The results of this study showed normal serum ferritin level in female patients suffering from telogen effluvium. So we can suggest the
absence of closely linked relationship between iron metabolism and hair loss.

References