The convergence between diagnostic methods in women with non-scarring hair loss

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Background: Hair loss is a major cause of dermatology visits resulting in considerable anxiety and distress for patients. The objective of the current research was to investigate the association among various diagnostic methods related to non-scarring hair loss in women.

Methods: After obtaining the complete history, clinical examination was carried out on women suffering from diffuse nonscaring alopecia. Laboratory tests and histo-pathologic study were conducted for each patient, and ultimately, data were analyzed by SPSS version 16.

Result: Forty-one women were enrolled with the average age of 28.1±8.4 years (16-48). Mean duration of hair loss was 6.2 years (2 months-20 years). The most prevalent type of hair loss was androgenetic alopecia. The sensitivity and specificity with which the clinical examination was done to detect this common ilk of hair loss was 94% and 25%, respectively. No acceptable correlation existed between laboratory test results (such as testosterone, DHEAS, ferritin and TSH) and clinical diagnosis. Data were further assessed through the use of IBM SPSS software version 22 using fisher exact test and Kappa coefficient. The significance level was set at $p<0.05$.

Conclusion: Clinical examination is an accurate approach to diagnosing certain types of non-scarring hair loss in women, eliminating the necessity to perform various endocrinology and laboratory tests; however, it is only through histopathologic studies that an exact diagnosis is specified.

Keywords: Diffuse hair loss, androgenetic alopecia, hormonal profile, histopathology

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INTRODUCTION

Alopecia, or hair loss, is a common complaint and, not infrequently, a prevalent source of distress for patients [1]. Different factors play parts in the diagnosis of the type of hair loss, such as pattern of hair loss (patchy or diffuse), duration of hair loss (acute or chronic), scarring and non-scarring clinical types and inflammation [2]. Blood tests and scalp biopsy are required in certain cases [3,4]. Four main causes of diffuse non-scaring alopecia in adult women are as follows: 1) androgenetic alopecia (Female pattern hair loss), 2) acute and chronic telogen effluvium, 3) diffuse alopecia areata, and 4) loose anagen hair syndrome [5]. Telogen effluvium is a diffuse hair loss type but does not eventuate in complete alopecia [5]. Leading to such type of hair loss are systemic diseases such as hyperthyroidism and hypothyroidism, iron deficiency anemia, autoimmune disease and severe nutritional deficiencies [6,7].

A common type of hair loss, with 50% of men

and women over 40 experiencing it, is androgenic alopecia [4], whose incidence augments in 75% of women following menopause [8]. With around 0.1%-0.2% prevalence estimate, alopecia areata is yet another non-scarring type of hair loss occurring in any part of the body [9] and in any age, particularly ranging from 15 to 30. It is a self-limited disease and patients recover after a few months either with or without treatment [10]. Loose anagen hair syndrome is a hair disorder characterized by anagen hairs of abnormal morphology that are easily and painlessly pulled or plucked from the scalp. Hair is thinned and does not typically grow long [11,12].

The aim of the present study was to research into the correlation between various diagnostic methods of diffuse non-scarring hair loss and clinical diagnosis in women.

MATERIALS AND METHODS

In a prospective study, 41 female patients with signs and symptoms of diffuse non-scaring alopecia were referred to dermatology clinic in Ghaem University hospital and further enrolled. Inclusion criterion was women suffering from diffuse non-scaring alopecia regardless of its duration (acute or chronic) and cause. Informed consent was obtained from all participants. Further conducted was a precise history taking related to common causes of diffuse hair loss including age, family history, past medical history of acute or chronic disease, dieting, recent surgery and physical examinations such as scalp skin pull test, thyroid exam and search for signs of hirsutism. Patients were primarily diagnosed as having one of the four main causes of diffuse non-scaring alopecia.

Then, laboratory tests, including serum total testosterone, Dehydroepiandrosterone sulfate (DHEAS), prolactin, Thyroid-stimulating hormone (TSH), ferritin, and ESR were carried out on all patients. Eight patients did not consent to biopsy, hence the fact that a final 33 patients underwent scalp skin biopsy. All paunch biopsy samples were examined by the same pathologist.

Final diagnosis was done according to the findings of histopathology and lab tests. All data including demographic information, clinical examination and paraclinic study results were collected; subsequently, the agreement between diagnostic methods and clinical diagnosis were statistically assessed via IBM SPSS software version 22 employing fisher exact test and Kappa coefficient. The level of significance was set at $p<0.05$.

RESULTS

Forty-one women were enrolled with the average age of 28.1±8.4 years (range: 16-48), and a mean hair loss duration of 6.2 years (2 months_20 years). Of all the subjects, 46.3% had a positive family history associated with their first degree relatives.

Medical history of women with non-scarring hair loss is illustrated in Table 1.

Such menstrual disorders as oligomenorrhea, menometrorrhagia and hypermenorrhea were found in 31.7 % (13 participants). Most frequent positive points in our patients' past medical history were medical conditions (such as brain tumor, open heart surgery, sinusitis, diabetis mellitus, pelvic fracture and acute blood loss) (22%), recent emotional stress (17%), drug use (7.3%) and low-calorie diet (1.2%). Eight women suffered from hirsutism. ESR was higher than normal in 21.9% of patients (9 women). Physical examination and laboratory results are summarized in Table 2 and Figure 1 demonstrates the final diagnosis of the patients with non-scaring hair loss.

In patients with androgenic alopecia, abnormal testosterone levels were observed in 3 patients, high DHEAS levels were found in 6 patients, and abnormal serum ferritin (normal ranges: 10-291 ng/ml) and TSH levels in 4 patients. There existed no relationship between laboratory tests results, such as testosterone, DHEAS, ferritin and TSH, and clinical diagnosis (Table 3).

The most common type of hair loss was

Table 1. Medical history of women with non-scarring hair loss

Medical Condition	Frequency (%)	Medical Condition	Frequency (%)
Chronic disease	9 (22%)	Recent surgery	5 (12.1%)
Acute blood loss	2 (4.8%)	Pregnancy in the last year	2 (4.8%)
Low calorie diet	5 (1.2%)	Breastfeeding in the last year	4 (9.7%)
Drug usage	3 (7.3%)	Recent stressful condition	7 (17%)

Table 2. Physical examination and laboratory results of women with non-scarring hair loss

Medical Condition	Frequency (%)	Medical Condition	Frequency (%)
Thyoid dysfunction	3 (7.3%)	Microcytic Anemia	5 (12.1%)
High DHEAS level	6 (14.6%)	Acne mild moderate sever	25 (61%) 18 (43.9%) 6 (14.6%) 1 (2.4%)
Positive pull test	2 (4.8%)	Hirsutism	8 (19.5%)
High testosterone level	4 (9.7%)	Low Ferritin level	4 (9.7%)
High prolactin level	4 (9.7%)	High ESR	9 (21.9%)

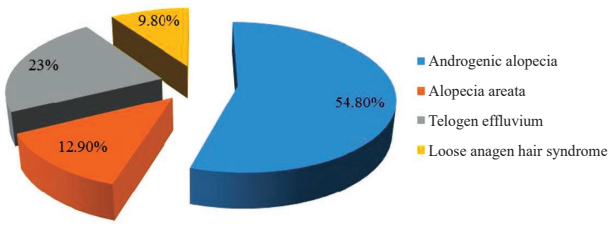

Figure 1. Final diagnosis of non scarring diffuse hair loss in our female patients

androgenetic alopecia. Figure 1 shows the final diagnosis based on histopathology findings. Clinico-pathologic agreement was not statistically significant with a Kappa ratio of 6% (P>0.05) (Table 4).

Sensitivity and specificity of clinical examinations was 94% and 25% for androgenetic alopecia. Positive and negative predictive values of clinical manifestations were 57% and 80%, respectively.

DISCUSSION

In the current study, 46.3% of women with non-scarring hair loss had a positive first-degree family history, which is higher compared with previous reports [12]. This is probably due to the differences in patient selection criteria, and the variety in the ages of the patients. High incidence of positive family history corroborates the fundamental role of genetics as a predisposing factor for hair loss in women. Some studies have revealed that family history affects hair loss severity [13]. Nevertheless, the duration of hair loss plays a more significant role in the severity and expansion of hair loss [14,15].

Table 3. Clinico-laboratory correlation in women with non-scarring hair loss

Laboratory Finding	Clinical Finding Androgenic alopecia			Fisher's exact test
	Yes	No	Total	
Testosterone				
Normal	31 (86.1)	5 (13.9)	36 (100)	0.493
Abnormal	3 (75)	1 (25)	4 (100)	
DHEAS				
Normal	22 (78.6)	6 (21.4)	28 (100)	0.562
Abnormal	6 (100)	0	6 (100)	
TSH				
Normal	24 (89.5)	4 (10.5)	28 (100)	1
Abnormal	1 (100)	0	1 (100)	
Ferritin				
Normal	29 (82.9)	6 (17.1)	35 (100)	1
Abnormal	4 (100)	0	4 (100)	

Table 4. Clinico-pathology correlation in women with non-scarring hair loss

Pathological Finding	Clinical Finding Androgenic alopecia			Kappa
	Yes	No	Total	
Androgenic alopecia				
No	1 (20)	16 (57.1)	17 (100)	K=0.195 P=0.126
Yes	4 (80)	12 (42.9)	16 (100)	

Hair follicle needs iron in anagen phase [6]. There are various reports as to the correlation between iron level and hair loss, particularly prior to menopause. A study by Ruiz-Tovar et al. showed that women with iron deficiency are 4 times more likely to develop hair loss [16].

Certain studies have confirmed the association of low ferritin level with androgenetic hair loss [17]. Kantor et al. demonstrated that serum ferritin is an important and reliable factor for determining the nutritional status of patients [18]. The relationship between serum ferritin levels and hair loss is yet to be proved. For instance, Bregy and colleagues suggested that there is no positive correlation between ferritin and iron levels and hair loss in women [19]. Confirming Bregy, Vujovic reviewed previous studies regarding the role of ferritin in FPHL [20]. These findings are in agreement with the present results.

There exist various theories concerning the role of hormonal levels in FPHL, most of which highlight the fact that hormonal levels are normal in patients [21]. Herskovitz et al., confirming the foregoing fact, point to the changes in the metabolism of FPHL patients [7]. Accordingly, it is not advised to perform extensive endocrinology which is a test for non-scaring hair loss in most women [17]. In the present investigation, most women had normal hormonal test results despite their hair loss. In line with previous studies, no correlation was observed between clinical diagnosis and testosterone, and DHEAS levels.

Hair loss might be associated with TSH level [22-24], as there is some evidence pointing to the direct effect of TSH on hair follicles, particularly in women [23]. Chu confirmed this association in alopecia areata [25], which was not proved in the present study, probably owing to the small sample size.

In contrast to our study, Vujovic claims that scalp biopsy is not required in most cases [20]. Sensitivity and specificity of clinical examination was 94% and 25% for androgenetic alopecia in the present research. Positive and negative predictive values of clinical manifestations were 57% and 80%, respectively. This means that, because clinical examinations have a low specificity, histopathologic studies are not conducive to ruling out other differential diagnoses, particularly in cases where a definite diagnosis is required.

This study revealed that although detailed clinical examination conduces to the diagnosis of the type of hair loss in women with non-scarring diffuse alopecia, in certain cases, histopathology studies might be considered useful for specifying the exact diagnosis. Laboratory tests are not necessary in any cases of hair loss.

CONCLUSION

Clinical examination is an accurate approach to diagnosing certain types of non-scarring hair loss in women, eliminating the necessity to perform various endocrinology and laboratory tests; however, it is only through histopathologic studies that an exact diagnosis is specified.

Conflict of Interest: None declared.

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