

Comparison Between Hemoglobin Serum Level and Serum Ferritin level in Detecting Low Iron Store in Adult Menstruating Females with Chronic Telogen Effluvium.

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ABSTRACT:

BACKGROUND:

Chronic telogen effluvium is a non-scarring diffuse hair loss which lasts longer than 6 months. Low iron stores are considered a possible cause of chronic diffuse telogen hair loss in women. Serum ferritin concentration is an indicator of the status of iron stores.

OBJECTIVE:

This study was done to Compare the hemoglobin serum level and serum ferritin level in detecting low iron store in adult menstruating females with chronic telogen effluvium and show the relation between chronic telogen effluvium and iron deficiency.

PATIENTS AND METHOD:

Case-control study of 63 adult menstruating female subjects. Case group; 38 patients with chronic telogen effluvium and control group; 25 healthy volunteers. Serum ferritin levels and hemoglobin were estimated for the case group and some other investigations were done in selected cases as indicated. For controls only measurements of hemoglobin and serum ferritin levels were done and were statistically compared.

RESULTS:

The mean serum ferritin level was low in the case group (17.6ng/ml) in comparison with control group (41.2ng/ml). The difference was statistically significant ($P < 0.001$) between both groups. The mean hemoglobin levels were similar in both groups and there was no significant statistical difference ($P = 0.868$) between both groups.

CONCLUSION:

There was a statistical association between low serum ferritin and chronic telogen effluvium. Hemoglobin levels may not reflect the real iron state in patients with chronic telogen effluvium and serum ferritin level is a better indicator for early detection of low iron store.

KEY WORDS: telogen, effluvium, ferritin, hemoglobin, iron store

INTRODUCTION:

Hair loss is a common problem that affects both males and females of all ages. It affects over 25% of women in developed countries. Chronic telogen effluvium (CTE) is a hair shedding which lasts longer than six months. In some women CTE is an early feature of androgenic alopecia. Its onset is often insidious and it can be difficult to identify a triggering factor.^(1,2)

The etiology of telogen effluvium in general includes; endocrine causes, stressful events, nutritional causes, intoxication, drugs and Inflammatory scalp diseases. Underlying disorders, such as thyroid deficiency and systemic

lupus erythematosus (SLE), should be excluded. Iron deficiency, with or without anemia, is often cited as a cause of CTE. Adult menstruating females are thought to be more iron deficient than postmenopausal women. In many women, however no cause can be established and excess shedding may simply be the result of an age related shortening of the hair cycle.^(1,3)

Serum ferritin concentration is an indicator of the status of iron stores and the serum ferritin level (SFL) is directly related to the amount the iron stored in the body.⁽⁴⁾

Hemoglobin (Hb) level may be within normal limits in women with iron deficiency and hair loss. This is because decreased iron stores in body will lead to hair shedding before the development of microcytic anemia.⁽⁵⁾

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The Mechanism by which reduced iron stores may affect hair loss:- the hair follicle matrix cells are some of the rapidly proliferating cells in the body. At the cellular level, ferritin levels are increased in non dividing cells, such as stem cells and terminally differentiated cells, whereas rapidly proliferating cells appear to have lower level of ferritin and higher levels of free iron. This balance of ferritin and iron is at least partially controlled by transcription factor c-myc. ^(6,7) Over expression of c-myc in the cutaneous epithelium result in loss of follicular differentiation and decrease in stem cells. ⁽⁸⁾

Another likely mechanism for iron possible effect on hair growth stem is from its requirement as a cofactor for ribonucleotide reductase, the rate limiting enzyme for DNA synthesis. The depletion of iron could prevent proper functioning of this enzyme resulting in inhibition of proliferation. ⁽⁹⁾ Inhibition of other iron –dependent enzymes, such as stearyl CoA desaturase, which when mutated cause hair loss in mice and is also present in the human hair follicle, could contribute to hair as well. ⁽¹⁰⁾

This study was done to evaluate the relation between chronic telogen effluvium and iron deficiency and to show whether Hemoglobin levels reflect the real iron states or not in comparison to serum ferritin level in CTE adult menstruating females.

PATIENTS AND METHODS:

This case-control study was conducted in consultation Dermatological center in Sulaimania city in the period between February and November 2010.

It involved 63 adult menstruating female subjects were divided into two groups:-

1-Case group; were 38 patients with CTE.

2-Control group; were 25 healthy volunteers randomly recruited into the study.

All patients in case group were fitted with the definition of CTE, with diffuse hair loss of at least 6 months duration. The diagnosis was based on increase hair shedding by medical history and physical examination, and confirmed by a positive hair pull test.

Exclusion criteria included; diffuse hair loss less than 6 month duration, patients with a history of diseases known to cause diffuse hair loss eg. hypothyroidism or hyperandrogenism, abnormal laboratory studies (except SFLs and Hb) or on drugs known to cause hair loss.

Medical history inquires about duration of the hair fall, age of the patient, hair loss quantity, severe diet restriction, menstruation, medical diseases and thyroid symptoms.

Physical examination, including the examination of the scalp surface.

The hair pull test (Manually grasp 50-100 scalp hairs and apply gentle traction from the base to the terminal ends, repeating in various areas of the scalp. Shedding of more than two hairs/hair pull on multiple hair pulls is pathologic, if hair has been shampooed regularly) ⁽¹⁾ was done for all patients in case and control groups.

The investigations include serum SFLs and Hb in all patients, but thyroid function tests, renal and liver function tests, pelvic ultrasound and hormonal studies (LH, FSH, serum testosterone and DHEAS) were done in some suspected cases as indicated.

Both groups were categorized for SFLs using a cut-off point of 20 ng/ml as the acceptable minimum normal value. The acceptable minimum normal value for Hb was 11 g /dl ⁽¹¹⁾. Laboratory tests for controls included only measurements of SFLs and Hb.

Statistical analysis:

The statistic program SPSS for windows version 16 was used for statistical analysis to determine the frequency of low SFL among CTE patients and its relation to CTE. P-value detected by Chi-square and consider statistically significant if it is ≤ 0.05 .

RESULTS:

Sixty- three adult menstruating females, 38 cases with CTE and 25 healthy volunteers consecutively recruited in the study. Their ages ranged from 18 to 45 years with a mean of (30.15 ± 6.5) years

The mean age, Hb value and SFLs of the case and control groups are listed in table1 together with their respective ranges and standard deviation (SD).

The duration of the CTE was ranged from 6 to 12 months with a mean duration of (8.51 ± 2.7) months.

1. Case group (38 patients with CTE): Their ages ranged from 18 to 45 years with a mean age of (31.15 ± 6.5) years.

Twenty four (63.2 %) were married ; The mean SFLs of 14.85 ng/ml, 19 (79.16%) patients showed low SFLs, 6 (25%) Patients used intra uterine device (IUD). five (83.33%) of them showed low SFL.

Fourteen were Unmarried (36.8%) patients with a mean serum ferritin of 18.9 ng/ml. Eight (57.1%) patients in this group showed low SFL.

Hemoglobin level was ranged from 9 to 14.3 g /dl with a mean of 12.19 ± 1.26 g /dl. Decreased Hb levels were seen in 7 (18.42%) patients. The

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relation between Hb levels and CTE was not statistically significant (P-value =0.868).

Serum ferritin levels were ranged from 1.5 to 60 ng/ml with a mean of 17.63 ng / ml. Decreased SFLs were seen in 27(71%) of this group .The relation between low SFL and CTE was statistically significant (P-value =0.018).

2. The control group (25 normal subjects) ; Their ages ranged from 21 to 40 years with mean age of 29± 4.32 years.

Serum ferritin level was ranged from 5.5 to 74ng/ml with a mean of 41.23±19.47ng/ml.

Decreased SFLs were seen only in 4(16%) of this group. The relation between low SFL and controls was statistically not significant (P-value =0.8). Both groups were categorized for SFLs using a cut-off point of 20 ng /ml as acceptable minimal value (Table 2).

Hemoglobin levels ranging from 9 to 13.5 g/dl with a mean of 12.37±0.39 g/dl. Decreased Hb levels were seen in 2(8%) patients only. Hemoglobin levels were normally distributed in both groups. Using the T- test we found that the mean difference in mean Hb value was not statistically significant (P-value=0.311) between both groups.

Table1: Mean age, Hb, and SFLs in case and control groups

	Mean age (±SD)* [range]	Mean Hb (±SD)* [range]	Mean SFL(±SD)* [range]
Case group	31.15(±6.5) [18-45]	12.19(±1.26) [9-14.3]	17.63(±6.6) [1.5-60]
Control group	29.1(±4.23) [21-40]	12.37(±0.39) [9-13.5]	41.23(±19.74) [5.5-74]

*mean age is given by years, Hb by g/dl, and SFLs in ng/ml and Mean ± standard deviation.

Table 2 : Number of cases and controls according to Hb and SFLs

Category	Low		Normal	
	Hb	SFL	Hb	SFL
*Case group	7 (18.42%)	27(71%)	31(81.5%)	11(28.94%)
*Control group	2(8%)	4(16%)	23(92%)	21 (84%)
Total	9(14.28%)	31(49.2%)	54 (85.71%)	32(50.7%)

*p- value of SFL is statistically significant (P= 0.018) while not (p=0.868) for Hb% in Case group.

*p- value for both SFL(P= 0.8) and Hb% (p=0.311) statistically not significant in control group .

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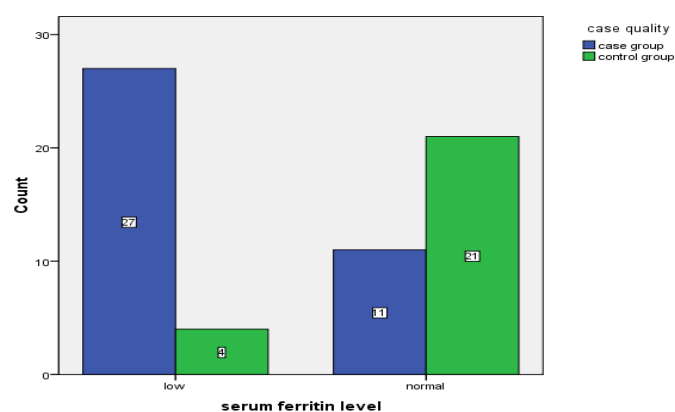


Figure 1 : Frequency of SFLs in both case and control groups

DISCUSSION:

Since serum ferritin measurement has been reported to be the most sensitive assay for estimating the iron states in adult population⁽¹²⁾, we use this assay for verifying a possible link between iron status and hair loss and to use serum ferritin level instead of serum Hb level .

The most common causes of iron deficiency in premenopausal women include heavy menstrual bleeding (>80 ml per month), use of IUD, and insufficient iron intake⁽¹³⁾, as appear in this study in which 5(83.3%) patients used IUD showed low SFL .It is known that menstruating women using IUD have significant lower SFLs than those without contraception.⁽¹⁴⁾

In the case group (patients with the CTE), the mean SFLs was 17.63ng/ml and p-value was statistically significant (P-value=0.009). This means that there is a strong relation between CTE and low SFLs. This result fully agreed with previous studies^(15,16,17) and provide further evidence that the iron status has to be taken into consideration when studying hair loss in women⁽¹⁸⁾ and contrast with some previous studies where no link between iron deficiency and hair loss was detected.⁽¹⁹⁾This discrepancy could be explained by difference in the design of studies. They did not take into consideration the parameters such as age, Hb, the use of IUD and most previous studies included other types of hair loss in addition to CTE.

The mean SFLs in the control group was 41.23 ng/ml which is higher than the values in case group but still lower than the values obtained (54.9 ng/ml) from another study of mean SFLs in normal women.⁽²⁰⁾This might reflect the prevalent low iron body stores of adult females due to decrease iron intake or increase blood loss during menstruation .

Hemoglobin levels were normally distributed in both groups (the mean Hb levels in case and control groups 12.19 and 12.37g/dl respectively).It is important to note that Hb may be within normal limits in women with iron deficiency and hair loss .This is because decreased iron stores in body will lead to hair shedding before the development of microcytic anemia.⁽⁵⁾

Therefore, measurements of Hb alone can not be identifying patients with decreased iron stores.^(13,21)

It is recommended that Hb measurements should not solely relied on in the assessment iron deficiency in hair loss, as they were not significantly different in this study (P-value =0.311).

CONCLUSION:

we found a statistically significant difference in the mean SFLs between case and serum ferritin control groups (17.63 ng/ml and 41.43ng/ml respectively) suggesting that the decreased SFL was associated with CTE.

Also the present study indicates that in suspected cases with CTE and low iron store ,we should do SFLs and not Hb level because the hair loss begin to appear when the SFLs <40 ng/ml or even < 70 ng/ml⁽¹⁶⁾ while in iron deficiency anemia, Hb begin to decrease when SFLs <15 ng/ml.⁽¹¹⁾

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